SWEDISH FUNDS-IN-TRUST
FAO/TF/RAS 40 (SWE)
IOFC/DEV/78/44.2

indian ocean fishery commission
INDIAN OCEAN PROGRAMME

project for the development of small-scale fisheries in the bay of bengal - preparatory phase

volume 2: working papers

UNITED NATIONS DEVELOPMENT PROGRAMME

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

Development Report No. 44, Volume 2

PROJECT FOR DEVELOPMENT OF SMALL-SCALE FISHERIES IN THE BAY OF BENGAL - PREPARATORY PHASE

VOLUME 2: WORKING PAPERS

SWEDISH FUNDS-IN-TRUST
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
UNITED NATIONS DEVELOPMENT PROGRAMME

Rome, June 1978

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

PREPARATION OF THIS DOCUMENT

This report contains papers describing the marine small-scale fisheries in Bangladesh, India and Sri Lanka, prepared in close collaboration with the Fisheries Administration of the respective countries and is based on information gathered during country visits by the project staff.

Volume 1 of the report includes the final project request and reports of the Advisory Committee meetings held during the preparatory phase.

Distribution

Member States of IOP
Contributing Institutions
SIDA
UNDP
FAO Regional Fishery Officer
FAO Department of Fisheries

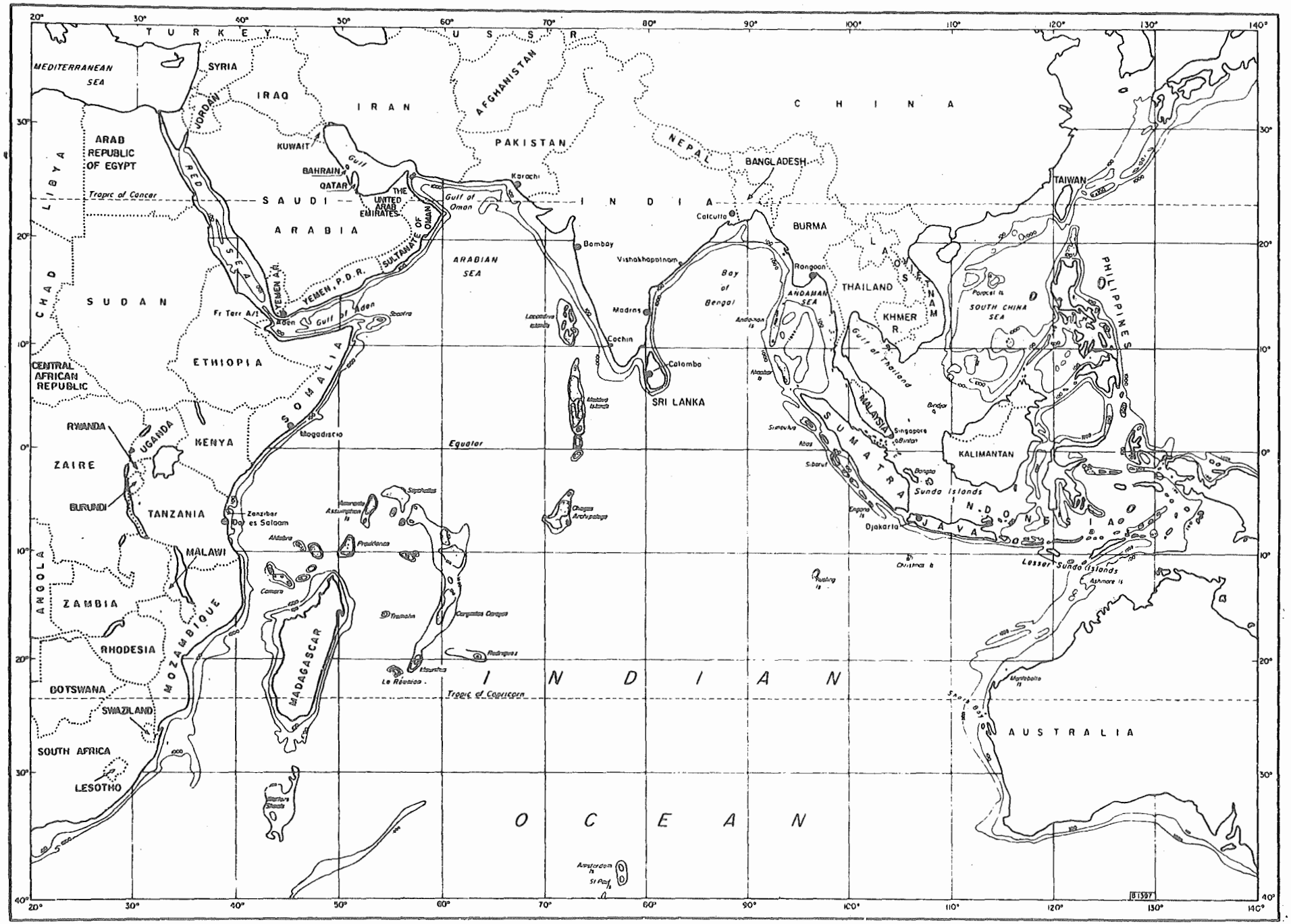
Bibliographic Entry:

Project for Development of Small-Scale Fisheries in the Bay of Bengal (1978)
Dev. Rep. Indian Ocean Programme, (44)Vol.2: pag.var.
Project for Development of Small-Scale Fisheries in the Bay of Bengal - Preparatory Phase. Volume 2. Working Papers
Artisanal fishing. Fishery development. Fishery surveys. Stock assessment. Marine fisheries. Fishery resources. Fishing vessels. Trawling. Marketing. Processing fishery products. Fishing gear. Historical accounts. Indian Ocean. Bangladesh. India. Sri Lanka.

THE INDIAN OCEAN PROGRAMME

The International Indian Ocean Fishery Survey and Development Programme, or Indian Ocean Programme for convenience, was formally conceived by the Indian Ocean Fishery Commission and its activities are conducted through that body. The Programme is supported by the UNDP and is being carried out by the FAO Department of Fisheries. Put simply, the objective of the Programme is fishery development in the Indian Ocean region.

H.C. Winsor
Programme Leader


MEDITERRANEAN SEA
TURKEY
SYRIA
IRAQ
IRAN
U S S R
AFGHANISTAN
C H I N A
JORDAN
LIBYA
ARAB REPUBLIC OF EGYPT
KUWAIT
Gulf
PAKISTAN
NEPAL
BANGLADESH
BAHRAIN
QATAR
THE UNITED ARAB EMIRATES
Karachi
Tropic of Cancer
S A U D I
A R A B I A
Gulf of Oman
I N D I A
Calcutta
TAIWAN
BURMA
SULTANATE OF OMAN
RED SEA
Bombay
Vishakhapatnam
ARABIAN SEA
Bay of Bengal
Rangoon
PHILIPPINES
CHAD
YEMEN A.R.
YEMEN, P.D.R.
THAILAND
L A O S
V I E T N A M
KHMER R.
SUDAN
Fr Terr A/I
Aden
Gulf of Aden
Socotra
Laccadive Islands
Madras
Cochin
Andaman Is
ANDAMAN SEA
Gulf of Thailand
Paracel Is
SOUTH CHINA SEA
ETHIOPIA
SOMALIA
Colombo
SRI LANKA
Maldive Islands
CENTRAL AFRICAN REPUBLIC
RWANDA
UGANDA
KENYA
Mogadiscio
Equator
Singapore
MALAYSIA
Sabang
Belitung
KALIMANTAN
ZAIRE
BURUNDI
TANZANIA
Zanzibar
Dar es Salaam
Seychelles
Amirantes
Aldabra
Providence
Chagos Archipelago
Banka
Sunda Islands
I N D O N E S I A
Djakarta
J A V A
MALAWI
ANGOLA
ZAMBIA
Comoro
Mayotte
Comoro Archipelago
Christmas Is
Lesser Sunda Islands
Ashmore Is
MOZAMBIQUE
RHODESIA
MADAGASCAR
Reunion
Rodrigues
BOTSWANA
Tropic of Capricorn
I N D I A N
SWAZILAND
SOUTH AFRICA
LESOTHO
Le Réunion
Mauritius
Shoals
AUSTRALIA
Montebello Is
O C E A N
Amsterdam Is
St Paul Is
B1597
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°

REPORT ON THE PREPARATORY PHASE OF THE PROJECT FOR DEVELOPMENT OF SMALL-SCALE FISHERIES IN THE BAY OF BENGAL

PREFACE

This document is PART 2 of the Report on the preparatory phase of the project for the Development of Small-Scale Fisheries in the Bay of Bengal, and contains working papers which describe the marine small-scale fisheries and their problems and needs in the countries and states bordering the western Bay of Bengal.

Volume I of the report documents briefly the work undertaken, the final project request and reports of the Advisory Committee Meeting held during the preparatory phase.

The working papers are based on information gathered during visits to fisheries institutions and to fishing centres and villages along the coasts.

An attempt was made to present the main characteristics of the marine small-scale fisheries in a brief and factual form and to highlight constraints and problems in the sector for identification of needs for support and remedies to accelerate development. Although the papers are believed to give a fair account of the situation, they should not be considered as final reports but as actual working papers for further elaboration in order more fully to describe the sector and to penetrate its problems and needs.

The preparation of the papers was undertaken by the FAO/UNDP project for Development of Small-Scale Fisheries in Southwest Asia, RAS/74/031, based in Colombo, in close collaboration with the Fisheries Administrations in the countries and states concerned. Most of the work was undertaken during December 1976 and the first half of 1977. The papers describe the situation at that time and do not record changes which have taken place in the period between completion of the work and preparation of this report.

The views expressed in the papers are those of the officers participating in the surveys and do not necessarily represent the official view of the Governments or of the Food and Agriculture Organization of the United Nations.

CONTENTS

Bangladesh

WP/3 General Description of Marine Small-Scale Fisheries RAS/74/031 - Working Paper No.3 (Rev. 1), 1977.

WP/11 Assessment of Problems and Needs in Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.11, 1977.

India - West Bengal

WP/9 General Description of Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.9, 1977.

WP/10 Assessment of Problems and Needs in Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.10, 1977.

Orissa

WP/7 General Description of Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.7, 1977.

WP/8 Assessment of Problems and Needs in Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.8, 1977.

Andhra Pradesh

WP/13 General Description of Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.13, 1977.

WP/14 Assessment of Problems and Needs in Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.14, 1977.

Tamil Nadu

WP/12 General Description of Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.12 (Rev. 1), 1977.

WP/15 Assessment of Problems and Needs in Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.15, 1977.

Sri Lanka

WP/1 General Description of Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.1 (Rev. 1), 1977.

WP/6 Assessment of Problems and Needs in Marine Small-Scale Fisheries, RAS/74/031 - Working Paper No.6, 1977.

General Description of Marine Small-Scale Fisheries

BANGLADESH

Prepared by
M.A. Karim, Chief Fisheries Section, Planning Commission, Bangladesh
and
Revised by RAS/74/031

Development of Small-Scale Fisheries in Southwest Asia, Colombo, June 1977.

CONTENTS

		Page No.
1.	Country Data	1
2.	Introduction	3
3.	Brief History	3
4.	Fisheries Administration	4
5.	Specialized Institutions	5
6.	Corporations	7
7.	Cooperatives	8
8.	Fishery Resources	9
9.	Production	10
10.	Craft and Gear	10
11.	Landing Centres	11
12.	Handling and Processing	12
13.	Marketing and Distribution	13
14.	Export and Import	14
15.	Ancillary Industries	15
16.	Socio-Economics	15
17.	Government Policy	16
18.	Development Plans	16
19.	Bibliography	18

Appendices

1.1	Map of Bangladesh	19
4.1	Fisheries in the Government Administration	20
8.1	Trawl Catch-Distribution of Fish off the Coast of Bangladesh.	21
9.1	Important commercial marine fish and shrimp species	22
10.1	Fishing craft and gear used in estuarine and coastal fishing	23
12.1	Existing and planned ice making and cold storage facilities in the coastal districts	24
12.2	Fish Processing Facilities	25
16.1	Fishermen and fishing households in the coastal districts (1967/68)	26
18.1	Fisheries Projects in Bangladesh receiving external support	27

Currency

Tk. 1 = $ .065

US$ 1 = Tk 15.4

1 COUNTRY DATA

1.1 Location	At the northern end of the Bay of Bengal with coastal borders with India in the west and Burma in the south east.	
	Latitudes $20^{\circ}30'$ N - $26^{\circ}45'$ N Longitudes $88^{\circ}0'$ E - $92^{\circ}56'$ E	
	(Map in Appendix 1.1)	
1.2 Size	Area (km^2):	141,131
	Coastline (km):	480
	Continental shelf to 200 m (km^2):	60,000
1.3 Population (1974)	Total (million):	76
	Density (nos/km^2):	540
	Birth rate (%):	4.6
	Death rate (%):	1.7
	Growth rate (%):	2.9
1.4 Education (1973)	Adult literacy rate (%):	23
	Primary school enrolment (%):	56
1.5 Health (1973)	Population per physician	10,000
	Population per hospital bed	7,000
1.6 Nutrition (1973)	Calorie intake in % of requirement	54
	Per capita-protein intake (gr/day):	40
	Per capita animal protein intake (gr/day):	7.5
	% of animal protein intake consisting of fish:	87
1.7 Employment (1973)	Labour force (millions):	26
	Agriculture (%):	78
	Industries + Services (%):	22
1.8 Gross National Product (1972/73 constant prices at factor costs)	Total (million Tk)	55648
	Per capita (Tk)	
	Annual rate (1965 - 1973) of growth (real) of GNP per capita	1.6
1.9 Trade (1975/76)		
Exports (%)	Jute	31
	Jute goods	50
	Leather	8
	Tea	5
	Shrimp, Fish and Froglegs	3
	Others	3
Imports (%)	Food	31
	Investment goods	19
	Petroleum	11
	Fertilizer	5
	Cotton, Cotton textiles etc.	7
	Others	27
Trade Balance (million Tk)	Export (fob)	5540
	Import (cif)	18200
	Trade balance	-12660

1.10 Prices (1975/76) General price index (1969/70 = 100) 380.2

1.11 Administration

Bangladesh is divided into 19 civil Districts, grouped into 4 administrative divisions as follows :-

Divisions	Districts
Rajshahi (north-west)	Dinajpur, Rangpur, Bogra, Rajshahi and Pabna.
Dacca (centre)	Mymensingh, Tangail, Dacca and Faridpur.
Khulna (south-west)	Kushtia, Jessore, Khulna, Barisal and Patuakhali.
Chittagong (east)	Sylhet, Comilla, Noakhali, Chittagong and Chittagong Hill Tracts.

(Coastal districts are underlined).

The districts are divided into Sub-Divisions which are divided into Thanas (Police Stations): each thana consists of Unions which are the smallest administrative units. There are 62 Sub-Divisions in the country, about 450 Thanas, about 4,500 Unions and about 65,000 villages.

2 INTRODUCTION

Nearly all fishing in Bangladesh consists of small-scale fishery activities.

The fisheries sector (inland and marine) contributes about 5% to the national economy. The inland sector is the most important one but marine fisheries are increasing and has a good potential for further expansion.

This paper deals primarily with the small-scale fisheries of the five coastal districts viz: Chittagong Noakhali, Barisal, Patuakhali and Khulna, including the estuarine fisheries of these districts and of the contiguous sea.

The fisheries of these waters play an important role in providing animal protein. About 95% of the estimated total marine landings of 100,000 tonne of fish per year refers to the efforts of small-scale fishermen. In addition, the rich estuarine fisheries resources are harvested by this category of fishermen. The delta region is regarded as the most fertile fishing ground in the open inland waters of the country but the actual magnitude of the estuarine catch is not known.

The small-scale fishery is an important source of employment. A survey undertaken in 1974/75 identified 149,000 fishing families in which there were 156,000 persons engaged in wholetime fishing and a further 92,000 persons engaged in part-time fishing and ancillary activities.

High value fishery products such as prawns are being exported and yielded about US $ 10 million in 1976/77.

There are good prospects for an expanded marine small-scale fishing industry and, given additional state support, the coastal fishermen can play a more important role than hitherto in harvesting the untapped marine fisheries resources.

3 BRIEF HISTORY

The history of the fisheries of Bangladesh is not well documented because of the scarcity of statistics and other quantitative information.

Until early mid-sixties, very little effort was made to upgrade the traditional fisheries and to develop the industry.

At that time, the nylon nets were introduced and the motorization of indigenous craft was started, which boosted the marine production. It is estimated that it has doubled since 1962 from about 50,000 tonne to the present 100,000 tonne. Since 1965/66, about 1,200 units of traditional craft have been motorized.

After the creation of Bangladesh (1971) the introduction of new, locally built, coastal fishing boats and of imported larger trawlers has been accelerated.

The export of fishery products was in the mid-sixties an important trade and was the biggest foreign exchange earner after jute. The fish export declined during the subsequent political conflicts and is now negligible. However, the export of frozen prawns (and froglegs) has recently shown a sharp increase.

The development of the Bangladesh fisheries is hampered by unfortunate climatic and topographic conditions. The history is full of small and large tragedies caused by cyclones and floods. In the 1970 disaster, thousands of fishermen were drowned and thousands of boats with equipment were lost and houses and other facilities were damaged or washed away.

4 FISHERIES ADMINISTRATION

Fisheries administration and management in Bangladesh is characterized by multiple control (ref. Appendix 4.1), though the main responsibility rests with the Ministry of Fisheries and Livestock, headed by a Presidential Adviser (comparable to Minister*).

The chief public sector agencies involved in the implementation of fisheries development activities are the Fisheries Department and the Bangladesh Fisheries Development Corporation (BFDC) both of which are under the direct control of the Ministry of Fisheries and Livestock.

Other Government and cooperative agencies directly connected with fisheries development are: (i) the Cooperative Department, (ii) the Integrated Rural Development Programme (IRDP), and (iii) the Revenue Department, all of which form part of Divisions of the Ministry of Local Government, Rural Development, Cooperatives, Land Administration and Land Reform, (iv) Bangladesh Sugar and Food Industries Corporation (BSFIC) of the Ministry of Industries and (v) Bangladesh Jatiya Matshyajibi Samabaya Samity Ltd., (BJMSS), a cooperative organization working under the direct supervision of the Cooperative Department.

For overall planning there is a Fisheries Section in the Planning Commission.

The Fisheries Department was established in 1943. The main functions of the Department are research, extension, training, administration, fishermen's welfare, promotion of fisheries development, legislation, licensing and certification. The major tasks presently executed by the Department relate to inventories of inland fisheries resources, production oriented research and to reclamation of Government derelict ponds and other enclosed water bodies for fish culture. Other important activities are extension work and training of inland fisheries personnel. The Department has a marine fisheries department based in Chittagong.

Taka 212.95 million, with a foreign exchange component of Taka 48.6 million, has been tentatively earmarked for development projects of the Fisheries Department for the period 1972/73 to 1977/78. The annual development programme for 1976/77 provides Taka 68.5 million, of which about 50% will be invested for collecting essential basic information regarding resources and for production oriented research. About 40% of the programme allocation will be invested for reclamation and development of derelict waters for fish production. Out of the total programme provision for 1976/77, Tk.42.32 million will be used for capital expenditure and Tk.26.25 million for revenue expenditure. A separate non-development budget amounts to Tk 12 million.

The department employs 208 officers and 1,224 other staff.

The Bangladesh Fisheries Development Corporation (BFDC) (see chapter 6).

The Cooperative Department is responsible for organizing fishermen into cooperatives and for registration of Cooperative Societies. The apex Cooperative Society (BJMSS) works under the direct supervision of the Cooperative Department and will be dealt with in Chapter 7. The Cooperative Department is also responsible for organizing and registering all other cooperatives, including agriculture cooperatives and weavers' cooperatives. The Local Government, Rural Development and Cooperative Division itself has launched a fish culture scheme in the rural areas through a "Works Programme".

The Revenue Department controls all waters not privately owned and leases, generally on a short term basis, exclusive exploitation rights of unit areas by auction. In recent times, this Department has also been involved in fish culture in Government owned ponds in technical and organizational cooperation with the Fisheries Department, and the Local Government, Rural Development and Cooperative Division.

The Bangladesh Sugar and Food Industries Corporation (BSFIC) owns and operates fish processing plants and exports fish, shrimps and froglegs.

---

* Fisheries and Livestock was until late 1977 a Division of the Ministry of Agriculture.

5 SPECIALIZED INSTITUTIONS

5.1 Research and Development Institutes.

5.1.1 Marine Biological Laboratory

The establishment of a Marine Biological Laboratory of the Fisheries Department was started in 1968, but not yet completed; it is located at Cox's Bazaar. At present (1977) there is only one biologist posted at the laboratory. The laboratory has a 22 m research vessel, currently under repair of damages incurred during the war of liberation (1971).

5.1.2 Fisheries Technological Research Station (FTRS).

Established in 1947, and originally located at Comilla, the FTRS of the Fisheries Department was shifted to its present position at Chandpur as part of the Fisheries Campus in the years 1960 to 1965. Since its inception, improvement of facilities and strengthening of manpower have been approved by the Government on several occasions. The expenditure of the research station is met from the non-development budget of the Department.

Initially, the station engaged itself in devising processes for refinement of shark liver oil for medicinal use, manufacture of fishmeal for poultry feed, use of fish manures for soil fertilization, preparation of adhesive gum from fish scales and manufacture of printers' ink from fish oil on a semi-commercial basis. Subsequently, with the establishment of BFDC in 1965, the responsibility for production of processed fish and fish products was taken up by the corporation leaving FTRS with research functions only.

FTRS has a cadre of 16 professional officers and other supporting staff; 6 posts are vacant(1977).

It has five Divisions, viz: (i) Fish handling, Processing and Bacteriology, (ii) Oil, (iii) Biochemics and Nutrition, (iv) Fish by-products and (v) Gear and Craft. Current activities relate to preservation of Hilsa by means of ice, improvement of sun-drying methods by salting, study of the seasonal variation of Hilsa in respect of fat, protein, ash and moisture content and studies of shark-liver oil emulsion.

The performance of the station is not entirely satisfactory. The Government is making efforts to improve the activities of FTRS by appointing more qualified and experienced personnel creating better job opportunities and making available necessary equipment and expertise. UNDP has indicated an offer of technical assistance to the Research Station.

5.1.3 Fresh Water Fisheries Research Station (FTRS).

A scheme for establishment of FTRS at Chandpur was approved by the Government in 1961/62, with the objective to study various aspects of fish farming. The scheme was revised one year later to include an investigation of the biology of Hilsa.

This was in operation for five years and in 1966/67 a scheme for expansion of FTRS, at an estimated cost of Tk. 2.96 million, was sanctioned by the Government with the following objectives :-

> (a) Hydrographic mapping of open waters, (b) Mapping of fishing grounds and banks for commercially important fish species, (c) Estimation of size and composition of available stocks of different species, (d) Study of the dynamics of the fish populations, (e) Study of the behaviour, movement, migration, etc., of the population, (f) Estimation of rates of recruitment, mortality etc., and other population characteristics with a view to achieve maximum equilibrium yield from the fisheries of the country.

The station has 37 experimental ponds covering a total area of 10.5 ha and 35 cisterns. The ponds depend solely on rain for water supply. A 21 m steel-hulled research vessel donated by DANIDA has been available since 1975 for conducting riverine research but has not been used as yet.

The staff of FFRS consists of 29 professionals and 150 supporting staff.

The expenditure of FFRS is met from the non-development budget of the Fisheries Department.

5.2 Training Institutes.

5.2.1 Marine Fisheries Training Centre (MFTC).

With a view to create a cadre of qualified skippers, marine engineers and other crew for operation of existing and planned trawlers for exploitation of the marine fisheries resources, the BFDC established a training centre at Chittagong Fish Harbour with USSR assistance in 1973/74, at a cost of Tk. 13.81 million with a foreign exchange component of Tk. 4.9 million.

The objectives of the Centre are to impart training in the following fields: (a) Navigation, (b) Marine Engineering, (c) Electrical Engineering, (d) Refrigeration Engineering, (e) Radio Engineering and Operation, (f) Trawl Operation and Care, (g) Fish Processing and, (h) Boatswain Duties.

In 1973/74, short courses of one year or less were conducted for pre-qualified in-service personnel and 11 navigators, 13 marine engineers, 6 radio specialists, 6 fish processing technicians, 3 trawl operators, 8 refrigeration technicians and 4 boatswains were trained; they are now working on board trawlers. During the period 1974/75 to 1975/76, 37 cadets for training in navigation, 43 in marine engineering, 11 in refrigeration engineering, 11 in electrical engineering, 19 in fish processing and 15 in trawl operation were recruited. 27 cadets have been trained in the USSR.

The duration of the course for navigation and marine engineering is $2\frac{1}{2}$ years, while that of other disciplines is 1 year.

Eight instructors and eight interpreters from the USSR worked in the Fisheries Training Centre from 1973 to 1976. Since no local counterparts could be trained in the required fields, the repatriation of these instructors has created a vacuum in the training programme. Attempts are being made to recruit instructors within the country.

5.2.2 Vocational Training Centres (VTC).

Four vocational training centres were established in 1961/62 by the Fisheries Department at Sirajganj (Pubna) Kuliarchar (Mymensingh), Chandpur (Comilla) and Kashipur (Barisal). Their purpose was to provide selected fishermen with on-the-job training in operation and maintenance of mechanized craft, use of modern fishing gear, use of sonic devices for fish detection and location, fish behaviour, modern methods of handling and preservation of fish, etc. It was expected that BFDC, BJMSS and private fishing enterprises would employ the trained personnel. To date, about 800 persons have been trained.

The recurrent expenditure for these centres is Tk. 60,000 which is met from the regular budget of the Department. Present staff consists of 4 professional officers and 15 supporting staff.

5.2.3 Inland Fisheries Training Centre (IFTC).

The IFTC was established in 1960/61 and was originally located in Dacca but later shifted to the Chandpur Fishery Campus. It was established with the objective of imparting pre-service training to under-graduate and graduate students with a view to appoint them to suitable posts in the Fisheries Department. With the establishment of a Fisheries Faculty at the Bangladesh Agricultural University, Mymensingh, the graduate training programme was discontinued in 1967. IFTC now conducts an in-service training programme which provides refresher courses to officers of the Fisheries Department to enable them to extend fish culture techniques and to follow the development of fisheries management and administration.

IFTC has 10 professional posts (5 vacant) and 25 supporting staff.

The scheme is being revised to make the training more practically oriented and to suit the present and future needs of the country. FAO/NORAD has provided technical assistance in support of the centre. Since August 1976, a programme to expand the training of extension workers in the fields of fresh water fisheries and marine fisheries has been formulated.

5.3 Educational Institutions.

Three Universities cater for fisheries education at degree level. These are: University of Dacca, University of Chittagong and the Bangladesh Agricultural University, Mymensingh.

The Department of Zoology, Dacca University, offers a Master's Degree in Zoology with specialization in several subjects, one of which is fisheries.

The Department of Marine Biology, University of Chittagong has been recently instituted and is providing graduate level education and training in various aspects of marine fisheries, such as shrimp biology and culture, fish taxonomy and marine ecology.

The Bangladesh Agricultural University, Mymensingh, has a full-fledged Faculty of Fisheries which was instituted in 1967/68. The faculty has three Departments: (a) Fisheries Biology and Limnology, (b) Aquaculture and Management and (c) Fisheries Technology and offers B.Sc. (Hons) and M.Sc. Degrees in fisheries. It has currently an enrolment of about 300 students. To date (1976) 40 students have been graduated. The faculty does not have sufficient accommodation for class room and laboratory use but a new faculty building is under construction. Several ponds of various shapes and sizes are at the disposal of the faculty and an elaborate experimental pond complex is planned within the university campus under a project of the Fisheries Department. (Assistance may be available from DANIDA and UNDP for implementation of the project).

6 CORPORATIONS

The Bangladesh Fisheries Development Corporation (BFDC) was established in June 1964. In terms of the most recent Act (1973), the functions of the Corporation are: (a) To take measures for the development of fisheries and the fishing industry; (b) To establish units for capture of fish and promote a better organization for exploitation of fish wealth; (c) To establish fishing industries; (d) To acquire, hold or dispose of fishing boats, fish carriers, road river transports and all equipment and accessories necessary in connection with development of the fishing industry; (e) To establish units for preservation, processing, distribution and marketing of fish and fish-products; (f) To advance loans to fishing industries and to fishermen's cooperative societies; (g) To encourage establishment of fishermen's cooperative societies; (h) To undertake survey and investigation of fish resources; (i) To establish institutes or make arrangements for training and research in the methods of catching, processing, transport, preservation and marketing of fish; (j) To set up organization for export of fish and fish-products.

BFDC operates a fishery harbour at Chittagong constructed by assistance from Japan, at a total cost of about Tk. 48 million; the construction was completed in 1971. The harbour has a basin area of 2.5 ha, a wharf of 65 m, a slipway for 33m (250 tonne) vessels, auction hall, workshop, ice plant, cold storage and processing facilities. The harbour campus also accommodates training facilities (MFTC) and a boat building yard. Heavy siltation of the harbour basin and its mouth are causing serious and continuous problems.

BFDC has a fleet of 14 large trawlers which landed merely about 1,000 tonne in 1975/76.

BFDC has distributed 225 outboard engines and 33 inboard engines to small-scale fishermen to encourage mechanization of country fishing craft. The Corporation intends to procure and distribute about 500 mechanized boats with inboard engines (14.5 hp) to small-scale fishermen on hire purchase or cash payment basis (DANIDA scheme) by 1977/78.

BFDC has established 3 wholesale fish markets - one at Cox's Bazaar, one at Khulna and one at Dacca. Fish is also marketed wholesale at Chittagong Fish Harbour. Nine temporary retail shops, 7 at Chittagong and 2 at Khulna, are in operation on a trial basis, for sale of frozen marine fish. Under an ongoing marketing and distribution scheme the Corporation intends to establish landing facilities, ice plants and cold storages in Galachipa (Patuakhali) and Hatiya (Chittagong). In order to provide marketing facilities for the Sunderban estuarine area a refrigeration complex is under construction at Mongla.

BFDC has at present 4 insulated trucks and 1 refrigerated van for transport of marine fish landed at Chittagong and Khulna. These vehicles are also used for carrying freshwater fish landed elsewhere.

BFDC sometimes uses its trawlers for carrying fish to Dacca. The corporation plans to import 2 carrier vessels and 4 vans through an Asian Development Bank Loan.

A small fish processing complex with facilities for manufacturing of fishmeal, extraction of shark liver oil and fish drying has been in operation at Cox's Bazaar since 1966/67.

There is a workshop for servicing and repairing outboard engines at Cox's Bazaar.

BFDC has a net factory at Comilla.

The annual development budget for BFDC (1976/77) is Tk. 91.42 million with a foreign exchange component of Tk. 31.5 million. Of this amount, Tk. 73.27 million has been earmarked for capital expenditure and the balance for revenue expenditure. The Corporation has a non-development budget of Tk. 13.32 million.

The Government has recently formed a Committee to look into the operations of the Corporation to suggest ways and means to improve its efficiency.

7 COOPERATIVES

Records show that there were about 120 fishermen's cooperatives in Bangladesh at the partition in 1947. Cooperative societies remained largely neglected and uncared for until 1960. In that year an effort was made to organize them into meaningful and functional cooperatives by the establishment of an apex Cooperative organization - the Provincial Fishermen's Cooperative Society, now known as Bangladesh Jatiya Matshyajibi Samabaya Samity (BJMSS).

The objectives of BJMSS are (i) to improve socio-economic conditions of fishermen and encourage thrift, self-help and mutual cooperation; (ii) to procure and supply fishing inputs to the fishermen at reasonable prices; (iii) to issue loans to the affliated societies for financing their members; (iv) to introduce innovations and mechanized techniques in fishing; (v) to set-up ice plants, cold storages, workshops, net making machines; (vi) to arrange marketing of fish and set up fish processing units for exporting fish and fish products.

The cooperatives are organized in terms of the traditional three tier pyramidal structure - primary, central and apex. There is one national society (apex), 80 central societies and 3885 primary societies. The total individual membership of the primary societies stands at 376,879.

BJMSS employs a staff of 200 persons at a monthly cost of Tk. 90,000 on salaries, excluding provident fund and other facilities. The staff consists of executive and administrative officers, accountants, supervisors, engineers, mechanics and supporting staff.

The supply and service programme forms the major function of the apex society. BJMSS imports fishing materials for their members, exempt from all taxes and duties. It has imported nylon rope, marine diesel engines, floats, etc., worth Tk. 50 million since 1972.

BJMSS has imported 1604 marine engines for motorization of boats and has installed several ice plants freezing plants and cold storages at landing centres in the coastal area. It has also established workshop facilities, a net making factory, a ferro-cement boatyard and wholesale marketing facilities in the coastal districts.

Other activities besides fishing are processing at one centre (Chittagong) and export of frozen fish, shrimp and froglegs. Exports of shrimps by the National Society were worth Tk. 12.5 million in 1976/77.

The regular source of finance for BJMSS consists of share capital and savings. The share capital and savings contributed from 1960/61 to 1970/71 by the various tiers is as follows :-

Table 7.1 Share Capital and Savings of BJMSS.

Societies	Share capital (Million Tk.)	Savings (Million Tk.)
A. Primary	2.92	1.86
B. Central	0.36	0.15
C. Apex	0.47	1.73

BJMSS obtains loans from the Government and from the Bangladesh Bank on 100% Guarantee by the Government. A total amount of Tk. 31.41 million was received to cover losses in the period 1961/62 to 1975/76.

A "Depth Scheme for Development of Fishermen Cooperatives" has been sanctioned recently. The total cost is estimated at Tk.90 million. The scheme envisages the establishment of 9 ice plants, one freezing plant, the issue of 425 mechanized boats, 750 country boats and 30 carriers. Furthermore, a net making factory, a workshop and training and transport facilities will be included in the scheme.

8 FISHERY RESOURCES

The total area of the inland and estuarine waters of Bangladesh is about 60,000 km^2, of which about 43,000 km^2 have potential for fish production.

The Continental shelf area is about 60,000 km^2 of which 37,000 km^2 is no deeper than 50 m.

The estuaries as well as the continental shelf area are rich in fish, shell-fish and other aquatic organisms. Several surveys have been conducted to estimate the resource potential of the Bay of Bengal. The most comprehensive of these was the UNSF/PAK - 22 Project conducted by Bangladesh Fisheries Development Corporation in collaboration with FAO. The survey covered about 26,000 km^2, mostly north of latitude 20° 40'N.

As a result of this survey three major fishing grounds, "South Patches" 6,200 km^2, "Middle Ground" 4,600 km^2 and "Swatch of No Ground" 3,800 km^2 were charted (Appendix 8.1). According to this survey, a minimum sustainable yield of 57,000 tonne of fish per year is available for exploitation. This would be in addition to the present landings of marine fish of about 100,000 tonne per annum. The estimate has been made without taking into consideration potential catch of shrimps and pelagic fish.

From results of various surveys it has been estimated that the standing stock of shrimps is about 9,000 tonne.

There is a largely untapped resource of pelagic fish in the Bay of Bengal. Some estimates indicate a potential of the order of 200,000 tonne but no proper assessments have been made.

Seasonal, climatic and oceanographic variations are determined by the monsoon periods which largely influence the present fisheries. The peak season is during the fair weather period i.e. from November to March. During the rest of the year, there is practically no fishing activity in the open sea and the availability of fish is largely unknown.

9 PRODUCTION

Real statistics of fish production in Bangladesh are not available; fishing activity is extremely scattered and varied; there is no built-in system for recording catches; the importance of statistics is inadequately appreciated. Estimates of fish production are still based on the findings of a nutrition survey carried out as far back as in 1962. One then arrived at a total consumption of some 640,000 tonne per annum (11 kg/person). The survey indicated that the marine production was about 50,000 tonne.

A combination of events including over-exploitation of certain resources and other injudicious fishing practices, conflicts about resource-use, socio-economic trends, ravages of the repeated cyclones and of the liberation war etc., suggests that the total output of fish has either declined, or at best, remained static since 1962. Marine landings however, are estimated to have increased about two-fold. A survey (1972) estimated the marine fish catch (excluding the estuarine catch) at about 100,000 tonne. The district of Chittagong contributed most to the marine catch accounting for 70% of the total. Noakhali, Barisal, Patuakhali and Khulna contributed 5%, 9%, 13% and 3% respectively.

Nearly the entire marine catch is harvested from near-shore waters by small-scale fishermen, many of them fishing without boats. Small quantities are harvested from the deeper waters by trawlers operated by BFDC.

The set bag net is the most important fishing gear yielding more than 42% of the total marine catch. Set and drift gill nets were responsible for 33% while seine nets, long lines and cast-nets yielded 7%, 6% and 6% respectively.

A quantitative species composition of the catch is not available but the important species are listed in Appendix 9.1. As is generally the case in tropical waters, the catch includes a large number of species, none of which forms a predominant group.

Marine fishing generally starts in October and continues till April. Monthly catch statistics are not available, but the months of December and January show the highest marine landings.

10 CRAFT AND GEAR

A survey carried out in 1969 indicated that about 9,500 craft were employed in the marine fisheries; about 2,200 were simple dugout canoes and the others planked vessels of different types. Only 41 were then powered. (See Appendix 10.1). Motorization of country boats became popular in the mid-sixties and by 1974/75 nearly 1,200 mechanized boats were used in estuarine and marine fishing.

Three principal types of traditional fishing craft are used in the brackish and marine waters of Bangladesh. The type employed in marine waters i.e. the Balam is exclusively for these waters; similarly, those used in brackish waters i.e. the Dinghi and Chandhi are not used in marine waters.

(a) Dinghi: A plank built shallow boat about 7 m long, 1.2 m wide, and 0.9 m deep with pointed bow and stern. There are ribs and cross-beams to strengthen the hull. They are made of shal, teak and jarul varieties of locally available wood. The decking consists of detachable half split bamboo. They are propelled by long oars and/or by a thin cloth or plastic sail mounted on a bamboo mast. A dinghi costs about Tk 2000. It is operated by 2 - 3 persons.

(b) Chandhi: This boat is also a plank built of upto 15 m length, 3 m beam, and 1 m depth and has a stern slightly higher than the bow. Part of the vessel is decked with planks; the rest may be decked with split bamboo. These vessels carry 3 to 7 pairs of long thin bamboo oars with wooden blades. The mast is far forward and carries usually a square sail. It is constructed by the same types of woods as the dinghi. It carries a crew of 7 to 15 people.

(c) Balam: The hull is a dugout. The bow and the stern are slightly raised. The sides are built up by fitting planks to the dugout. These planks are tied with "rattan" and made watertight by plugging the joints with weeds; this is renewed every year. A small balam has no deck or hood. The bamboo mast carries a square sail. The large balam is 15 - 20 m long, the medium size 10 - 15 m. These boats are used by the Chittagong fishermen and operated in the open sea off Cox's Bazaar and Dubla island. The prices are Tk. 5,000 - 8,000 for a large balam and Tk. 4,000 - 5,000 for the medium size. The crew is 20 - 30 (large) or 10 - 13 (medium)

(d) Motorized traditional boats: These craft are usually of the Cox's Bazaar type of a length between 12 and 14 m, equipped with 15 - 33 hp engines. They mainly use gill-nets, but also operate the behundi and/or funda nets. During one or two months of the year these boats stay on the Kalidaha fishing grounds or off Dubla island. They carry upto 100 pieces of gill-nets at a total length of 1,400 m. The number of crew is 8. Total costs of a fully equipped unit vary from Tk. 60,000 to Tk. 100,000.

Gillnets, cast-nets, stake nets (Funda), set bag nets (Behundi), seines and long lines are the most widely used gears.

(a) Behundi net: This is a fixed bag net with a 15 - 30 m circular mouth. Wings are often attached on the two sides of the mouth which increases the total fishing areas of the nets. The net tapers from its mouth and ends in a bag 25 - 30 m from the mouth. The mesh size decreases continually from the mouth to the bag; the bag is of fine mesh ($\frac{1}{2}$" - 3$\frac{1}{4}$"). The mouth of the net is kept open by two vertical bamboo poles. The net is fixed by tying the two ends of its mouth to wooden poles driven into the bottom. The fish, which comes with the current (tide), enters into the mouth and ends up in the bag. A behundi net has a life-time of about 5 years, and costs Tk. 2,500 - 10,000 depending on size.

(b) A Funda net is 55 m long and 3 - 4 m deep, with 4 inch meshes. It is a stake net used off Chittagong in the open sea from November to March for capturing Bhekti (Cock-up) and Lukwa (Indian salmon). The price of a funda net is in the order of Tk. 6,000, and has an average life-time of 5 years.

11 LANDING CENTRES

Fishermen land their catch at numerous scattered landing places; most of these places have no landing or shore facilities. The marine delta fishermen (mainly from Chittagong) migrate during the season to the outer areas, and land the fish close to the temporary Camps where they live (Dubla) and where the fish is sun-dried.

There are four fish landing terminals in the coastal belt, two of which, located at Khulna and Cox's Bazaar, are owned by BFDC (ref. chapter 6). The other two terminals located at Chittagong and Cox's Bazaar, are owned by the Cooperative sector.

Fish landing for the last 5 years at two BFDC wholesale centres at Khulna and Cox's Bazaar is given below which indicates that only a very small portion of the production is channelled through these terminals.

Table 11.1

Landings of fish at BFDC wholesale markets.

in tonne

Year	BFDC Khulna	BFDC Cox's Bazaar
1970/1971	48	571
1971/1972	1649	578
1972/1973	2514	1482
1973/1974	3806	1437
1974/1975	2891	1288
1975/1976	2977	1362

12 *HANDLING AND PROCESSING*

12.1 Fish Handling.

The bulk of the traditional boats do inshore fishing and stay out for only one to two days and do not use ice for preservation of the fish. In the Kalidaha and Dubla operations, however, the fishing boats remain for longer periods at the fishing grounds and launches carry the fish to the landing centres. In the case of Dubla, the carriers bring the fish to the camps where it is sun-dried. In the case of Kalidaha, the fish is iced and reaches the landing centres in Cox's Bazaar in fresh form.

Because of rough handling, improper cleaning and inadequate use of ice at the landing places, low quality fish is supplied to the consumer. Very often fish is carried on deck of open boats exposed to the sun and unloaded on dirty beaches or banks where it is allowed to remain for long periods. However, due to a growing health consciousness on the part of the consumers, post-harvest treatment of fish such as icing and chilling is gradually increasing, but the methods of icing and the hygienic condition of wooden boxes for instance is still unsatisfactory.

Hilsa, caught in the sea or in the estuaries (e.g. Khulna and Barisal) and marketed elsewhere, is generally iced. Icing is also common for species like prawns and Indian salmon.

A list of ice plants and cold storage facilities owned by different agencies is given in Appendix 12.1. Cost of block ice is Tk. 180 per tonne.

The fish processing complex owned by BFDC at Cox's Bazaar includes a modern fish drying kiln and simple facilities for manufacturing of fishmeal and extraction of shark liver oil.

Small-scale canning facilities exist at Chittagong fish harbour. Additional processing facilities for fish and fish by-products are being added to this harbour. A fishmeal plant and a shark liver oil plant have been installed recently. A refrigeration complex is being established at Mongla. In addition to providing ice and cold storage facilities to the fishermen of the Sunderban area, BFDC will also process shrimp and fish for export. Freezing will also be undertaken at the Chittagong processing complex. Equipment is obtained under grant and credit schemes from Denmark and USSR.

There are two private sector firms at Khulna and three at Chittagong engaged in processing (dressing, packaging and freezing) shrimp, frog-legs and fish. These firms, which form parts of BSFIC, export all their products in frozen form. These firms make a significant contribution to the total export of fishery products.

BJMSS has also fish processing facilities at Chittagong for export products (frozen shrimp and frog-legs).

Large quantities of fish and small shrimp are sun-dried by coastal fishermen; no statistics are available.

Capacities of the various fish processing facilities in the country are shown in Appendix 12.2.

13 MARKETING AND DISTRIBUTION

Fish in the estuarine and coastal regions is sold by fishermen to fish traders ('mohajon') through agents ('dalals'). The dalals act as brokers between the traders and the fishermen in the negotiation of prices. Fishermen are often obliged to sell their catch at a low pre-determined price to the fish traders or money lenders to whom they are socially and financially indebted. Fishermen sell their fish either by count or by lot.

The fish traders either auction the fish at the beach or send the fish direct to the interior wholesale markets. The fish traders have their own or hired carrier boats. In the wholesale markets, wholesalers ('arathdars') conduct the sale on behalf of the mohajons on the basis of a commission of 3% on the sale value. Forming a powerful group, fish traders control the trade through all stages.

The conditions of the wholesale markets of the private sector is far from satisfactory. They are generally not accessible by vehicles; the water supply is often inadequate; the floors of the markets are usually exposed to sun and rain. With a few exceptions, retail markets are in a similar state. Public health regulations in regard to quality of fish are hardly ever respected. There is an increasing awareness of this situation among the authorities responsible for the markets and a willingness to effect improvements.

Traditionally most fish is sold whole but larger fish is cut into pieces before sale.

In the table below some wholesale prices of different species of fish at the BFDC wholesale markets of Chittagong (75/76) and Cox's Bazaar (76/77) are given:

Table 13.1

Average wholesale prices of fish in Chittagong and Cox's Bazaar Markets.

Variety	Average wholesale price in Taka per kg. 1975/76 BFDC Chittagong	1976/77 BFDC Cox's Bazaar
Chinese Pomfret	7.50	10
Silver Pomfret		10
Brown Pomfret		5
Rivershad (Hilsa)	3.75	4.5
Seashad (Hilsa)	2.50	3.0
Spanish Mackerel	3.00	4.0
Indian Mackerel	2.00	4.0
Jew fish	3.00	5.0
Cat fish	1.80	2.5
Shark	1.25	2.2
Indian Salmon	7.00	8.5

The retail prices are about 100% higher than the wholesale prices.

In order to ensure fair prices to the fisherman, fisheries cooperatives try to link their production with marketing. The BFDC is also active in marketing to ensure reasonable prices to the producers by establishing marketing facilities at various strategic places in the coastal belt.

Most of the species of fish available in the estuarine and marine waters are eaten by the people of Bangladesh. Indian salmon (polynemus indicus), Hilsa (Hilsa), Pomfrets (stromateus), Cock-ups (Lates) and Red snappers (Lutianus) are high in demand. Non-edible varieties include crabs, cuttlefishes and a few varieties of finned fishes. Sharks, skates and rays which comprise a significant portion of the total catch have only a limited local consumer demand. Sharkfins are of course in great demand for export as is shark liver.

There is a clear consumer preference for freshwater fish and also a preference for fresh fish as against frozen, salted or canned fish.

14 EXPORT AND IMPORT

14.1 Fish Export

The traditional export of fresh and dried fish, mainly to India, has ceased and the bulk of the export items now consists of frozen shrimps. Japan and the USA are the principal markets. The total value of the export (which includes froglegs) amounts to about US $ 11 million per year. Further details are given in table below:

Table 14.1

Export of Marine Products (1971 - 1977).

in Thousand Taka.

Kind of product	71/72	72/73	73/74	74/75	75/76	76/77
Fresh fish	-	10,981	26,894	11,394	13,000	-
Frozen prawns	32,989	22,649	33,318	23,808	145,019	137,583
Frozen fish					587	128
Dry fish		18	428	120	177	58
Frozen froglegs			2,437	98	11,822	10,490
Shark, fish maws, etc.	7	161	234	203	1,456	2,466
Total:		33,809	63,311	35,623	172,061	150,725

Source: Export Promotion Bureau

14.2 Equipment Import.

The major imports of equipment since 1972 consist of trawlers (from USSR, UK, Denmark), marine engines (from USSR, Denmark, Japan, Sweden and Germany), synthetic twine and ropes (from USSR, Denmark, Japan and Norway), boat-building timber (from India), refrigeration equipment (from USSR and Denmark), ice plants (from Denmark, Norway and Rumania), plants for making fish-meal and shark liver oil (from Denmark), a fully equipped inland fishing research vessel (from Denmark), refrigerated and insulated lorries (from Rumania) and training equipment for trawling (from USSR).

15 ANCILLARY INDUSTRIES

Wooden fishing boats, mostly of planked constructions are built by local boat builders in many areas. The only boatyard with a permanent slipway is located in Chittagong. In 1973, BJMSS established in collaboration with the Canadian Hunger Foundation, a boatyard for construction of ferro-cement boats at the Fishermen's Cooperative Market, Chittagong. Boats of two sizes, 38 ft. with 22 hp and 44 ft. with 33 hp Yanmar engines are constructed at this yard. To date, 16 ferro-cement boats have been constructed. A new boatyard is being established by BFDC at the Chittagong fish harbour with the assistance of Danish boat building experts.

Most of the nets used in Bangladesh are hand-made. Net-making is an important cottage industry in the coastal districts and a large number of people earn a livelihood by making nets in their homes.

There are two net factories, one at Comilla owned by BFDC and the other at Chittagong belonging to BJMSS. The net factory at Comilla has been in operation since 1952/53 and the one at Chittagong since 1962. The demand for factory-made nets is increasing. The output from the two factories cannot meet the growing demand.

16 SOCIO-ECONOMICS

Fishermen engaged in the marine coastal fishery belong to the five coastal districts. According to the 1967/68 survey there were about 29,000 marine fishermen's households and 42,000 active marine fishermen in these districts (Appendix 16.1). The households were classified into households with boats (27%), households without boats (26%), and fishery labourers households (47%). 72% of the total number of households and 70% of the households with boats were located in the Chittagong District. These figures do not include fishermen and fishing households restricting their fishing activities to the estuarine waters.

During the short winter season, fishermen migrate along the coast, i.e. from Chittagong District to the Sunderban region (Dubla) and from the inner parts of the delta out to the sea. Many of the fishermen in Chittagong District switch to river or lake fishing during the off season.

According to a survey conducted in 1974/75, by BJMSS, relating to both marine and estuarine fishermen, there were approximately 149,000 fishing families of whom only about 129,000 families had homesteads. Ten per cent of the families had land-holdings of more than one acre, 25% had one acre or less and the balance (65%) were landless.

Of a total of about 248,000 persons directly or indirectly engaged in fishing, 156,000 were engaged in wholetime fishing and the balance were engaged in part-time fishing, fish trading, services, selling of fish and as fishery labourers.

About 57% of the fishing population were less than 19 years old.

Most fishermen were indebted either to fish merchants or to local money lenders to whom they are bound by contract to sell their fish at a price which is far below the market price. Fishermen borrow money on a lien of the future catch for the purpose of buying fishing boats and nets or for family reasons.

14% of the total fishing population could be considered as literate. Not more than 1% have had secondary schooling or higher education. The average rate of literacy among fishermen of the coastal districts is much less than the national average which is reported to be 23%.

17 GOVERNMENT POLICY

The Government's main policies in regard to the marine and estuarine fisheries during the current Five Year Plan (1972/73 - 1977/78) are as follows :-

(a) Commercial exploitation of the coastal and marine fisheries resources to increase the protein level in the people's diet.

(b) Limitation of the operation of both public and private sector trawlers to the area beyond the coast line.

(c) Greater emphasis on the exploitation of nearshore fisheries with the use of locally built mechanized boats than on the exploitation of deep sea fisheries with sophisticated imported trawlers.

(d) Reservation to Bangladesh of the exclusive right to exploitation of inland and territorial water fisheries.

(e) The exploitation of fisheries outside the limit of territorial waters through joint ventures between the Bangladesh Government and foreign parties.

(f) Establishment of shore installation facilities by the public sector which will be made available for use to the private sector as well.

(g) The ensuring of social and economic freedom to the fishermen.

(h) Export of very high priced or locally unacceptable fish and other aquatic organisms.

(i) The vigorous and earnest enforcement of rules already promulgated in the past or to be promulgated in the future to prevent the destruction of fish stocks, both marine and inland.

18 DEVELOPMENT PLANS

The First Five Year Plan (1972/73 - 1977/78) of Bangladesh has launched a massive development programme for the fisheries sector. The plan includes both short-term and medium-term programmes. The main objectives of the First Plan, as originally envisaged, are as follows:-

(a) to increase fish production by about 26 per cent at the terminal year from a benchmark production of 800,000 tonne in 1969/70 to 1,021,000 tonne in 1977/78;

(b) to maximise the utilization of fishery resources, both inland and marine;

(c) to improve the socio-economic conditions of the fishermen;

(d) to create greater employment opportunities in fishing and ancillary industries; and

(e) to increase fish exports, to about 20,000 tonne by 1977/78.

Strategies set out in the Plan for development of coastal fisheries are as follows:-

(a) to accelerate fishing activities in the coastal and marine waters;

(b) to introduce 34 trawlers for fishing in the deeper waters and to employ about 3,000 country built mechanized boats for fishing in the near shore and estuarine waters;

(c) to establish new, or expand existing multi-purpose industries for processing and utilization of fish, fish waste oil and non-edible items;

(d) to establish a well organized and scientific system for collection, preservation and marketing of fish in order to eliminate loss of fish through spoilage with a view not only to supplying fish in fresh condition to consumers but also to ensure reasonable remuneration to the poor fishermen;

(e) to encourage formation or cooperatives in order to provide fishermen with material inputs, including credit, more easily and foster the spirit of self-help;

(f) to expand the export potential of fish, including shrimp, frog-legs, shark and other aquatic organisms which have relatively lower local demand;

(g) to launch a training programme for marine fishing in order to train a sufficient number of crew, including skippers and engineers;

(h) to conduct exploratory marine investigations so as to gather more information about the size and nature of the fish and shrimp population etc.

Under the original Plan it was estimated that marine production would increase from the benchmark production of about 100,000 tonne to 178,000 tonne in the terminal year of the plan. Of this production, it was estimated that the BFDC's 34 trawlers would yield about 33,000 tonne of marine fish while the rest would come through the efforts of small fishermen, using either sail boats or mechanized boats or fishing gear without boats.

For augmentation of fish production in the inland sector, fish culture in derelict waters has been given emphasis. The Plan provides for assistance in the form of technical know-how, fingerlings and fertilizer at subsidized rates in order to encourage potential fish farmers to bring their ponds under scientific fish culture. Other programmes include production oriented research, training and extension.

The financial outlay proposed for implementing the programme for the fisheries sector was Tk.451.84 million (1972/73 estimates). Later, in 1975, the extreme global economic instability made a revision of the First Plan necessary. Taking resource limitations and past experience into consideration some adjustments were made in the Plan and a 3-year programme (1975/76 - 1977/78) was prepared. The strategies for fisheries development have remained more or less unaltered. However, much of the emphasis on deep sea fishing by trawlers has been shifted to the fishing of near shore waters by country-built motorized boats. The tentative outlay for the revised plan for the fisheries sector is Tk.370 million.

Bangladesh is receiving substantial external support for implementation of its fisheries development programme. A list of externally supported projects is attached in Appendix 18.1.

19 BIBLIOGRAPHY

1. ____ 1974 - Annual export receipts 1974 - 75, Bangladesh Bank.

2. K.S. Ponnuthurai 1973 - Report on the Cooperative Fishery Movement in Bangladesh, International Cooperative Alliance.

3. ____ 1974 - Abstracts of fishery Research Report 1963 - 1972, Research Report Series No.1, Fresh Water Fisheries Research Station, Government of Bangladesh.

4. M.M. Hussain 1971 - The commercial fishes of the Bay of Bengal, Project Publication No.1, UNDP.

5. W.Q.B. West 1973 - Fishery Resources of the Bay of Bengal, IOFC/DEV/73/28, FAO, Rome.

6. A.L. Khuriyan 1977 - National Marine Fisheries Seminar 1977 proceedings, Department of Marine Biology, Chittagong.

7. ____ 1965 - Preliminary Report on the East Pakistan Nutrition Survey 1962/63, Directorate of Nutrition and Research, Government of Bangladesh.

8. Ahmed Nazir 1970 - Fishing Gear in East Pakistan, Directorate of Fisheries.

9. ____ 1975 - Socio-Economic Study of Fishermen of Bangladesh, BJMSS (not yet published).

10. ____ 1972 - Report on marine fishing village identification survey in Bangladesh 1967/68, Project Publication No.2, UNDP.

11. ____ 1972 - Terminal Report on the Survey for development of fisheries, FI:SF/PAK - 22, FAO, Rome.

12. ____ 1972 - First Five Year Plan, 1972/73 - 1977/78, Planning Commission, Bangladesh.

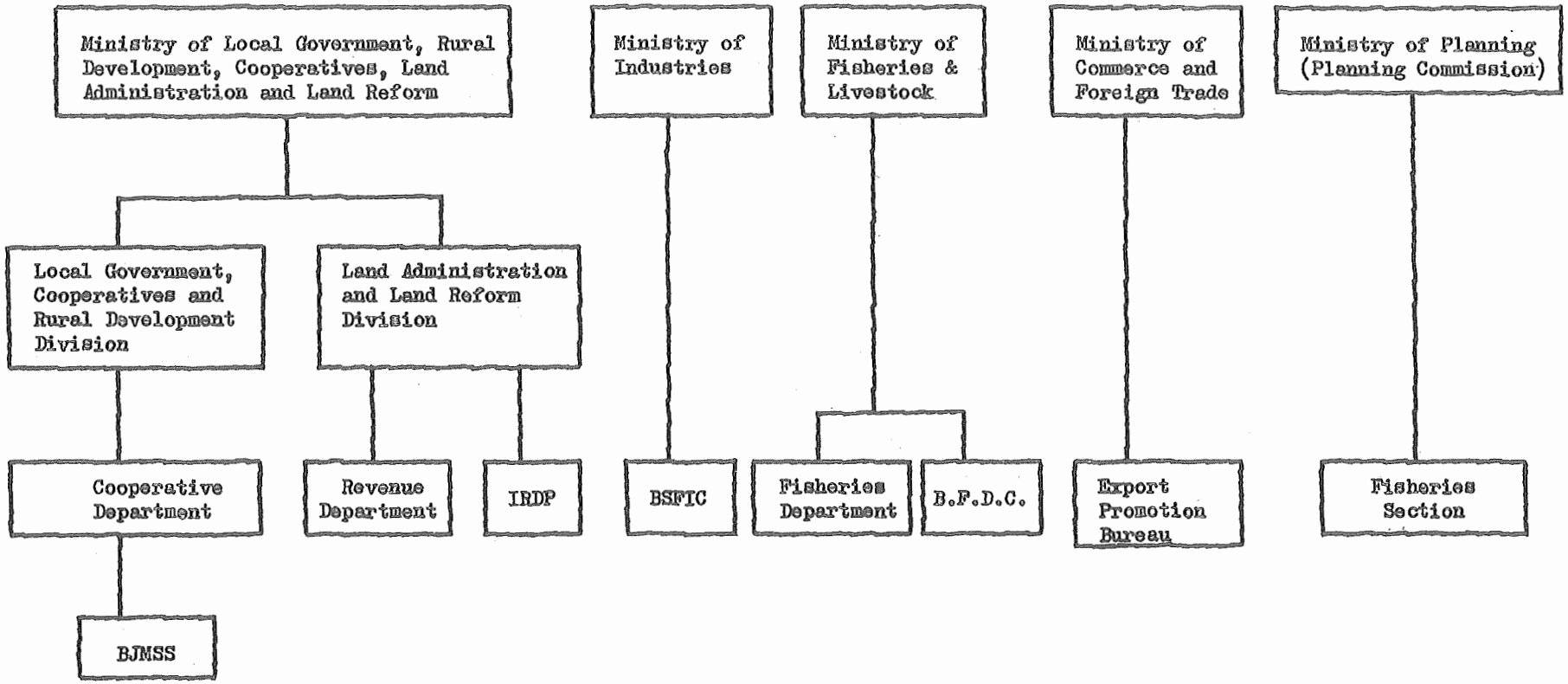
13. A.K.M.G. Rabbani, and M. Hussain 1970 - Development of fisheries in East Pakistan, Fourth Plan study No.6.

Appendix 1.1

Map of Bangladesh.

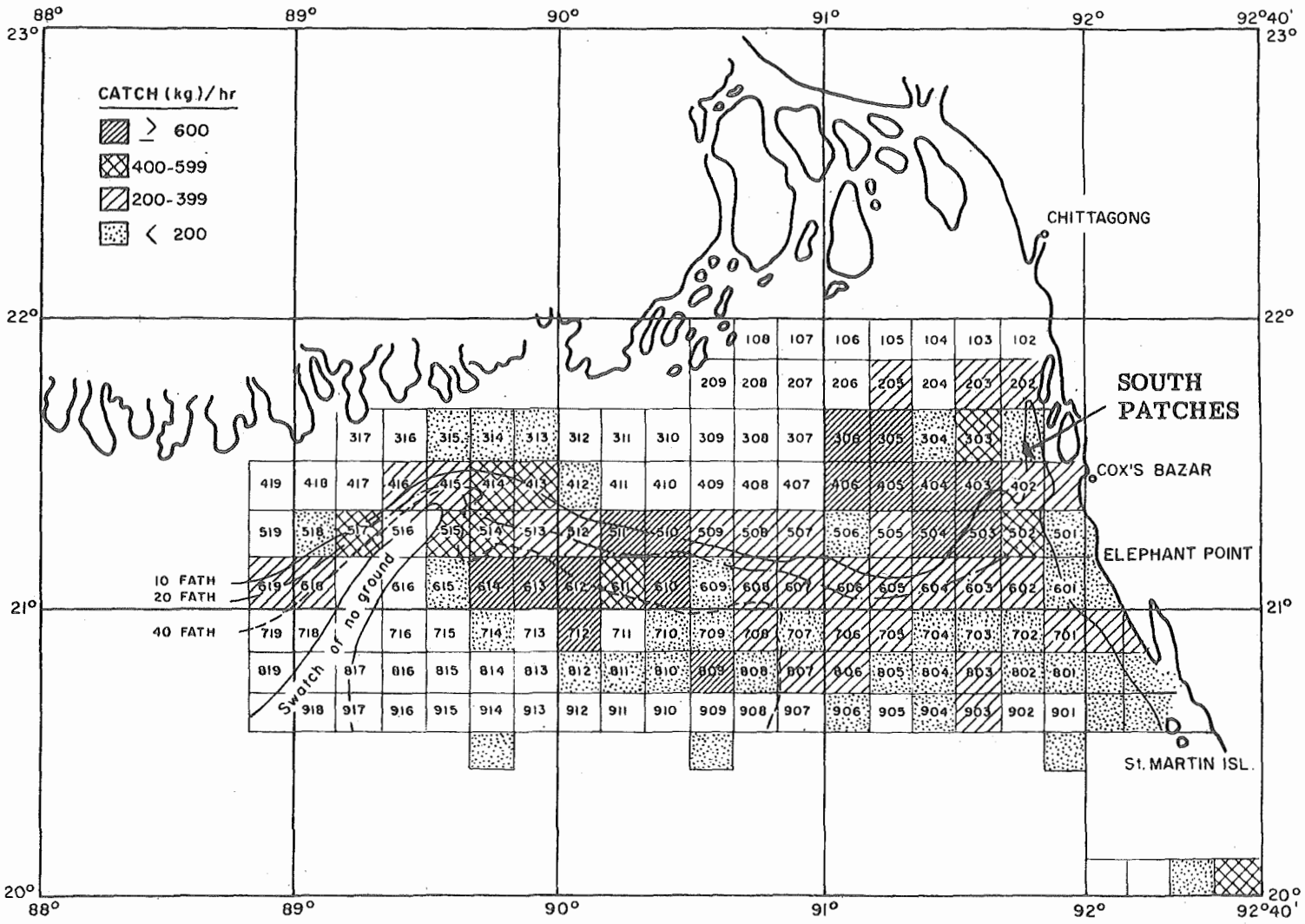
Appendix 4.1

Fisheries in the Government Administration.



Appendix 8.1

Trawl Catch-Distribution of Fish off the Coast of Bangladesh.



Appendix 9.1

Important commercial marine fish and shrimp species.

Family	Species	Popular English name	Local name
Clupeidae	Hilsa ilisha	Indian river shad	Jati ilish
	Hilsa kanagurta	Indian sea shad	Chandana ilish
Tachisuridae	Tachisurus gagorides	Catfish	Quizza
	T. thalassinus	Catfish	Quizza
Sciaenidae	Pseudesciaena bleekeri	Croaker, Jew fish	Poa
Polynenidae	Polynemus indious	Indian Salmon	Tapsi, Lukwa
Latidae	Lates calcarifer	Cock-up	Bhetki
Synodentidae	Harpodon neherius	Bombay-duck	Lotia
Trichiuridae	Trichiurus haumela	Ribbon fish	Chhurimeachh
Pomadasyidae	Pemadasys hasta	While grunter	Shada datina
Moraenesocidae	Muraenesez talboncides	Eel	Kamila
Lutianidae	Lutianus johnii	Red snapper	Ranga choukya
Scombridae	Cybium guttatum	Spanish mackerel	Maitta
	Rastrelliger kanagurta	Rake - gilled mackerel	Champa
Stromateidae	Stromateus cinerius	Silver Pomfret	Foli Chanda
	Stromateus chinensis	Chinese pomfret	Rup Chanda
Carcharhinidae	Scoliodon serrakowah	Dogfish	Hangar
	Carcharhinus metanopterus	Shark	Hangar
Dasyatidae	Hilmantura uranak	Stingray	Hsush
Penaeidae	Penaeus indicus	Shrimp	Chamma chingri
	Penaeus Mondon		Kala icha
	P. semisulcatus		Bagda chingri
	Metapenaeus brevicornis		Saga chingri
	Metapenaeus monoceros		Lallia chingri
	Parapeneopsis sculptilis		Bagtara chingri
Palaemonidae	Macrobrachium rosenbergii	Freshwater giant shrimp	Golda chingri
	M. malcomsonii		

Appendix 10.1

Fishing craft and gear used in estuarine and coastal fishing.

Fishing implement	1967/68[1]	1974/75[2] Total	1974/75[2] Chittagong District
INDIGENOUS CRAFT	9,563	46,355	12,673
Planked boats	7,352	45,199	
Dugouts	2,170		
Motorized boats	41	1,156	1,083
TRAWLERS		20[3]	20[3]
25 - 50 ft.		3	
51 - 70 ft.		4	
71 -100 ft.		4	
Above 100 ft.		9	
GEAR	22,905		
Gill nets	4,878		
Seine nets	2,601		
Set bag nets	4,808	(Details not available)	
Cast nets	4,906		
Long lines	2,215		
Miscellaneous	3,497		

Note: 1) Data relate to marine fisheries only.

2) Data relate to both estuarine and marine fisheries.

3) 1976 figures.

Appendix 12.1

Existing and planned ice making and cold storage facilities in the coastal districts.

District	Town	Agency	Ice Plant (Tonne/24 hrs.)		Freezer (Tonne/24 hrs.)		Cold Storage (Tonne)			
			Block	Flake	Blast	Contact	Ice	Fish	Ice/Fish	Frozen Products
Barisal	Barisal	BJMSS	10+							
	Bhola	BJMSS	10+, 10+				50+			
	Thalakati	BJMSS	10+				50+			
	Parerhat	BJMSS	10++							
	Perojpur	BJMSS	10+				50+			
Chitta-gong	Chittagong	BFDC	30	20	10+		200	105		350
		BJMSS	33++, 10++	10, 10	½, ½	2++	50++			20, 50++
		BFSIC	4, 4, 5							100, 125, 150
	Cox's Bazaar	BFDC		2½, 2½, 10	6+			3	10, 20	20+
		BJMSS	7, 10+				3		50+	
Khulna	Khulna	BFDC		2½, 2½					10	
		BJMSS	10, 33++	5+		1½+	10+, 50++			50++
		BFSIC	5	3		4				100
	Mongla	BFDC	35+	25+	12+		105(B)+ 75(F)+	200+		500+
		BFSIC	5			2½				100
Noakhali	Hatiya	BFDC	25++					50++		
	Ramgati	BJMSS	10+						50+	
Patuakhali	Amtali	BJMSS	10							
	Galashipa	BFDC	25++						50++	
	Patuakhali	BJMSS	10+							

\+ Plant procured and under installation.

++ Scheme approved.

Appendix 12.2

Fish Processing Facilities.

Name of Scheme	Agency	Fishmeal plant (capacity in tonne per 24 hours for handling raw fish)	Shark liver oil (capacity in tonne)	Canning plant (tonne per hour of finished products)	Drying kiln capacity in tonne per 24 hours for handling raw fish.	Freezer (Tonne/24 hours) Blast	Freezer (Tonne/24 hours) Contact
1. Fish and fish by-products processing unit at Cox's Bazaar	BFDC	1½	-	-	1	2	-
2. Fish and fish by-products processing units at Chittagong	BFDC	25	12	100	-	10	-
3. Processing and marketing units at Mongla for development of Sundarban fisheries	BFDC	-	-	-	-	12*	-
4. Marketing and distribution of fish.	BFDC	-	-	-	-	10**	5**
5. Bangladesh Jatiya Matshyajibi Samabaya Samity Ltd., Chittagong.	BJMSS	-	-	-	-	½, ½	½
6. Bay Fishing Ltd. Chittagong	BFSIC	-	-	-	-	-	5
7. Eastern Fisheries Ltd., Chittagong.	BFSIC	-	-	-	-	-	3
8. Amin Agencies (1947) Ltd., Chittagong.	BFSIC	-	-	-	-	-	3
9. Bangladesh Cold Storage Ltd., Khulna.	BFSIC	-	-	-	-	-	4
10. Fish Export Ltd., Khulna	BFSIC	-	-	-	-	-	2½

* Plant procured but not yet installed.
** Procurement order placed.

Appendix 16.1

Fishermen and fishing households in the coastal districts (1967/68)*

District	Number of fishing households		Number of fisheries labourer's households	Number of fisheries management units	Number of fishermen
	With boat	Without boat			
Chittagong	5 100	7 327	8 255	12 803	31 842
Noakhali	771	40	765	961	1 842
Barisal	771	-	1 303	254	2 989
Patuakhali	719	129	2 214	411	3 665
Khulna	332	32	1 034	402	1 619
Total	7 637	7 528	13 571	16 390	41 954

* Data relate to marine fisheries only.

Source: FAO/UNDP Project publication No.2, 1972.

Appendix 18.1

Fisheries Projects in Bangladesh receiving external support[1].

A. Technical assistance

1. FAO/UNDP: (Regional)

Development of small-scale fisheries in Southwest Asia, RAS/74/031.

- Identify constraints limiting the development of small-scale fisheries.
- Assist the participating countries in formulating policy guidelines and development concepts.
- Assist in identifying and formulating specific projects.

Started: October 1975
Duration: 27 months
Budget UNDP: $ 160,000
Host Government (Sri Lanka): $ 25,000

Location: Colombo, Sri Lanka.

2. FAO/UNDP:

Project Co-ordination, BGD/72/016.

- To assist the Bangladesh Government in co-ordinating the activities of various agencies/organizations concerned with fisheries development and in co-ordinating between international bodies which are providing assistance to fisheries.
- To aid in the formulation of fishery development policies and programmes, to identify priorities and to prepare fisheries sub-projects.

UNDP contribution: US$ 667,675
Tk. 0.7 million.

Government contribution:

Tk. 2.1 million.
Draft agreement memorandum signed, subject to final Government approval.

Location: Dacca.

3. FAO/UNDP:

Research and Resources Development Project, BGD/75/031.

- To carry out a pre-investment survey of various aspects of fish, fishermen and fisheries resources.

UNDP contribution:
US $ 2,664,265 and Tk. 1.9 million in local currency.

Bangladesh Government contribution: 7.4 million.
Draft agreement memorandum signed, subject to final Government approval.

4. FAO/UNDP:

Fisheries Training & Extension, TF-BGD/5(NOR).

- To provide training facilities for in-service officers and staff of different categories of the Fisheries Department.
- To extend the knowledge of fish farming to the fish farmers of the country.

Operational

Norway contribution:
US $ 57,070

Government contribution:
Tk. 2.8 million

Location: Chandpur.

Contd/...

Appendix 18.1 Contd/...

5.	FAO/DANIDA:	Fisheries Development in Bangladesh Marketing, TF-BGD/4(DEN). - To rehabilitate and develop the marketing of fish in Bangladesh through assisting in the establishment and operation of an efficient distribution network.	Operational Denmark contribution: US $ 157,000 Tk. 5.9 million. Location: Dacca.
6.	FAO/DANIDA/UNDP:	Aquaculture Experiment Station, BGD/75/036. - To undertake adaptive research in the field of intensive fish culture. - To conduct investigations to evolve techniques for large scale production of quality fish fry by induced spawning. - To establish training programme for fish culture and extension officers etc.	UNDP contribution: US $ 517,100 Tk. 0.6 million. DANIDA contribution: Tk. 2.7 million in foreign exchange and Tk.7.2 million in local currency. Government contribution: Tk. 24.1 million.
7.	World Bank:	Technical Assistance by World Bank for preparation of Inland fisheries project. - To survey ponds, link roads, marketing facilities, etc., in connection with the feasibility of developing an inland fisheries project for the northern districts of Bangladesh.	Started: 1974/75 (under revision) World Bank contribution: US $ 22,000 Government contribution: Tk. 1.8 million.
8.	World Bank:	Development of fishery in the Chandpur, Muhuri and Karnafully irrigation & flood control projects, 8 - 14 ED. - To study the present status of fisheries and their progressive changes in the project area. - To establish a fish and a shrimp hatchery at Halda. - To formulate a fisheries development programme in the project area based on information to be yielded from implementation of the investigation phase.	Started: 1975/76 IDA contribution: Tk. 28.6 million in foreign exchange and Tk. 28.4 million in local currency. Government contribution: Tk.17.9 million. Location: Chandpur.
B.	Investment.		
9.	ADB & DANIDA:	Scheme for the marketing and distribution of fish and fish products, 129-BAN. - To create facilities for the marketing and distribution of fish and fish products.	Started: 1974/75. Budget ADB: $ 2.763 million DANIDA; DK 3.00 million. Government: Tk. 44.9 million. Location : Chittagong.

Appendix 18.1 Contd/...

10.	DANIDA & USSR:	Fish preservation & processing schemes. - To establish fishmeal plant, shark liver oil plant, and cold storage at Chittagong. - To establish refrigeration complex at Mongla.	Started: 1973/74. DANIDA Loan: Dkr.5.20 million. USSR Loan: Tk. 6 million.
11.	DANIDA:	Boat building and mechanization scheme. - To build about 500 boats and equip them with gears and fishing materials. - To distribute them among the fishermen on cash purchase and hire purchase basis. - To give training in handling and maintaining engines and boats. - To set up 3 workshops for repairing and servicing of the marine engines.	Started: 1974/75. Budget DANIDA: Dkr.20 million. Government: Tk.6.5 million. Location: Chittagong.
12.	USSR & DANIDA:	Mechanization of country fishing boats. - To procure 500 marine diesel engines and to distribute them among the fishermen on cash purchase and hire purchase basis.	Started: 1974/75 Budget USSR: £0.3405 million. Government: Tk. 3.9 million. Location: Chittagong.
13.	U.K. & DANIDA:	10 - trawler project - To procure 10 trawlers for fishing in the Bay of Bengal.	Started: 1973/74. (under revision). Budget U.K.: Tk. 3 million. DANIDA: Tk. 3.2 million. Government: Tk. 4.7 million. Location: Chittagong.
14.	U.S. :	Dubla, jetty, warehouse, hospital.	Subject to final approval.

Assessment of Problems and Needs in Marine Small-Scale Fisheries

BANGLADESH

Prepared by

V.L.C. Pietersz, Fisheries Adviser (Consultant)
A. Andreasson, Fisheries Adviser (Associate Expert)
H. Copper, Economist (Associate Expert)

in consultation with

Department of Fisheries, Bangladesh.

Development of Small-Scale Fisheries in Southwest Asia, Colombo, June 1977.

CONTENTS

		Page No.
1	Introduction	1
2	Institutional Support	2
3	Infrastructure	3
4	Fish Production	4
5	Fishing Communities	6
6	Recommendations	6

1 INTRODUCTION

The estimated marine fisheries production is 100,000 tonne per year and about 95% of this is produced by the small-scale sector. About 8,300 sailing and/or rowing boats (planked boats and dugouts) and about 1,200 mechanized craft are engaged in marine fisheries. In the five coastal districts there are some 30,000 marine fisheries households. More than 70% of these households belong to the Chittagong district.

The structure of the marine small-scale fishery is complex and cannot be completely separated from estuarine and river fisheries. Any long-term planning for small-scale fisheries development must take into account the utilization of estuaries and rivers by fishermen during the off-season when traditional sea fishing is precluded by adverse weather conditions.

Fish is the major source of animal protein (about 80% of the total intake) in Bangladesh, a country with a serious protein deficit. The marine fishery resources are far from fully exploited and further development of the marine fisheries will contribute to improved nutritional standards.

2 INSTITUTIONAL SUPPORT

The lack of institutional support to the existing marine small-scale fisheries, coordination of on-going activities and planning for the development of the sector are among the major problems identified.

The Fisheries Administration is characterized by dual management and control which is particularly evident in the marine sector. The functions related to small-scale fisheries are inconsistently dealt with by two different institutions without one of them having overall responsibility.

- The Fisheries Department is devoting most of its attention to the inland fisheries. There are only a few officers in the department with a first-hand knowledge of, or interest for, the marine fisheries and their fishermen. Even these few officers have been accustomed to consider marine fisheries from the point of view of large-scale fishing rather than in terms of small-scale fishery activities. Although there is a section of the Fisheries Department designated as the Marine Fisheries Department in Chittagong, it is completely moribund because of financial and other reasons. It does not appear to have been assigned any definite role and lacks the means to contribute to the development.

- The Bangladesh Fisheries Development Corporation (BFDC) is a public commercially oriented enterprise but has, by its charter, been entrusted with several development functions. These functions are often incompatible with the commercial objectives and furthermore overlapping with those of other institutions.

There is an urgent need for a reorganization and strengthening of the fisheries administration. Both a clear definition as well as a re-allocation of functions between the Fisheries Department and BFDC are necessary to avoid overlapping, confusion and a continued hazardous development process.

- The Fisheries Department should be entrusted with the functions of Planning, Development and Coordination, Extension, Registration and through its specialized institutes Applied Research and Training.

  In order to make it possible for the Fisheries Department to deal effectively with marine small-scale fisheries, a marine fisheries wing, entrusted with these functions should be set up within the department. It is understood that plans are underway to reorganize the fisheries administration, inter alia, by the establishment of a strengthened marine fisheries wing. The findings of the mission strongly support this move.

- BFDC's functions should be concentrated to activities yielding commercial benefits such as, fish storage, distribution and marketing and deep-sea fishing and to the provision of essential infrastructure e.g. harbours which are too large and capital intensive to handle by the private sector or small communities.

The following aspects warrant particular concern for the future :

(i) Planning and Development Coordination.

There are several fisheries development projects being planned or implemented, many of which are concerned with marine small-scale fisheries, by the Government itself or in collaboration with multi-lateral, bilateral, cooperative and voluntary agencies. It is a clear lack of coordination between these projects; they are often planned and implemented independently of each other without fitting into the framework of a plan for development of small-scale fisheries. In some cases this has led to competition, overlap and conflicts between projects and activities.

(ii) Extension.

There is a lack of contact between the Government and the fishermen. Neither the Fisheries Department nor the BFDC employ officers or even administrative field officers concerned with marine fisheries. Consequently the interests of the fishermen are not looked after and there is no feed-back to the Government regarding their problems. The seasonal fishery at Dubla can be taken as an example. During the season, the island is inhabited by some 9,000 fishermen. Their only contact with the government is through the Forest Department and the Police.

A development oriented field organization needs to be established for the marine fisheries. The ultimate target would be a Fisheries Officer for each Thana and a Field Officer for each Union Council in the coastal districts. It is recognized that this has to be built up gradually and be accompanied by training programmes.

(iii) Resources Assessment.

Information on fishery resources (availability, catch/effort, etc.) essential for management and development of the marine small-scale fisheries is lacking. Surveys carried out to date have been directed towards the identification of demersal resources for large-scale fisheries exploitation.

A proper sampling system for the collection of statistics of marine fish landings need to be introduced. This must be supplemented by exploratory fishing, which should be a function of the marine fisheries wing of the Fisheries Department. In research of more basic and long-term nature, the Fisheries Department should consider the possibility of better utilizing the services of the Marine Biological Department of the University of Chittagong.

(iv) Training.

In order to enable staff of the Fisheries Department to provide meaningful input to the development of the marine sector an intensive training programme for staff at all levels is required.

The Inland Fisheries Training Centre at Chandpur which trains extension officers for inland fisheries could probably be expanded to cater for training of development officers for the marine fisheries. Additional specialized training for subsequent extension work in the field should be provided through a programme for experimental fishing and craft and gear development, under the aegis of the Department of Chittagong.

It is understood that the training of development officers for the small-scale marine fisheries is included in a five-year programme already formulated for expansion of the activities of the training centre. This plan is supported by the findings of the mission. The implementation of this plan might demand the strengthening of the staff at the centre with craft and gear expertise. Technical assistance would probably be necessary for this purpose.

Training is also necessary for officers at higher levels. This training could be on-the-job training provided through technical assistance and/or national and regional workshops, fellowships and training courses at training

institutions abroad.

The training of skippers and engineers now conducted by the BFDC at Chittagong should be integrated with the Department's training programme.

(v) Cooperative Development.

The channelling of easy-term loans and fishing requisites at concessionary prices through Fishermen's Cooperatives (BJMSS) has led to these functions being regarded as ends in themselves. Cooperatives are often established for the sole purpose of obtaining these concessions. Many of them have undesirable elements amongst the members; they often become office-holders and manipulate the societies for their own ends to the detriment of the fishermen; some societies are virtually owned by one rich member. Thus most cooperative societies are mere "paper organizations" and are not functioning in the interest of the bona-fide fishermen members. No real achievements are made for the betterment of the conditions under which the majority of the fishermen work and live. BJMSS does provide services and facilities to the small-scale fishery sector. The scope of its activities and its resources are however limited with the result that its impact in the sector is marginal.

A modified and pragmatic approach to cooperative development is necessary in view of the obvious difficulties encountered in forming effective economic groups among the fishermen.

It is also suggested that assistance channelled through cooperative societies should be coordinated and sanctioned by the Fisheries Department. Consideration should be given to transfer the control of support to cooperative societies to the Fisheries Department by deputising Officers from the Cooperative Department to the Fisheries.

3 INFRASTRUCTURE

Infrastructure for landing, transportation, handling and storage of marine fish is inadequate and in many areas completely absent.

Although the consumer preference in Bangladesh is for fresh water fish, the marketing of marine fish in population centres offers no problems provided the quality is good. However, fish is frequently reaching the markets in poor condition because of the lack of distribution facilities.

(i) Facilities at landing centres.

Most landing centres, with very few exceptions, lack basic amenities such as jetties to facilitate unloading, covered accommodation where sorting, sale and packing can be carried out and running water for washing and cleaning; lack of ice, facilities for short term storage of wet fish, and transport services are other factors which limits the distribution of fish to consumer markets. The need for these facilities is clearly evident in a landing centre such as Maheshkali.

Low cost facilities of simple construction suited to the needs and capabilities of the communities they are to serve should receive priority before establishment of large expensive complexes. Because of the tidal variations and the difficult soil conditions, further use of pontoons for landing and service purposes should be considered.

Basic statistical data and information on the flow of fish is not available. There is a need for a survey to identify landing centres (in order of priority) by assessing the throughputs and estimating the magnitude of the requirements of ice, transport, storage and other facilities. Such a survey should result in a master plan which aims at harnessing the resources and coordinating the projects of Government, Cooperative and Voluntary Agencies already involved in providing infrastructure facilities at

landing centres in accordance with the objectives and capabilities of the different agencies.

(ii) Transportation of fish.

Environmental factors and geographical distribution of the population in the coastal area result in fishing being often carried out far from landing centres. For better utilization of the fishing capacity during the short season, fishing boats have to stay on the fishing grounds with as few interruptions as possible. Many fishermen, therefore, are heavily dependent on fish carrying vessels for disposal of their catch. Insufficient number of carrying vessels, inefficient organization of the operations of the carriers and the irregularity of their visits, frequently cause problems of catch disposal.

The carrier service is largely handled by the private sector but there is a need for the government to increase the coverage and to promote proper handling and preservation of the fish. It may be possible to rationalize carrier vessel services by allocating collecting routes to the various agencies such as BFDC and Cooperatives on a basis similar to that suggested above in respect of landing centres.

(iii) Wholesale and retail markets.

In the major urban consuming centres, wholesale fish markets are virtually non-existent. They often consist of small open spaces without proper access and are characterized by the complete absence of any facilities (e.g. Chittagong wholesale market which is an open square of about 20 x 20 m with access through narrow alleys, situated in the midst of retail stalls for meat, vegetables, provisions and fish). Already unable to cope with the present throughput, available space alone, will render such markets incapable of handling increased supplies of marine fish.

The retail fish markets are congested and over-crowded. They form part of the general markets in which different types of durable and perishable foodstuffs are sold in addition to other goods. Lack of basic facilities like running water, adequate drainage, ventilation, lighting and provision for overnight storage of surplus stock militate against hygienic standards as well as against effective marketing.

The Fisheries Department, in collaboration with Municipal and other authorities, need to play a more active role in planning for the establishment of wholesale markets and retail markets for perishable foodstuffs with separate sections for fish. This planning should, in the first place, concentrate on major urban areas and result in a long-term programme which takes into account the increased fish supplies that can be expected from the development of marine fisheries.

4 FISH PRODUCTION

The marine small-scale fisheries of Bangladesh is of seasonal and migratory nature. The season lasts only for about five months and for some fisheries, e.g. those of Dubla and Kakidaha only, for only three months. A large portion of the marine fishermen undertake fishing in the estuary, rivers and lakes during the off-seasons.

(i) Fishing effort.

The marine small-scale fishermen currently exploit only a small portion of the extensive shelf area during a short season. Fishing operations are confined to :

- the traditional so called deep-sea fishing grounds, such as the grounds off Dubla and Kakidaha where fishing is carried out in depths of 5 - 9 m; they are "deep-sea" fishing grounds only in the sense of being located far from the home bases;
- the estuarine and inshore waters of the delta area,
- the coastal waters off the Chittagong District.

The limits of the fishing season are primarily determined by safety reasons. The fishermen, who live on their boats in the open sea throughout the season, leave a safe margin at commencement and termination for the incident of adverse weather. Utilization of craft and gear during only a short period of the year adversely affects the profitability of the operations.

About 9,500 boats are engaged in estuarine and marine small-scale fisheries, of which some 1,200 (approximate 14%) are mechanized. Apart from the difficulty of covering the long distances to the fishing grounds, the low level of mechanization also inhibits the full utilization of the fine weather season for sea fishing by migratory fishermen from the inland areas. These fishermen cannot venture out further without mechanized craft. A large number of fishermen operating non-mechanized craft in the Chittagong District are similarly handicapped.

Extension of the fishing effort is needed to make the operations more profitable and to generate funds for future investments in the sector. A programme with the following elements may serve to counteract some of the factors, limiting the length of the season and area of operation.

- motorization of some of the types of indigenous craft used by estuarine and coastal fishermen resident in the riverine villages of the coastal districts. Some information regarding the types of craft suitable for motorization is already available from experiments conducted earlier. The use of kerosene fueled out-board motors and small light diesel inboard engines may be considered;

- establishment of essential fishery infrastructure facilities and habitation requirements, in the delta area to be located so as to make it possible for the settlers to engage in year-round fishing operations in the sea and in the estuaries;

- acceleration of mechanization in the Chittagong District by introducing more boats of the satisfactory types already in use;

- exploratory fishing to demonstrate the availability of other fishing grounds within the reach and capability of the small-scale fishing fleet.

(ii) Fishing gear and methods.

Fishing methods are limited in scope and variety. The most common gears such as the behundi or set-bag net (e.g. at Dubla and in the Chittagong District) and funda or staked gill-nets (e.g. at Kakidaha) are passive and unselective. The use of drift gill-nets, particularly in the Chittagong District is increasing but there is room for improvement of the gear.

Boats seem to carry only about half the number of nets appropriate for the size of boats used because of a shortage of synthetic twine for net-making. The under-utilization of the fishing capacity directly affects the production and the earnings of the fishermen.

An experimental and demonstrational fishing programme should be undertaken with the view to diversify fishing methods including :

- development of traditional methods
- experiments with new fishing techniques such as small boat trawling and purse-seining
- introduction and demonstration of improved craft and gear.

The availability of twine and/or nets need to be increased by :

- importation of larger quantities under the control of a suitable agency

- broadening the sales through authorized dealers (public or private) at controlled low prices.

5 FISHING COMMUNITIES

Fishing is traditionally a low status occupation and the majority of the fishing families belong to socially neglected classes. Fishermen have experienced a long history of being oppressed and appear to have conditioned themselves to accept this situation. Consequently, they submit themselves easily to exploitation by the more well-to-do fishermen and by middlemen and traders.

The living conditions of fishermen particularly in urban areas are deplorable. In such areas, they live in slum settlements which are characterized by congestion, sub-standard housing and inadequate municipal services, e.g. water, refuse disposal and sanitation. The only facility available for bathing and washing is a small polluted communal pond. In rural areas, congestion and sanitation usually do not pose that great problem but the situation concerning housing and water is similar.

The social structure and low economic level of the fishing communities have contributed to failures of attempts to organize fishermen into economic units (groups for the operation of mechanized craft) or into cooperative societies.

Better programmes for community development and social welfare are required to provide basic adult education, primary education for children, health-care, better housing resettlement in less congested environment and upgrading of hygienic standards.

The establishment of close liaison and understanding between the Fisheries Department and other Government departments concerned with Health, Education, Rural Development, Land, etc., will be needed to obtain these services for the fishing communities. The provision of such services in one or two selected "experimental" fishing villages through the medium of voluntary agencies in active association with fisheries development officers may serve to pin-point the need for and the impact of such services on the fishing communities.

These activities may be supplemented by the organization of small-scale credit and savings groups, as a first step towards the formation of true Cooperatives.

6 RECOMMENDATIONS

From the discussion in previous sections the following recommendations are identified for further preparation and/or appraisal :

6.1 Physical development (investments).

(1) Supply of nylon twine and/or nets.

(2) Motorization of traditional craft.

(3) Accelerated introduction of new mechanized craft.

(4) Improvement of infrastructure and facilities at landing centres.

(5) Improvement of fish carrier vessel services.

(6) Improvement of facilities at major wholesale and retail markets.

6.2 Technical development.

(1) Reorganization of the fisheries administration.

(2) Establishment of a field organization to cater to the needs of the marine small-scale fisheries.

(3) Training of development/extension officers by strengthening the Inland Fisheries Training Centre at Chandpur.

(4) Intensive training of officers, at all levels, concerned with marine fisheries.

(5) Exploratory, Experimental, Demonstrational fishing and craft and gear development.

6.3 Other recommended measures include:

(1) Provision of community development services in one or two fishing villages as demonstration and training projects for subsequent wider application.

General Description of Marine Small-Scale Fisheries

WEST BENGAL
India

prepared by
G.E. Lierens, Systems Analyst (Associate Expert)
in consultation with
Department of Fisheries, West Bengal

Development of Small-Scale Fisheries in Southwest Asia, Colombo, June 1977.

CONTENTS

		Page No.
1	State Data	1
2	Introduction	4
3	Brief History	4
4	Fisheries Administration	5
5	Specialized Institutions	6
6	Corporations	8
7	Cooperative Societies	9
8	Fishery Resources	10
9	Production	11
10	Craft and Gear	12
11	Landing Centres	13
12	Handling and Processing	13
13	Marketing and Distribution	14
14	Export and Import	15
15	Ancillary Industries	15
16	Socio-Economics	16
17	Government Policy	17
18	Development Plans	18
19	Bibliography	19

Tables

1.1	School Enrolment	1
1.2	Population by category of workers	2
1.3	NNP in West Bengal and India	2
1.4	Consumer price index numbers of food items for agricultural labourers	3
3.1	Introduction of mechanized craft	5
4.1	Total expenditures 1976/77 - Fisheries	6
9.1	Marine Production 1976/77	11
13.1	Fish consumption versus requirements (1976)	14
14.1	Export of marine products (1974 - 1976)	15
16.1	Castes engaged in coastal fishing	16

Appendices

1.1	Map of coastline of West Bengal	20
3.1	Marine fisheries development schemes in the past (before 1974/75)	21/22
4.1	Organization of the Directorate of Fisheries	23
4.2	Functions of organizations related to fisheries	24
4.3	Financial Plan 1977/78, Expenditure 1976/77; Directorate of Fisheries	25
9.1	Commercial Species of Marine Fish	26
11.1	Small-Scale Marine Fisheries Landing Centres (1974/75)	27
13.1	Flow of fish from producer to consumer (1976/77)	28
13.2	Fish flow into Calcutta	29

1 STATE DATA

1.1	Location:	Northern part of Bay of Bengal; coastal borders with the State of Orissa in the South, and Bangladesh in the East. Latitudes: 21.5°N - 24.5°N Longitudes: 86°E - 89°E (Map in Appendix 1.1)		
				All India*
1.2	Size:	Area:	87,853 km^2	(2.6%)
		Coastline:	64 km	(1.0%)
		Continental Shelf (200 m):	20,000 km^2	(4.8%)
1.3	Population:	Total (1971):	44.3 million	(8.1%)
		Urban:	24.75%	
		Rural:	75.25%	
		Density (nos/km^2):	504	(177)
		Growth rate (period 1961-70):	26.9%	(24.8%)
		Birth rate (per year 1961-70):	16.6/1000	(41.1)
		Mortality rate (per year 1961-70):	6.2/1000	(18.9)
1.4	Education:	Literacy rate: (1971) Total:	33.0%	(29.5%)
		Males:	42.8%	(39.5%)
		Females:	22.1%	(18.7%)

Table 1.1 School Enrolment

Level	Age group	% of enrolment of the total population of age group	
		West Bengal (1969-70)	All India (1973-74)
Primary School	6 - 11	72.2	83.5
Middle School	11 - 14	30.0	35.6
Secondary School	14 - 17	(unknown)	21.2
Universities, Colleges	17 - 24	4.5 (after interpolation)	5.0

1.5	Health (1972):	Population per doctor:	1682 (4200)
		Population per hospital bed:	1039 (1809)
1.6	Nutrition (1971):	Calorie intake in % of requirement:	(78%)
		Per capita protein intake (gm/day):	(40 - 52)

* Figures within brackets in this column give the State share in percentage of All India or All India data, as applicable.

1.7 Employment (1971):

Table 1.2 Population by category of workers

Category	% of total population		% of total workers	
	West Bengal	India	West Bengal	India
1. Total Workers	27.9	32.9	100	100
(i) Cultivators	8.9	14.3	31.9	43.3
(ii) Agricultural labourers	7.4	8.7	26.5	26.3
(iii) Livestock, Forestry, Fishing, Hunting, Plantations, Orchards	0.8	0.8	2.9	2.4
(iv) Mining and Quarrying	0.3	0.2	1.0	0.5
(v) Manufacturing, Processing, Service, Repairs	3.9	3.1	14.1	9.5
(vi) Construction	0.3	0.4	1.0	1.2
(vii) Trade and Commerce	2.2	1.8	7.9	5.6
(viii) Transport, Storage and Communications	1.2	0.8	4.2	2.5
(ix) Other services	2.9	2.8	10.5	8.7
2. Non-Workers	72.1	67.1		

1.8 Net National Product:

Table 1.3 NNP in West Bengal and India

NNP excluded depreciations, included taxes, at factor prices		1973/74			1975/76
		West Bengal	India	West Bengal as % of India	West Bengal estimates
. NNP (1960/61 prices)	million Rs.	17,344			19,322.6
. NNP (1960/61 prices, per capita)	Rs	372.3			396.8
. NNP (current prices)	million Rs.	43,960.2	492,900	8.9	50,953.6
. NNP (current prices, per capita)	Rs	943.8	849.8		1046.3
. Index of wholesale prices (base 1960/61)			254.3		

1.9 Trade:

Exports — Products exported from the State of West Bengal to other States are: Jute yarns and manufactures, Tea, Engineering goods, Tobacco, Leather Products.

Imports — Products imported to the State of West Bengal from other States are: Coffee, Cotton, Wheat (products), Fish.

1.10 Prices:

Table 1.4 Consumer price index numbers of Food items for agricultural labourers (base year 1960/61 = 100).

	1970/71	1971/72	1972/73	1973/74	1974/75	APR 1976
West Bengal	222	226	233	302	371	298
Annual charge %		1.8	3.1	29.6	22.8	-19.6
All India	206	215	246	313	413	295
Annual charge %		4.4	14.4	27.2	31.9	-28.5

1.11 State Administration:

The West Bengal State is divided in 3 Divisions: Burdwan Division, Presidency Division and Jalpaiguri Division. Within each division districts form administrative units. There are 16 districts altogether.

Division	Districts
Burdwan	Burdwan, Birbhum, Bankura, Midnapore, Hooghly, Purulia.
Presidency	24 - Paraganas, Calcutta, Howrah, Nadia, Murshidebad.
Jalpaiguri	West Dinajpur, Malda, Jalpaiguri, Darjeeling, Cooch Behar.

The districts Midnapore and 24 Paraganas cover the coastal area. (Very often, for practical purposes, Midnapore is divided in East and West Midnapore and 24 Paraganas in North - and South Paraganas). Every district is again divided in blocks (development blocks).

2 INTRODUCTION

This document is primarily concerned with marine fisheries and specifically with the traditional small-scale coastal fisheries. However, frequent references are made to other sectors of the fisheries, such as inland fisheries, marine deep-sea fisheries, in order to put the marine small-scale sector in a proper perspective; the inland fisheries provide about 80% of the fish production; the landings of the deep-sea sector are negligible.

The fishery sector (inland and marine) contributes 1.9% to the State economy and the contribution shows an up-going trend.

By tradition fish is an important part of the diet of the population and the main role of the fisheries in West Bengal is therefore as a provider of food. The annual production amounts to about 280.000 tonne of which the marine sector accounts for about 50,000 tonne. About 25,000 tonne (wet weight) of dried fish, which is generally not eaten in West Bengal, are exported to other states. Some 25,000 tonne of fresh fish (inland and marine) are imported from other states. The consumption in the state is therefore about 280,000 tonne. This is equivalent to a per capita consumption of 6.3 kg/year, which falls short of the demand, resulting in high prices of fish.

The consumer preference is for fresh water fish, but because of the high prices of this commodity the demand of marine fish, which is available at much lower prices, is steadily growing.

The fisheries (inland and marine) provide employment to approximately 60,000 fishermen and related workers, excluding people engaged in ancillary activities such as boat building. This is about 0.5% of the working people in West Bangal. During the peak season (mid October till end February) the number of marine fishermen varies between 15,000 and 20,000. The majority of these fishermen are also involved in either agriculture or inland fisheries during the off season and some of them are migrants from other states (Orissa).

The export of frozen prawns amounted to about 1300 tonne in 1976. Most of these prawns are caught in small-scale brackish water operations. The value of this export is Rs.68.0 million, representing 5.8% of India's fish export value and 0.2% of the total India export earnings.

There are good potentials for an expanded small-scale marine fishery industry because of the big gap between demand and supply of fish.

3 BRIEF HISTORY

The widening gap between supply and demand of fish has gradually increased the need for development of marine fisheries.

General development lines pursued by the Government over the years are:

- Introduction of off-shore-fisheries.
- Financial support to needy fishermen.
- Better utilization of sharks and other trash fish.
- Support for cooperative marketing.
- Provision of landing facilities.
- Introduction of mechanized fishing boats.

Many of the Government intentions and schemes have failed or have not been implemented very often, due to lack of funds, but also because of inadequate institutional support.

Among the achievements in the marine sector are:

- Station Junput with a factory for the production of shark liver oil and fishmeal.
- Station Frezergange for exploratory and experimental fishing, operating 5 vessels (2 mechanized Bachhari, 2 nos. of 30' boats and 1 steel trawler).
- Landing jetty at Namkhana.
- Roychawk fishery harbour (52 km from Calcutta) to accommodate deep-sea trawlers.
- Introduction of mechanized craft, as shown below (table 3.1).

Table 3.1 Introduction of mechanized craft

	1954	1969	1973	1976	1977	Commissioned
Government						
Bachhari	2	2	5	4	26	13
30' CIFT boats				2	48	12
Private sector						
Bachhari						13
30' CIFT boats						2

Further details about development schemes, expenditures and achievements are given in Appendix 3.1.

In the past fish was imported from Bangladesh (maximum 4,000 tonne per year). In 1976 this import was only 1,382 tonne and has now ceased. A revival in the foreseeable future is not likely, in view of the high protein demand in Bangladesh itself.

It appears that the production increase of inland fish has slowed down in recent years, while the marine fish production is growing.

In the field of Marketing the foundation of the Central Fisheries Corporation Ltd (CFC) in 1965 is noteworthy. It was established with the aim of stabilizing the market by competing with the traders controlling the wholesale markets in Calcutta. CFC is described in more detail in Chapter 6.

The Fisheries Directorate was previously part of the Agricultural Department but is now separate under a Minister which reflects the growing importance of fisheries and their development.

4 FISHERIES ADMINISTRATION

The State Government is directly responsible for the development of fisheries (inland, marine, estuarine) within the State.

The Central Government, however, has responsibility for planning at national level and for coordinating the activities of the various State Fisheries Departments.

The Directorate of Fisheries operating under the Department of Fisheries, carries out general administrative and coordinating activities and implements specific development schemes. There are about 1537 people employed in the Directorate, 703 technical officers and 834 administrative staff. Of these, 125

posts are located at Headquarters in Calcutta and the remaining 1412 posts are in the districts.

The organization of the Directorate is built up by technically oriented units at Headquarters and at field stations and by service oriented district units, as shown in Appendix 4.1.

The districts are divided into Blocks (Community Development Blocks), of which there are 335 in the 16 districts, 171 of these are of importance to fisheries. In each of these 171 Blocks there should b Fisheries Extension Officer, to be recruited and trained by the Directorate of Fisheries, to support the Block Development Officer. However some of the Fisheries Extension Officers posts have not been established and others are not filled.

The specific functions of the Fisheries Administration and the responsible institutions and units thereof are shown in Appendix 4.2.

The total yearly (1976/77) expenditure on fisheries in the State is Rs.26.4 million excluding financing and schemes executed by institutions outside the fisheries administration. The bulk of funds are allocated by the State Government, ref Table 4.1.

Table 4.1 Total expenditure 1976/77 - Fisheries

(Thousand Rs.)

° Plan expenditure	21,494
° Non - plan expenditure	4,111
° Total Directorate West Bengal	25,605
° Centrally sponsored (see chapter 18)	148
° Central Sectors	658
Grand Total	26,411

(Source: Directorate of Fisheries).

The main marine fisheries schemes under implementation are, the mechanization and improvement of fishing craft, support to co-operative societies and improvement of the socio-economic situation of the fishermen.

About 12.7% of expenditure in 1976/77 referred to marine fisheries, 50.7% to inland fisheries and the balance to shared schemes and administration, etc.

For further details see Appendix 4.3.

5 SPECIALIZED INSTITUTIONS

5.1 Research Institutes:

State of West Bengal

° West Bengal Fresh Water Fisheries Research Station:

This institution, located at Kulia, was established in 1959 at a cost of Rs.1.15 million.

Several district level sub-station have been set-up. Main activities are inland fishery

research and production of high quality fish seed for distribution.

The staff consists of about 20 people, and the budget allocation is Rs 1 million.

Central Government

- Central Inland Fisheries Research Institutions (CIFRI):

Established in 1947 in Calcutta, the Headquarter is now in Barrackpore near Calcutta. The institute has 3 sub-stations and 11 units.

The principal objective of the Institute is to study and elucidate the scientific principles which can be applied for fuller utilization of all available inland waters of the country for maximizing the fish production. The institute has about 228 scientific personnel and had a budget grant of Rs.6.81 million during 1974/75.

5.2 Training:

State of West Bengal

- There is a 6 months course for departmental junior fishery officers at the fresh water research station at Kulia.
- Training is given to educated unemployed to enable them to establish fish/fish-seed farms themselves. This training is given at Junput, Kulia, Berhampore and Malda.
- A short term vocational training course on composite fish culture is also given to private fish farmers in whose tanks the Block Demonstration Centres are operated.
- Senior officers are deputed for training at training institutes at Barrackpore, Hyderabad and Bombay.
- Members of fishermen co-operative societies in coastal areas are trained in the use of gear and craft, especially mechanized boats.

The amount spent by the Directorate on training and education in 1976/77 amounted to Rs.388,000.

Central Government

- Inland Fisheries Training Unit, Barrackpore:

There is a one year course, which offers a certificate in inland fisheries development and administration.

5.3 Development Institutions:

State of West Bengal

- Station Junput

Besides fish farms for development of inland and brackish water fish stocks there is a factory producing fishmeal (100 tons/year), shark liver oil (5000 ltr. deluted oil) and dried fish (500 kg).

- Station Freezergange

This station is the base of 2 mechanized bachhari boats, two 30 ft. CIFT boats and 1 steel trawler. It also operates a small "factory" where shark liver oil (350 ltr. crude oil) and fishmeal are produced.

Central Government

- Exploratory Fisheries Project (EFP):

The Headquarter is in Bombay. The sub-office at Calcutta undertakes exploratory fishing work in the Upper Bay of Bengal and operates one research vessel.

- Marine Products Export Development Authority (MPEDA):

The main objective of the Authority, with Headquarters at Cochin, is to develop the marine products industry with special reference to exports. There is a regional office in Calcutta.

6 CORPORATIONS

There are two corporations concerned with marine fisheries:

6.1 Central Fisheries Corporation Ltd. (CFC)

The CFC was established in 1965 by the Government of India to facilitate more Government control on fish supply and prices, mainly in Calcutta. While the CFC covers the whole of India, most activities are concentrated in the Calcutta area. The Corporation is buying fish at relative high prices and selling at relatively low prices in its own stalls at various retail markets. In Greater-Calcutta there are about 200 such stalls. The small margin between producer price and consumer price is possible because the wholesale phase is not entering into their marketing chain.

The value of the fish sold in 1974/75 amounted to Rs.21.84 million. About 6 tonne, which is 5% of the fish supply to Calcutta, is handled daily; the target is 12 tonne, of which 5 tonne should come from marine landings. The CFC was also the institution which handled the imports from Bangladesh; in 1975/76 this was 1,400 tonne. The import from other States into West Bengal by the CFC was 808 tonne.

The CFC has contracts with various suppliers, which stipulate floor prices, quantities and quality. The cooperative societies and governmental stations are, in principle, obliged to sell their fish to the Corporation. In Calcutta, the CFC has cold storage facilities (4 x 40 tonne capacity).

CFC is promoting the proper handling (e.g. use of ice) and marketing of fish and increased consumption of marine fish.

It is believed that the Corporation, after working at a loss for long periods, will be able to make modest profits in the coming years and become a sounder commercial enterprise.

The CFC has some side-line activities such as supply of pituitary gland and fish seed spawn to fish farmers.

6.2 State Fisheries Development Corporation Ltd.

This Corporation was established in 1966 for the development of sewage fed fish farms. Presently the corporation is operating farms at Digha, Alampur, Frezergange and a brackish water experimental farm at Henry's Island.

However, attention is now focussing on a deep-sea fisheries project with the objective of exporting frozen prawns. Four Mexican built trawlers have been ordered (23 m), which will be based at the new Roychawk harbour. It is envisaged that 500 tonne of fish per vessel per year will be landed. Of these landings 25% will consist of prawns and 10% of quality fish.

In the Roychawk fishery harbour the Corporation will operate an ice plant, cold stores and freezing units (still to be installed at a cost of Rs 8 million).

The Corporation has a Headquarter staff of approximately 10 officers. The recurring expenditures and other costs were Rs.0.75 million, while the revenue from farms amounted to Rs.0.2 million, thus resulting in a loss of Rs.0.55 million.

7 COOPERATIVE SOCIETIES

In West Bengal there are 767 primary fisheries cooperative societies and 8 central societies. They were mainly established as "credit-societies", channelling loans to their members to enable them to start fishing. Sometimes the societies also help fishermen to get through periods of financial difficulties.

In the two coastal districts the number of societies is:

	Midnapore East	24 Paraganas South
Number of primary societies (of which active)	27 (19)	19 (10)
Number of central societies	1 (Contai)	1 (Diamond Harbour)
Average number of members of a society	70	60

Not all of these societies are involved in marine fisheries.

It is estimated that in those two districts, 30% of the fishermen are members of a society, while in areas covered by governmental support to societies, 80% are members.

The conditions for becoming a member are to be at least 18 years, live in the area of the society and to buy at least one share of Rs.10. One of the problems of becoming a member is the condition that one should live in the "society area", since many marine fishermen migrate and operate at different places.

Development schemes concerned with the issue of gear and craft are mostly carried out through the cooperative societies. After obtaining a boat the society selects 5 - 6 crew members to operate it. The system of income calculation is as follows:

Fish landings value	Rs.100
% Labour cost handling charges	5
	Rs. 95
To be divided amongst the crew*(47.5%)	45
	Rs. 50
Repay loans, costs fuel, food, reserve fund	X
Profit	Rs. 50 - X

The profits are divided in relation to the number of shares the respective members possess.

The societies which are receiving Government loans and/or grants are in principle obliged to sell their landings(edible varieties) to the CFC.

The following credit schemes serve the cooperative societies.

a. National Cooperative Development Corporation (NCDC) coastal mechanization scheme (marine)

The supply of mechanized craft and nets for coastal societies is operated by the Directorate but to a large extent financed by the NCDC.

The NCDC gives a subsidy of 20% and the State Government pays a share of 25%, which can be paid back over a long term. The effect is that the NCDC loan is 55% of the investment. During the first two years only interest on the loan is paid: 10 3/4% and if paid on time: 8 3/4%. During the years 3 - 10 the loan is repaid in instalments plus interest. If after 8 years everything is paid according to plan, the balance of the loan (years 9 - 10) is written off as a grant.

* The fishermen are allowed to distribute among themselves the low quality fish, which is not traded.

b. Credit through the Cooperative Department of the State Government (inland and marine)

(i) State Government buys shares up to a maximum of twice the sum of the shares paid up by the societies to enhance the societies' borrowing power.

(ii) Credit for boats and nets. The Cooperative Department gives a subsidy of 25%. The loan, covering 75% of the investment is repayable in 10 years against 8 1/4% interest.

(iii) Credit for office building. The same conditions prevail here as under (ii).

(iv) Credit for maintaining a society manager. The State Government grants Rs.1,800 per society.

c. Assistance to "needy" fishermen (inland and marine)

Loans are granted by the Fisheries Department for country boats, nets and fingerlings. The loans are repayable against 8% interest in four years for boats, in three years for nets, and in one year for the fingerlings. The highest possible loan is the minimum of (a) ten times paid up societies shares and (b) the number of members times Rs.400.

8 FISHERY RESOURCES

Very little is known about the fishery resources in the marine waters of West Bengal. No surveys have been undertaken except for some limited effort in off-shore waters. Real statistics of landings and species composition do not exist and only scanty qualitative information is available from the commercial fleet.

Seasonal climatic and oceanographic variations are determined by the two monsoon periods which influence the fisheries. The peak season is during the fair weather period i.e. from mid-October to end February. During the rest of the year, there is practically no fishing in the open sea. The weather, during this period is too rough for the traditional craft and larger vessels cannot operate in the absence of protected sites for landing and berthing. The availability of fish might also be lower in this period, but supporting evidence i.e. quantitative data are lacking.

The continental shelf of West Bengal is wide (about 150 km) and shallow and has an area of about 20,000 km^2. The bottom is muddy and its configuration is affected by the large river systems and tidal currents.

The Exploratory Fisheries Project (EFP) is surveying demersal resources of the outer part of the shelf. This survey has been undertaken mainly in water depths from 20 to 40 metres and not closer than about 90 km from the coast. No concentrations of high value species except prawns have been encountered in the area surveyed. The catches consist of about 30% of skates and rays, and of small quantities of miscellaneous species.

A recent summary of the findings of the EFP concludes that the yearly potential yield of demersal species of the upper East Coast is about 130,000 tonne. This would mean about 50,000 tonne, in the waters off West Bengal. However, the estimates are based on exploratory fishing mainly undertaken off the Orissa coast and may not be valid for the shallow water area off West Bengal.

The information about the pelagic resources is limited to the knowledge, which is incomplete, of the landings of the existing traditional fisheries employing gillnets and stationary bag nets.

9 PRODUCTION

Fish production in West Bengal is believed to be:

Inland Fisheries	230,000 tonne
Marine Fisheries (small-scale coastal)	50,000 tonne
Total	280,000 tonne.

However the statistics appear to be affected by large margins of error. The official record of the marine production (1976/77) is 16,000 tonne, but the Marketing and Statistics Department of the Directorate of Fisheries in West Bengal estimates after a recent production survey at the landing centres, that the production of marine fish in 1976/77 was 50,000 tonne. A breakdown of this production by category is shown in Table 9.1.

Table 9.1 Marine Production 1976/77

Type of Operation	Type of boat	Nos boats	Landing in tonne (approx)	Species
∘ Launch operation mainly by Kachal "Gillnetting"	216 mech.Launches with 900 non-mech. boats	116 (Diamond-Harbour)	12,000	Hilsa 90% other 10%
∘ Bhasani, Chhandi etc. "Gillnetting"	Un-Mechanized "Bachhari", "Chhot" (very few boats mechanized)	100 (Digha) 1380 (mainly Digha)	11,000	Hilsa 30% other 70%
∘ Behundi	Un-mechanized "Bachhari"	608	24,000	Bombay duck, Ribbon fish, Mackerel, Tapra, Bhola. All production is dried
∘ "Chhele-Fish Net" Fixed net	Un-mechanized "Chhot"	200	3,000	Big size sea fish, Chhele, Bhola, Dog fish.
Total			50,000	about 50% dried

(Source: Marketing & Statistics Department, Directorate of Fisheries, West Bengal).

Production of marine fish is entirely from the small-scale coastal operations.

A list of commercial marine fish species is given in Appendix 9.1.

The peak fishing season is from mid-October until end February during which about 80% of the production is landed. The remaining 20% is landed from mid-June until mid-October. During the rest of the year (end February until mid-June) hardly any marine fish is caught.

10 CRAFT AND GEAR

The marine small-scale fishing fleet is composed of (1977):

- Traditional craft About 3030
- Traditional craft (motorized) 50
- Gillnetters (30 ft) 22
- Launches 216

In the traditional fleet there are several Bengali type of boats under the names of Bachhari, Chhot, Dhinghy, (Botali, from Orissa). The boats vary in length from 6 m to 15 m and are characterized by raised and pointed ends and oval midship section, usually without a keel. They are carvel built with the planks butted together by "staples". They are partly decked with loose planks and have a tunnel-formed bamboo cover placed midships as protection against sun and rain. They are driven by sails and oars. A 8 m long Dinghy costs about Rs.2,000, a 14 m Bachhari about Rs.9,500 and a 11 m Chhot about Rs.11,500.

The traditional craft are employed in ~~two major~~ types of fisheries, (i) gillnetting (about 2250 units), (ii) behundi (stationary bag nets) fishing (about 610 units) and (iii) other methods.

(i) Gillnetting is usually done within a 15 km range from the coast by individual boats but as far as 70 - 90 km off-shore in a fleet of five to six units supported by a launch which tows them to and from the fishing area. The crew complement in each boat is 6 - 7 men. A full set of fishing gear is 120 pcs. of 300 x 10 cm. mesh thin (210 d/2 x 3) nylon nets. The total length of a set is about 1500 m. The usual depth of a net is 10 - 12 m. but nets of twice that depth i.e. 20 m. have recently been employed in the fishery.

Species caught are hilsa (70%) catfish, pomfret and miscellaneous. The average catch rate is in the order of 100 kg/day. The individual boats make day-trips while the boats operating with a launch stay out for about a week.

(ii) The Behundi fishery takes place in the delta creeks. Each boat operates two nets. The net is in the form of a trawlnet and is fixed in the wings and stretched in the water by the tidal current. The nets are about 10 - 12 m. long and 5 - 7 m. wide. They are emptied each time the tide turns, i.e. four times per day. The fish caught is "bombay duck", ribbon fish, potna, chola, tapra, etc., of low value nearly all of which is dried. The boats are operated by about 10 men.

(iii) Other fishing methods in the area, not of a significant importance, are long-lining, beach seining and chhola-netting. The long-lining is carried out from a small dinghy or salti boat with 3 - 4 men onboard, operating about 300 hooks. The beach seining takes place in the Digha area and there are about 20 units each employing about 20 people. With the Chhola net (fixed-net) larger sea fish are caught. There are about 200 units operating this net.

The mechanized traditional boats are of the larger (14 m) Bachhari type equipped with a 12 hp. marine diesel engine. Of the 50 units only about 20 are in operation. Thirty new boats have just been completed and are to be distributed. These boats are also employing gillnets in a similar manner as the non-mechanized boats but have of course higher mobility. The cost of a motorized Bachhari is (in 1976) Rs.50,000 (excluding fishing gear).

The 30 ft. gillnetters are of the CIFT type equipped with engines of 37 hp. Of the 22 units 10 are presently being distributed to fishermen's cooperatives. These boats are also employed in the gill-net fishery. The cost is (in 1976) Rs.75,000 (excluding fishing gear).

The launches operating as mothership for the traditional craft are 16 - 18 m. in length and are equipped with 120 - 220 hp engines. They have insulated holds and carry ice. The capacity of the launches is about 20 tonne.

11 LANDING CENTRES

The coast line of West Bengal can be divided into two different parts i.e. the more open Contai coast in the west and the delta area in the east. Since most of the fishermen migrate to the coast during the season there are very few permanent fishing centres. The fish is landed close to temporary camps, where the fishermen stay.

The important landing centres, craft and gear employed and production are given in appendix 11.1.

Some boats land their fish at the open beaches, while others, especially the bigger ones, utilize river mouths and lagoons and land the fish on the banks; the latter are very often dependent on the high tide to reach the landing sites.

Coastal facilities for landing (e.g. jetties) and handling of the fish are non-existent.

About 50% of the "mother-ship" launches, land their fish at Diamond Harbour, located at the bank of the Ganga (Hooghly) river, 48 km from Calcutta and 80 - 90 km from the coast.

Closer to the coast is Namkhana, where a new landing jetty is under construction. This landing site will mainly be used by river and brackish water fisheries.

A Roychawk a fishery harbour is being built, which will provide facilities for deep-sea fishing vessels. The distance to the sea is about 85 km and to Calcutta 52 km.

12 HANDLING AND PROCESSING

Generally the traditional fishing craft land their catch daily and do not carry ice, except for a few boats operating nets from Namkhana.

The "launch operation" is different; the launches tow 5 - 6 country boats to the fishing area, where they stay for 7 - 10 days. The fish caught by the country boats is iced and stored in the launches until landed.

Fish is generally not stored at landing places, but transported as soon as possible to the various markets by van. It is packed with ice in 40 kg baskets. The ice is often brought to the landing site by return load on the fish trucks. A truck load from Diamond Harbour to Calcutta (48 km) of 3 tonne of fish costs Rs.150 (excluding ice and baskets). The price for ice is about Rs.0.15 per kg.

There are several private ice plants in the Calcutta area which satisfy the demand for ice at the fish landing centres. The total production of ice is some 100,000 tonne which is less than half of installed capacity.

Outside Calcutta there are ice plants at Digha (5 tonne/day) and Diamond Harbour (4 tonne/day) and there is one planned for Namkhana (8 tonne/day). At the new Roychawk harbour an ice plant and cold storages will be erected.

Only the CFC in Howrah is using cold storage for storing fish (4 x 40 tonne units).

The marine catches landed by the launches and gillnetters (about 25,000 tonne) are consumed in the fresh form. The landings from the Behundi netting operation (about 25,000 tonne) are dried and transported to other Indian States, especially Assam. In West Bengal virtually no dried fish is consumed. Freezing is only employed for export prawns, which mainly come from brackish water sources.

At the Government stations in Junput and Freezergange there is a small production of fishmeal and shark liver oil, which can be considered as pilot plant operations.

There is no fish canning operations in West Bengal.

13 MARKETING AND DISTRIBUTION

The demand for fish in West Bengal is high, since about 95% of the population are fish eaters. The supply does not meet the demand and fish prices are consequently high. The deficit in 1976 based on a requirement of 50 g/day/ capita is indicated in Table 13.1. Although the established requirement may be unnecessarily high the shortage of supply is evident.

Table 13.1

Fish consumption versus requirements (1976)

Centre	Requirement based on 50 g/day/ capita (1000 tonne)	Actual consumption (1000 tonne)	Fish Deficit (1000 tonne)
Calcutta	60	28	32 (53%)
Greater Calcutta	143	63	80 (56%)
West Bengal	908	280	628 (69%)

(Source: Marketing & Statistics Division, Directorate West Bengal).

The supply of 280,000 tonne orginates from inland production (230,000 tonne), marine production (25,000 tonne) and imports (25,000 tonne).

About 75% of the marine fish production is consumed in Calcutta and the rest in other parts of West Bengal.

Dried fish is not popular in West Bengal and is exported to other states through agents.

Appendix 13.1 shows the "fish flow" from landing site to consumer.

Most fish is sent to wholesale markets on consignment basis where it is generally auctioned. The auctioneers act as agents charging a commission of 3 - 5% for their services. The risk involved in the marketing of fish is therefore solely with the producer or the middleman purchasing fish from the producers.

Fish, landed by cooperative societies, which have received Government grants and loans, has to be sold to the CFC which in turn, sells the fish in retail market stalls.

Calcutta is a large and dominant market. There are several wholesale markets of which Howrah, Chhagalhata and B.K. Paul are the biggest. Their daily turnovers are 54, 13 and 8 tonne respectively, representing 32%, 8% and 5% of the Greater Calcutta supply. The quantity handled by the CFC is growing steadily and is now about 6 tonne daily.

A large part of the fish sold at Howrah is imported from other states in India. A wholesale agent at Howrah has about 30 (estimated average) suppliers all over India. The sources of the imports are Orissa (41%), Andhra Pradesh (27%), Uttar Pradesh (10%), Maharastra (8%), Tamil Nadu (6%) and other states (8%). Chhagalhata's major supplier is the fishery of the Freezergange coastal belt.

The fish flow, entering Calcutta through 12 entry points, is shown in Appendix 13.2.

There are 130 wholesale agents at Howrah and 170 at the other wholesale markets of Calcutta.

There are about 3,000 retail traders in Greater Calcutta at 110 markets, which means 27 per market. Ten of these markets are administered by the municipality of Calcutta. The turnover and profit made by the retail traders vary according to the neighbourhood in which the market is situated. The daily turnover varies from 80 kg for a big trader to 10 kg for a small one. Their net profit is in the order of Rs.0.75/kg.

The strong consumer preference for inland fish is reflected in the high prices. Good quality Carp species fetch prices of 15 Rs/kg or more at the retail level. The marine species on the other hand fetch less than half that price. Indicative prices are : Hilsa 10 Rs/kg, Pomfret 5 Rs/kg, Sardines 3 Rs/kg.

The mark-up (difference producer-consumer price) is low, about 20-25% for fish supplied from areas near Calcutta and in Orissa and 30 - 35% in case of fish coming from more remote places. The CFC has a mark-up of maximum 20%.

14 EXPORT AND IMPORT

In 1976 about 1,300 tonne of marine products were exported, the bulk of which was frozen brackish water prawns.

Table 14.1 Export of marine products (1974 - 1976)

Year	Quantity in tonne		Value in Rs.1000	
	West Bengal	% of Indian total Marine export	West Bengal	% of Indian total Marine export
1974	582.5	1.68	14,620	1.30
1975	896.5	1.91	30,200	3.20
1976	1278.5	2.27	68,022	3,94

Source: MPEDA - Calcutta

The export has increased rapidly over the last three years and there is good potential for a further growth to which the deep-sea trawler project of the State Fisheries Development Corporation will contribute.

The import of fish from Bangladesh was 2,623 tonne in 1972/73 and 3,375 tonne in 1973/74. In 1975 only 1,382 tonne were imported and from January 1976 the import has been suspended.

15 ANCILLARY INDUSTRIES

The main ancillary industries are boatbuilding and net-making.

All traditional craft are constructed locally at temporary establishments. Carpenters set up their "boatyards" at places where they get the orders. All working methods are primitive without use of modern tools. The workmanship and quality is good. A 11 m Batchary is built in one month by 4 carpenters.

The 10 m CIFT boats are being built in a boatyard at Kakdwip. The construction is said to be completed in one month by 10 workers. There are another half a dozen boatyards in the Calcutta area building launches.

Nearly all fishing nets are made by hand by fishermen and their families.

16 SOCIO-ECONOMICS

Most of the marine fishermen are also engaged in inland fisheries and some work during the off-season in agriculture or have other occupations. It is therefore difficult to define a West Bengali marine fishermen and describe his socio-economic conditions. The information given below is extracted from a census in 1971, which at least partly relates to the population dependent on marine fisheries.

According to the 1971 census there are approximately 60,000 people occupied in the Bengali fisheries. During the peak season it is estimated that 15,000 fishermen are employed in marine fishing, some of which come from other states. They usually live in temporary settlements during this time.

The profession of fisherman is still restricted to members of special castes and sub-castes. The castes of which members are fishing in coastal areas are Jalia Kaibarta, Jhalo Malo/Malo, Mal and Rajbanshi.

It is estimated that about 45% of the population of these castes are working in the fishing industry. The population is given in Table 16.1.

Table 16.1 Castes engaged in coastal fishing

Caste	Total population	Working population	Average family size	Married
Julia Kaibarta	117,400	25,300	5.51	38%
Jhalo Malo	68,800	19,500	5.49	32%
Mal	117,700	46,100	unknown	42%
Rajbanshi (mainly agriculture)	1,201,700	394,700	5.82	42%
Total	1,505,600 = 3.4% of West Bengal population	485,600 = 3.9% of West Bengal working population	5,58	40%

Source: Survey by Institute of Management Calcutta (1972)

For the population of the mentioned castes the income, from all sources, is as follows (1972 figures):

Income/family			Income/capita		
Annual	:	Rs. 2,670	Annual	:	Rs. 479
Monthly	:	Rs. 222	Monthly	:	Rs. 40

The distribution of the monthly family income is (1972):

Rs. 100	21% of the families
Rs. 101 - 250	59% of the families
Rs. 251 - 500	11% of the families

The way they spend their income gives an indication of the low standard of living:

Food	82.5%
Clothing	6.0%
Education	0.8%
Medical	1.8%
Repayment Loan/ Interest	1.5%
Others	7.4%

The mechanization programme has not yet progressed enough to analyse its income effects.

Only a few fishermen (10%) own boats. Often an owner of a boat operates together with net owners in a joint venture. The fish landings are divided according to shares related to the input. There are not necessarily family ties between the crew members. Another commonly practised system is that a middleman owns and/or manages the entire operation including marketing and employs fishermen at a fixed share rate of the proceeds. The middleman also organizes the transport of boat equipment and housing utensils for the fishermen. This system is also common to the launch operations.

In the case of beach seining very often fishermen contribute their own pieces of net, which, put together, are operated by the whole group. The earnings are divided accordingly.

In all share systems there is a high dependance by the fishermen on the middlemen/owners. The latter pay advances to enable the fishermen to maintain their families which stay behind in the villages. At the end of the season the final settlement is made, often resulting in a debit balance for the fishermen. For the next season, whether in debt or not, fishermen generally prefer to stay with the same middleman.

The educational level of the fishermen castes is low; 75% are illiterate (West Bengal: 67%), males 62% (West Bengal: 57%) and females 89% (West Bengal: 87.9%).

With regard to the housing, about 60% of the families among the fishermen castes live in houses made of mud walls and straw roofs.

17 GOVERNMENT POLICY

The policy in the 5th Five Year Plan, as stated in the annual plan for 1977/78 of the Directorate of Fisheries of West Bengal, is as follows: -

- To increase the production of fish in the State, both in Inland and Marine Sectors, by utilizing all resources through extensive application of modern technology.
- To cater for the welfare of the fishermen and educated unemployed through promotion of cooperative societies for them and welfare schemes (grants, loans).
- To train fish farmers, fishermen, educated unemployed and officers in the latest improved technology.
- To introduce administrative and financial reforms for the most productive and judical expenditure in Budget allocations.

These general lines imply a number of special schemes, which are dealt with in Chapter 18.

The main policy of the Directorate concerning the marine small-scale fisheries is to issue mechanized boats through cooperative societies and to support these societies financially by supplying loans and grants.

The Directorate also supports and sometimes implements various schemes forthcoming from the central government development policies.

18 DEVELOPMENT PLANS

Based on the functional pattern and funding arrangements, the various fisheries plans are classified in three categories:

- State sector schemes.
- Centrally sponsored schemes.
- Central sector scheme.

The State sector schemes, which are the most common, are formulated, financed and administered by the State.

A centrally sponsored scheme, sanctioned by the Central Government, is to support the states financially. These schemes are administered by State Government.

The central sector schemes are handled entirely by the Central Government.

For the marine fisheries the following schemes are included in the plan of the Directorate of Fisheries.

18.1 State Sector Schemes

(a) Development of coastal fishing by mechanization and improvement of fishing craft

There are four activities some of which have already been started in the 2nd Five Year Plan.

(i) Survey and scientific investigation.

The coastal area of the state will be thoroughly surveyed with different types of craft and gear to locate the best fishing grounds and to produce biological data. An experimental marine fish farm will also be set up.

(ii) Standardisation of craft and gear.

The special circumstances prevailing in the coastal area necessitate the need for craft and gear different from that in other Indian States.

(iii) Organization of Cooperative Societies for commercial fishing and issue of mechanized boats on favourable conditions.

(iv) Utilization of existing boats; mechanized boats are given to societies on hire basis.

The financial outlay for the 5th Five Year Plan is Rs 11 million. Two hundred boats are planned to be issued; the initial financing by NCDC amounts to Rs 40 million.

(b) Production of shark liver oil.

Originated during 2nd Five Year Plan, this scheme will in the coming years increase the production of shark liver oil by the installation of modern equipment in Freezergange and Junput.

For the 5th Five Year Plan the financial outlay is Rs.1.9 million.

(c) Miscellaneous (only partly marine fisheries)

- Training of educated unemployed people
- Welfare of fishing communities
- Assistance to needy fishermen of the State
- Assistance to cooperatives

Together these schemes have a financial outlay of Rs.6.3 million in the 5th Five Year Plan.

18.2 Centrally Sponsored Schemes

(a) Support for construction of shore installation at Roychawk through the State Fisheries Development Corporation Ltd.

The State Fisheries Development Corporation will start deep-sea trawling by 4 Mexican built shrimp trawlers and establish and operate shore facilities in the new harbour at Roychawk. The entire capital costs of the project will be met by the Government of India. The total cost of the harbour facilities is Rs 38 million. The shore facilities will cost another Rs 0.8 million.

(b) Construction of a fish landing jetty at Namkhana.
The total cost of this jetty is Rs. 0.825 million.

18.3 Central Sector Schemes

(a) Infrastructural facilities for development of coastal fishing villages.

An integrated development (roads, water supply, curing yards, service facilities etc) is planned for two clusters of villages. These are Jalda (in Midnapur) with a population of 1120 active fishermen in 14 small villages and Noorpur (in 24 Paraganas) with a population of 777 active fishermen in 5 small villages.

The cost of the project is Rs. 5.6 million and the Central Government will contribute Rs. 4.2 million and the balance will be borne by the State Government.

9 BIBLIOGRAPHY

1. ____ 1974 - Master Plan for Fisheries Development West Bengal. Master Plan Committee for Fisheries Development, Government of West Bengal, Calcutta.

2. ____ - Annual Plan 1977/78, Directorate of Fisheries West Bengal, Calcutta.

3. ____ 1976 - Annual report 1974 - 75, Central Fisheries Corporation Limited, Calcutta.

4. ____ 1976 - Annual report 1975 - 76, State Fisheries Development Corporation, Calcutta.

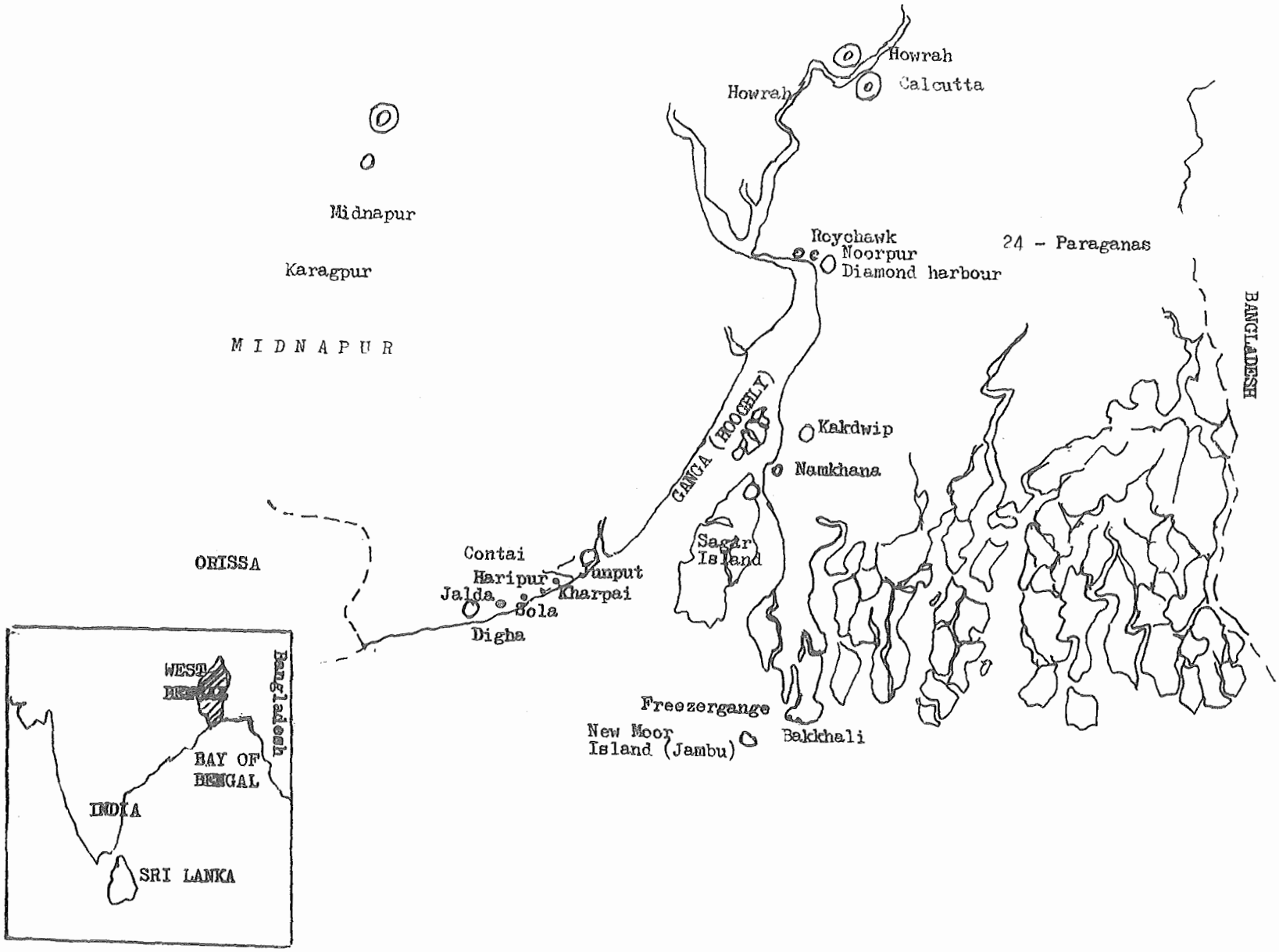
5. ____ 1976 - Results of demersal Fisheries resources survey along the East Coast of India 1959 - 74. Bulletin No.5 Exploratory Fisheries Project, Bombay.

6. ____ 1976 - Annual Report of the Exploratory Fisheries Project, Calcutta Base for 1975/76, Exploratory Fisheries Project, Calcutta.

7. A.K. Sen 1972 - Fishery Handbook, Directorate of Fisheries West Bengal, Calcutta.

Appendix 1.1

Map of Coastline of West Bengal



Appendix 3.1

Marine fisheries development schemes in the past (before 1974/75)

(in million Rs.)

Name of Schemes	Pre 5 year Plan		1st Plan 1951/52 - 1955/56		2nd Plan 1956/57 - 1960/61		3rd Plan 1961/62 - 1965/66		4th Plan 1969/70 - 1973/74		Achievements/ Remarks
	Plan Provision	actual expenditure	Plan Provision	actual expenditure	Plan Provision	actual expenditure	Plan Provision	actual expenditure	Plan Provision	actual expenditure	
* Exploitation of offshore fisheries at Contai Coast	0.41	0.18									Scheme abandoned after heavy losses; it was found out that there was not much of a prospect.
* Distribution of capital goods among needy fishermen (only partly marine)	1.33	0.5	0.75	0.34							
* Production of shark liver oil, fish meal, processed fish and utilization of other fish by-products	0.4	0.08	0.38	0.12	-	-	0.27	0.22	0.5	0.88	At Junput and Frezergunge there are small plants in operation.
* Sea fishing with Danish Cutters	?	0.68	6.1	2.5	2.7	0.01	2.4	-	-	-	Scheme abandoned, objectives as extension, education and research were not met.
* Assisting the needy fishermen of the State by granting loans (only partly marine)					0.43	0.17	0.5	0.27			Scheme continued in 5th Plan.
* Exploitation of coastal fisheries of the State by mechanizing indigenous fishing crafts					0.44	0.11	0.5	0.53	0.6	0.9	Continued in 5th Plan.
* Pilot scheme for reorganization of Calcutta fish markets on cooperative basis (only partly marine)							1.53	0.3	0.5	0.55	No achievement.

Contd/...

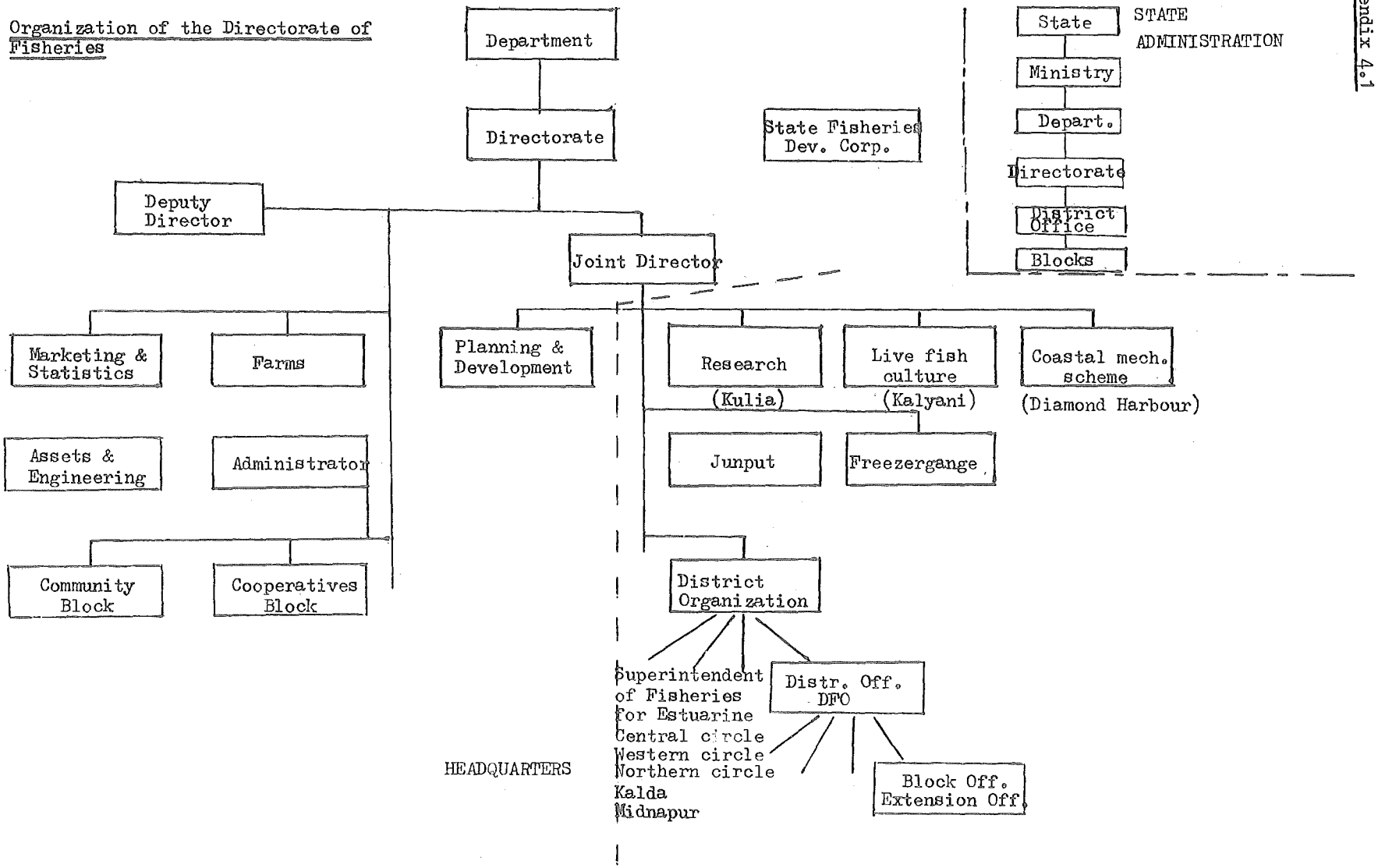
Appendix 3.1 (Contd/...)

Name of Schemes	Pre 5 year Plan		1st Plan 1951/52 - 1955/56		2nd Plan 1956/57 - 1960/61		3rd Plan 1961/62 - 1965/66		4th Plan 1969/70 - 1973/74		Achievements/ Remarks
	Plan Provision	actual expenditure	Plan Provision	actual expenditure	Plan Provision	actual expenditure	Plan Provision	actual expenditure	Plan Provision	actual expenditure	
* Provision of harbour facilities to coastal fishermen to enable them to continue fishing operations for longer periods							1.3	-			No achievement.
* Investment in CFC capital outlay (partly marine)								1.5			CFC operates develops into a commercial enterprise.
* Assisting the needy fishermen of the State and their cooperatives by loans.									3	1.9	Scheme continues in 5th Plan.
* Welfare of fishermen community									0.25	0.7	Scheme continues in 5th Plan.
* Supply of fishing boats at subsidized rates (only partly marine)									0.02	-	Scheme continues in 5th Plan.

Appendix 3.1 (Contd/...)

Appendix 4.1

Organization of the Directorate of Fisheries



Appendix 4.2

Functions of organizations related to fisheries

. Statistics, landings		. Directorate; division Marketing & Statistics; only just started activity.
. Statistics, boats		. Directorate; division Marketing & Statistics; only just started activity.
. Statistics, marketing		. Directorate; division Marketing & Statistics. Officers are stationed at some markets.
. Landing facilities development		. State Fisheries Development Corporation and/or special offices appointed in connection with special schemes.
. Introducing new craft		. Directorate, under special scheme; mechanization of coastal craft.
. Licensing fish dealers/ auctioneers/importers		. Directorate; division Marketing & Statistics.
. Cooperative societies support and contact		. Directorate; Cooperative wing.
. Loans		. Directorate; Contacts through District Fishery Officer (to NCDC etc.).
. Extension services		. Directorate; Block Extension Officer.
. Management of Markets		. CFC/private.
. Marketing promotion		. Directorate; division Marketing & Statistics in cooperation with CFC.
. Various schemes	. introduction	. Directorate; Planning division
	. technical	. Directorate; support by technical units.
	. loans	. See Loans
. Harbour development		. Calcutta Port Authority (Central Government).

Appendix 4.3

Financial Plan 1977/78, Expenditure 1976/77, Directorate of Fisheries

Area of Interest/ Schemes	5th Plan				Non Plan (inclusive previous plans)				Total			
	Anticipated Expenditure 1976/77		Proposed Outlay 1977/78		Anticipated Expenditure 1976/77		Proposed Outlay 1977/78		Anticipated Expenditure 1976/77		Proposed Outlay 1977/78	
	absolute mill Rs.	% of total plan	absolute mill Rs.	% of total plan	absolute mill Rs.	% of total plan	absolute mill Rs.	% of total plan	absolute mill Rs.	% of total plan	absolute mill Rs.	% of total plan
. Marine	3.01	15.2	3.65	16.7	0.26	4.4	10.98	65.7	3.27	12.7	14.64	38.0
- Scheme for construction of shore installation of Roychauk	-	-	-	-	-	-	-	-	-	-	-	-
- Scheme for large-scale production of Shark Liver Oil	0.22	1.1	0.30	1.4	0.03	0.5	0.03	0.2	0.25	1.0	0.33	0.9
- Scheme for dev. coastal fisheries by mechanization of craft	2.79	14.1	2.35	10.7	0.23	3.9	10.95	65.5	3.02	11.7	13.31	34.5
- Scheme for infrastructural facilities for dev. of marine fishing village	-	-	1.0	4.6	-	-	-	-	-	-	1.0	2.6
. Inland	11.28	57.1	12.95	59.2	1.71	29.0	1.64	9.8	13.0	50.7	14.58	37.8
- fish farms	1.90	9.6	2.50	11.4	0.87	14.8	1.04	6.2	2.77	10.8	3.53	9.2
- hatcheries	0.03	0.2	0.05	0.2	-	-	-	-	0.03	0.1	0.05	0.1
- various	9.35	47.3	10.40	47.6	0.84	14.2	0.60	3.6	10.2	39.8	11.00	28.5
Schemes for both marine and inland Education/Training	1.56	7.9	2.06	9.4	0.21	3.6	0.22	1.3	1.77	6.9	2.28	5.9
. Direction/ Administration	0.3	1.5	0.70	3.2	3.71	63.0	3.87	23.2	4.01	15.6	4.57	11.8
. Extension	3.61	18.3	2.50	11.5	-	-	-	-	3.61	14.1	2.5	6.5
Total	19.76	100.0	21.86	100.0	5.89	100.0	16.71	100.0	25.66	100.0	38.57	100.0

Appendix 9.1

Commercial Species of Marine Fish.

Family	English	Local
Exiphiidae	Sword fish	Gappara
Carcharinidae and related forms	Shark	Mora
Trygenidae and related forms	Rays	Maduwa
Clupeidae	Sardines	Salaya
	Herrings	Hurulla
Scombridae	Indian Mackerel	Kumbala
Trichiuridae	Ribbon fish	Savalaya
Mugilidae	Grey Mullet	Godaya
Lactariidae	White fish	Pulumna
Carangidae	Horse Mackerel	Parati
Mullidae	Mullet	Nagaraya
Stromateidae	Pomfret	Vauvalaya
Penacidae	Prawns	Issa
Paniluridae	Lobsters	Pokirissa
Portinudae	Swimming Crab	Moodhu Kakuluwa
Scyllaridae	Lagoon Crab	Kalapukakuluwa
Loliginidae	Squid	Dhalla
Cichilidae	Cichlids	Tilapia Koraliya
Cyprinidae	Carps	Hirikanaya Pethiya
Siluridae	Fresh water shark	Valaya
Heteropneustidae	Singing cat fish	Hunga
Ophiocephalidae	Snake heads	Loolla

Appendix 11.1

Small-Scale Marine Fisheries Landing Centres (1974/75)
(Source: Directorate of Fisheries West Bengal; division Marketing & Statistics)
excluding Launch operation

Centre	Gear (type)	Non-mechanized craft (nos)	Fishing days/year (nos)	Fish Production (tonne)	Catch/boat/day (kg)	Common species
East Coast						
. Bakkhali	Behundi	29	103	2,094	701	
. Hari Bhanga	Behundi	8	93	532	715	
. Jambu Dwip	Behundi	65	103	4,300	642	Bombay duck, Bhola, Ribbon fish, Shrimps, Phansa, Tepra
. Narayan Tala	Behundi	24	114	737	269	
. Sagar Island	Behundi	150	82	7,095	576	
. Frezergange Coast	Jagat Ber	2	373	56	75	Shrimps, Bhola, Catfish a.o.
	Kachal	9	121	52	48	Bhekti, Catfish a.o.
	Chhandi	318	286	6,519	716	Tepra, Ruli, Catfish, Hilsa, Pomfret, a.o.
West Coast						
. Contai Coast	Bhasani	1061	125	17,980	135	Hilsa, Pomfret, Mackerel a.o.
. Junput	Behundi	206	72	4,448	299	Shrimps
. Jalda	Behundi	99	68	4,539	674	Catfish, Shrimps
. Haripur	Behundi	27	73	725	367	Shrimps, Ribbon fish, Bhola.

Appendix 13.1

Flow of fish from producer to consumer (1976/1977)

(in tonne)

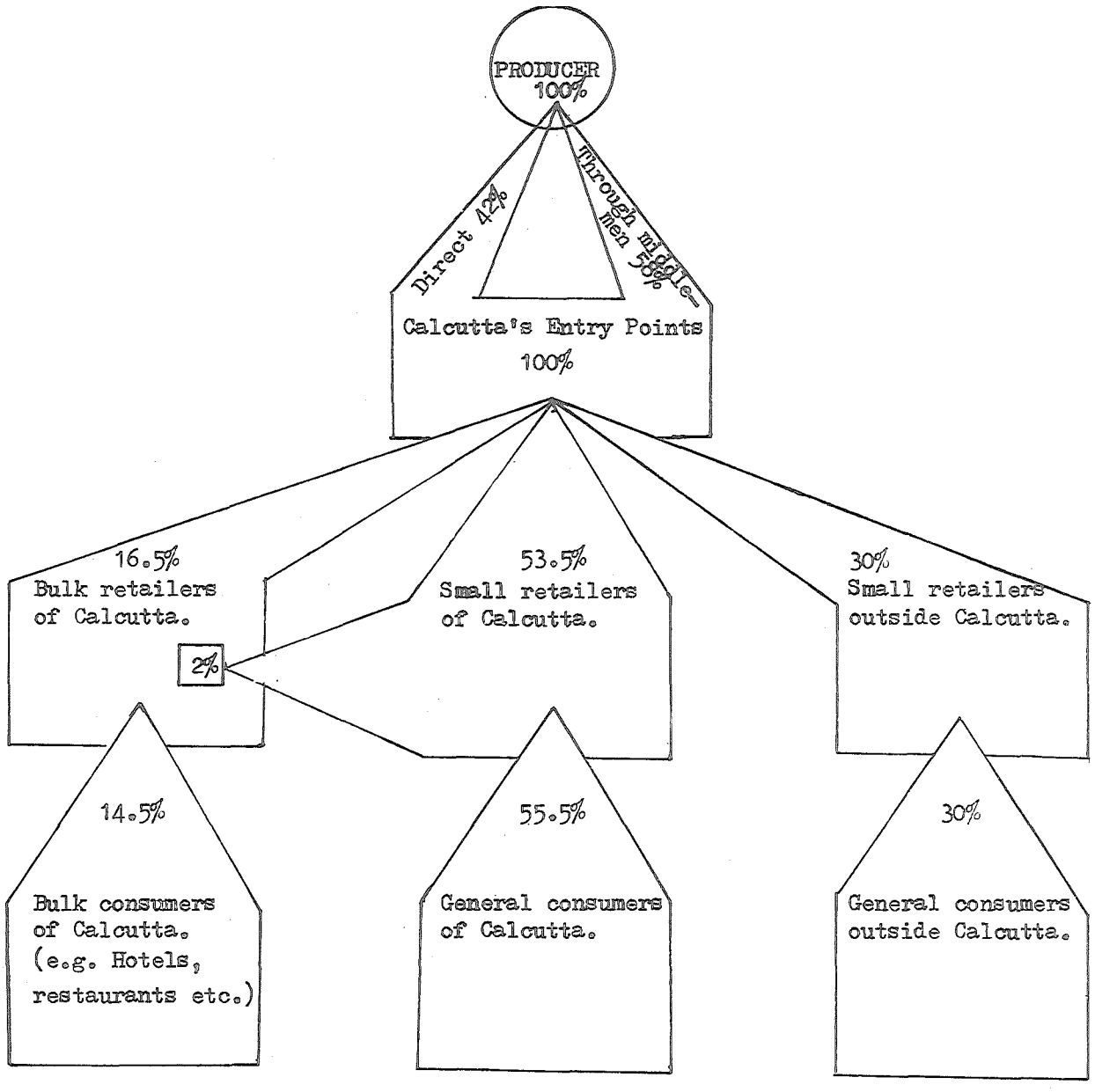
Source	Quantity	Destination		
		West Bengal (excluding Calcutta)	Greater Calcutta	Other States
Inland	230,000	213,900	16,100	
Marine — Dried fish (wet weight)	25,000			25,000
Marine — Fresh fish	25,000	5,000	20,000	
Import	25,000	4,000	21,100	
Total		222,900	57,100	25,000

Source: Marketing & Statistics Division, Directorate West Bengal.

Appendix 13.2

FISH FLOW INTO CALCUTTA

(through Calcutta's Entry Points, 1971)



Source: Marketing & Statistics Division, Directorate West Bengal.

Assessment of Problems and Needs in Marine Small-Scale Fisheries

WEST BENGAL
India

prepared by
L.O. Engvall, Project Manager,
in consultation with
Department of Fisheries, West Bengal

Development of Small-Scale Fisheries in Southwest Asia, Colombo, May 1977.

CONTENTS

		Page No.
1	Introduction	1
2	Fishing Craft	1
3	Landing Facilities	2
4	Marketing	2
5	Institutional Support	3
6	Recommendations	3

1 INTRODUCTION

The state of West Bengal has a fish eating population and there is a high unsatisfied demand for fish. The consumer preference is for fresh water fish, which is reflected in the high prices of carp and similar species. The marine fishery has played a very small role, but recent estimates* indicate that the production of marine fish may be as high as 50,000 tonne, which is about 20% of the total production in the state. Considerable quantities of Hilsa are caught and marketed during a short winter season, but it is believed that the prospects of increasing the catch of other marine species is good. There are three problem areas in which the major constraints for development can be identified.

The first problem is the low value of the marine species (except for Hilsa) as a result of the consumer preference for fresh water fish. The traditional background is probably that the marine fish supply has been irregular and very often in the past, marine fish brought to the major consumption centres was of poor quality because of inadequate handling and preservation. However, because of the big gap between supply and demand, it is considered that there are good prospects for increasing the demand for marine fish, and thereby also the prices to make expanded marine fishing operations economically viable.

The second problem is the short fishing season. Traditionally, fishing is only undertaken during the fair weather season, from October - March. This has been necessitated by the physical limitations of the primitive traditional craft which are not sea-worthy enough to operate during the rough weather season. Consequently, most of the fishermen are occupied in fishing only during a short period of the year, and have other occupations in inland fisheries and also in agriculture.

The third major problem is the lack of institutional support for development of marine small-scale fisheries. The marine sector has, if anything at all, been treated as a side line because of the traditional insignificance of marine fish as food.

2 FISHING CRAFT

The fleet of traditional craft consists of some 2,500 units of Bengali type of boats under the names of Batchary, Salti, Chhot, Dinghy, etc. A few (14) mechanized boats of more modern design are operated by the Fisheries Directorate and Cooperatives. There are also several launches operating as motherships for the traditional boats in the gillnet fishery.

The efforts made to mechanize the traditional craft have been successful as far as the technical aspects are concerned. However, the high costs of the engine (which is heavily taxed) and fuel, must be compensated for by increased production through higher mobility during the season, or through an extension of the fishing season. The first requirement is fulfilled, but an extension of the fishing period has not materialized as yet. The reason is not only the unseaworthiness of the craft, but also the built in traditions which prevent the country craft from operating in the open sea under rougher weather conditions. The further mechanization of traditional craft needs a re-appraisal of its economic feasibility.

The mechanized gillnetters of 30 feet in length, some of which are already in operation in West Bengal, are capable of operating during the major part of the year. The investment in such boats should, therefore, be encouraged and supported. They could, during the fair weather season, act as motherships for a few traditional gillnetters, a system which is already practised by the launches, and during the rest of the year fish independently. New boats should be equipped with insulated fish boxes or fish holds to enable them to stay out at sea for more than one day. A one day trip fishery for these boats is not likely to become profitable. The boats of this type, presently in use, have an engine power of about 40 hp. This is unnecessarily high for a gillnet fishery and consideration should be given to reduce the power to about 25 hp, thereby making savings on initial costs and costs of fuel for running.

No trawlers are operating in the coastal belt. Although there is no data on available resources in this area, an extrapolation of information from exploratory fishing activities further off-shore indicate that small trawlers (35 - 40 ft.) could be profitably employed. A gradual introduction of such

* The statistical service for marine fisheries is insufficient (ref. section 5 below).

craft could, therefore, be undertaken but must be accompanied by a trawling survey in near coastal waters and a careful monitoring of their performance to determine the requirements for large-scale investments in boats and training of skippers and engine drivers.

3 LANDING FACILITIES

There are no landing facilities in the coastal belt to cater for fishing craft. Higher up in the delta, along the Hooghly (Ganga) river, a small jetty is under construction in Namkhana, mainly intended to serve the stationary set net (behundi) fishery; simple jetties are available in Diamond Harbour, presently utilized by the "mothership" launches carrying hilsa from the traditional gillnet fleet; a new fishery harbour is under construction in Roychawk, intended for larger fishing vessels; shore facilities, and approach roads are planned for Jalda and Noorpur, in the Midnapur district, which are traditional landing sites for the behundi fishery.

A pre-requisite for the successful building up of a mechanized fishing fleet, and better utilization of the traditional fleet, is the provision of adequate landing facilities in the outer delta region. The steaming distance to Roychawk and similar places is prohibitively long for small craft (about 100 km or 10 hours). There are however, considerable physical problems because of the high tidal amplitude (about 3 metres), and frequent floods which by erosion continuously changes the topography in most areas.

The most suitable place appears to be Digha, from which a large number of traditional boats and launches are operating during the season. No other centres are closer to the fishing grounds than Digha and the road connections to Calcutta and other markets are good. Immediately east of Digha there is an approach canal, naturally kept open by the flow of drainage water, which can be navigated during high tide. The canal is presently being used for berthing of fishing craft. Between this canal and the main road to Digha there is an excavated area along the flood embankment running parallel with the road. At first sight this area appears to be suitable for a harbour basin. With reservations for specific engineering problems, the utilization of the natural physical conditions, an adequate low cost harbour could be established.

Another place in the outer delta, close to the fishing areas, is Freezergange where the Directorate is operating a small fishing station since many years. The feasibility of developing this site into a major fishing centre is questioned. It is very vulnerable to cyclones and floods, and the coastline in the immediate vicinity of the centre is rapidly changing because of heavy erosion. The remoteness combined with poor communal facilities and communications are other disadvantages. However, simple low cost jetties and berthing facilities may be justified and could easily be made without large investments.

The jetty in Namkhana does not appear to be the best solution on landing facilities for small craft. The jetty is too narrow to allow smooth and practical transportation of fish, equipment and ice and the loading and unloading will be unpractical because of the height of the jetty (necessitated by the tidal differences).

Serious consideration should be given to the utilization of floating pontoons (preferably of ferro-cement) as landing facilities in similar situations. There are many advantages such as; the elimination of the tidal problem; no fixed structures which, in some cases, may change the flow of water and thereby the drift of sand and mud; the possibility of moving to other sites or areas if required.

4 MARKETING

There is a high consumer preference for fresh water fish in West Bengal. This is reflected in the high prices which, at retail level, are about 15 Rs/kg. The corresponding prices for marine fish are only about 5 Rs/kg, which includes Hilsa (about 10 Rs/kg). Pomphret and Mackerel cost about 5 Rs/kg, cat fish and sardines about 3 Rs/kg and sharks and rays 2 Rs/kg or less.

In order to achieve an improved utilization of marine products, to the benefit of both the consumers and producers, an active sales promotion programme is required. An integrated approach is required with the main components being a propaganda campaign and demonstration of proper handling and preservation from the boat to the consumer; the sales promotion has to be combined with the physical evidence of good quality fish.

Such a scheme, which in the initial stages, would probably have to be subsidized should be entrusted to a suitable commercial venture. The demonstration of improved fish handling could be undertaken as pilot operations by contracting cooperatives now receiving fishing craft under different credit schemes.

5 INSTITUTIONAL SUPPORT

Most of the fisheries institutions in the State are geared to the support and development of fresh and brackish water fisheries and aquaculture. Support to marine small-scale fisheries is negligible and consists only of a mechanization scheme, the success of which has by no means been remarkable in spite of its long duration.

Without strong and meaningful government support in terms of planning, demonstration, extension and training, development is likely to continue to be slow. Such support is urgently needed in view of the large funds channelled through the cooperatives for investment in modern boats. Assistance is required for effective operation of these craft and for provision of supporting facilities to serve them.

The statistics and information about the marine fisheries are inadequate for planning purposes. This concerns the entire sector i.e. production, craft and their technical and economic characteristics, distribution and marketing of fish (including role of middleman), the fishermen and their socio-economic standard and needs. A proper system for collection and analysis of statistics is required.

The experimental and demonstration activities being undertaken under the coastal mechanization scheme, need a more systematic and development oriented approach as to fish availability and catching techniques to fulfil their intended purposes of providing guidance for further development of the coastal fishery.

Extension services, which are vital, particularly for the cooperative sector, are non-existent both on the technical and the administrative side.

There is no provision for regular training of operatives (skippers, mechanics, etc.) in the sector. Some of these functions are, however, carried out by the central institutes to which trainees are sent from West Bengal.

There is no expertise available in the Directorate for the complex tasks of planning for landing and shore facilities for coastal fishing craft.

In view of the many inputs needed to strengthen the institutional support it would be desirable to establish a separate marine fisheries division in the Directorate with specialized units for the tasks indicated above. Such an effort must also be supplemented by education and training of the officers concerned at all levels. The staff of the proposed marine fisheries division would need to receive thorough training.

6 RECOMMENDATIONS

From the discussions in the previous sections, the following development proposals are offered for further preparation and/or appraisal.

1. General.

1.1 Establishment of a separate marine fisheries wing in the Directorate with appropriate field representations of fishery development officers at block level.

2. Physical development.

2.1 Mechanized gillnetters capable of operating during the rough weather seasons (ref. 4.1).

2.2 Gradual introduction of small coastal trawlers (ref. 4.1).

2.3 Provision of protected landing facilities (small-scale fishery harbour) in the Digha area.

2.4 Provision of low cost landing facilities such as jetties or pontoons at Freezergange and other locations in a priority order to be assessed.

3. Technical development.

3.1 Trawling survey of near coastal waters.

3.2 Strengthening of experimental/demonstrational fishing activities now carried out mainly from Freezergange.

3.3 Introduction and implementation of a statistical system with initial emphasis on craft/gear and production.

3.4 Promotion of the utilization of marine fish by integrated pilot operations including, proper fish handling and preservation, transport and retail sales and propaganda.

4. Training/Extension.

4.1 Training of skippers and engine drivers for new mechanized boats (ref. 2.1 and 2.2).

4.2 Establishment of an extension service for management of cooperatives and their operations.

General Description of Marine
Small-Scale Fisheries

O R I S S A
India

Prepared by
H. Copper, Economist (Associate Expert)

in consultation with
Directorate of Fisheries, Orissa.

Development of Small-Scale Fisheries in Southwest Asia, Colombo, May 1977.

CONTENTS

		Page No.
1	STATE DATA	1
2	INTRODUCTION	3
3	BRIEF HISTORY	3
4	FISHERIES ADMINISTRATION	4
5	SPECIALIZED INSTITUTIONS	5
6	FISHERIES CORPORATIONS	7
7	COOPERATIVE SOCIETIES	7
8	FISHERY RESOURCES	7
9	PRODUCTION	8
10	CRAFT AND GEAR	9
11	LANDING CENTRES	10
12	HANDLING AND PROCESSING	11
13	MARKETING AND DISTRIBUTION	12
14	EXPORTS	12
15	ANCILLARY INDUSTRIES	13
16	SOCIO-ECONOMICS	13
17	GOVERNMENT POLICY	14
18	DEVELOPMENT PLANS	15
19	BIBLIOGRAPHY	16

Appendices.

1.1	Map of Orissa, Coastal Districts	17
3.1	Total Fish production 1960 - 76	18
4.1	Fisheries Administration	19
7.1	Marine Fishermen Cooperative Societies	20
9.1	Commercial Species of Marine Fish Landings (1975)	21
9.2	Monthly Landings of Marine Fish (1975)	23
12.1	Ice Plants in Coastal Districts supplying the fisheries	24
13.1	Wholesale and retail prices of fish (1976)	25
18.1	Fisheries Schemes and expenditures in the Fifth Plan (1974/75 - 1978/79)	26

1 STATE DATA

1.1	Location: (Map in Appendix 1.1)	Orissa is situated on the upper Western part of the Bay of Bengal, bordering the states of West Bengal in the North and Andhra Pradesh in the South. Latitudes: 18.5°N - 21.5°N; Longitudes: 84°E - 88°E		
				All India*
1.2	Size:	Area:	155,842 km²	(4.7%)
		Coastline:	480 km	(8%)
		Continental shelf (200 m):	25,000 km²	(6%)
1.3	Population: (1975)	Total:	24.5 million	(4.5%)
		Urban:	8.4%	
		Rural:	91.6%	
		Growth rate (1961 - 1970):	25.05%	(24.8%)
		Birth rate (1971):	34.11%	
		Death rate (1971):	13.92%	
		Density:	141 per km²	(177)
1.4	Education: (1971/72)	Literacy rate: Total	26.18%	(29.45%)
		Males	38.43%	(34.45%)
		Females	15.18%	(18.69%)

Table 1.1 School Enrolment

Level	Age group (years)	% of enrolment of the total population in the age group	
Primary School (Classes I - V)	6 - 11	77	(84%)
Middle School (Classes VI - VII)	11 - 14	21	(36%)
Secondary School (Classes VIII and above)	14 - 17	16	(21%)
Colleges	17 - 24	2	(5%)

* Figures within brackets in this column give the State share in percentage of All India or all India data, as applicable.

1.5	Health (1972):	Population/hospital bed:	2,200	(2000)
		Population/doctor:	9,200	(4200)
1.6	Nutrition (1971):	Calorie intake in % of requirement:	66	(78%)
		per capita protein intake:	33 gm/day	(40 - 52)

1.7 Employment (1971):

Table 1.2 Employment by different categories as percentage of total population.

Category	Percentage of total population	
(1) Cultivators	15.35	(14.26)
(2) Agricultural labourers	8.83	(8.67)
(3) Livestock, forestry, fishing, etc.	0.67	(0.78)
(4) Mining, Manufacturing and Construction	2.26	(3.68)
(5) Trade, Commerce, transport and communication	1.48	(2.64)
(6) Other services	2.64	(2.89)
Total workers	31.23	(32.92)

1.8 Net National Product: (1972) (at factor cost and current prices)

Total (in million Rs.):	11.31	(2.3%)
Index of NNP (1960/61 = 100)	302	(271)
Per capita NNP (Rs.):	511	(645)
Index of per capita NNP with 1960/61 prices:	236	(210)

1.9 Exports: Products exported from the State of Orissa to other States are: Lime and Lime stone, Iron and Steel bar, Manganese Ore, Timber, Cement, Hides and Rice. Minerals iron and chrome are exported to other countries.

1.10 Imports: Products imported to the State of Orissa are: Coal and Coke, Machineries, Oil, Kerosene, Wheat, Sugar and Textiles. The petroleum products are imported from other countries.

1.11 Prices:

Table 1.3 Consumer price index numbers of food items* for agricultural labourers (base 1960/61 = 100)

	1971/72	1972/73	1973/74	1974/75	August 1976
Orissa	245	274	313	448	390
Annual change %	12	14	43	-13	
All India	215	246	313	413	316
Annual change %	14	27	32	-23	

* The rural population spends about 85% of the income on food items.

1.12 Administration: The state is divided into 13 districts of which four, namely Balasore, Cuttack, Puri and Ganjam cover the coastal area.

2 INTRODUCTION

All fishing in the state of Orissa can be referred to as small-scale fishery activities except for shrimp trawling by a few larger vessels which have recently started to operate from a fishing base at Paradip.

The Inland fisheries and Marine fisheries are still of about equal importance in terms of production, but the marine sector is expanding rapidly and has potential to multiply its production. The present total production (1975) is about 45,000 tonne at a producers value of the order of Rs.150 million.

The fisheries sector contributes about 2% to the State's economy and its share has an up-going trend (about 1% in 1967).

The principal role of the fisheries sector is as a provider of employment. Fishing provides direct employment to about 0.8% (60,000 people) of the working population and the entire sector, including ancillary industries, employs 1.5% (110,000 people). These figures are according to a 1971 census report, but appear to be over estimated.

It is estimated that nearly 50% of the marine production i.e. about 10,000 tonne is exported from the State, mainly to the Calcutta market. Some of the inland production, about 5,000 tonne, is also marketed in Calcutta. The per capita consumption in the State of Orissa is therefore only in the order of 1 kg. per person per year. The fishery sector is thus a rather insignificant provider of food and protein in the State.

The Orissa fisheries contribute to India's foreign exchange earnings. In 1975/76 their total exports were valued at Rs.45 million which represents about 4% of India's fish export and 0.1% of the total export earnings.

3 BRIEF HISTORY

The marine fish production of Orissa shows a steady increase over the years and has more than doubled during the last ten years (ref. Appendix 3.1). Although new introduced mechanized boats are responsible for an increasing share of the catch, the backbone of the industry is still the traditional fisheries which in 1976 had a share of about 80% of the production.

During the first three Five Year Plans (1951 - 69) emphasis was laid on development of inland fisheries. However, attempts were made to improve the conditions of the traditional fishermen engaged in the marine and estuarine fishing industry by starting Cooperative Societies among them and by providing transport facilities from remote catching areas to consumer centres. Fishermen were encouraged to have their own boats and launches for speedy transportation of fish from the estuarine areas to the local markets. The department also operated a few motor launches for transportation of fish.

Many cooperative societies (about 50) were established and loans for boats, nets, etc., were issued through these organizations. The records of repayments were disappointing.

Mechanized fishing started in 1956/57 as a pilot fishing programme of the State. The river mouths of Dhamra, Mahanadi and Burhabalang, were selected as fishing bases where shelters and entrance to the sea were available. The bases at Paradip and Chandipur are now well established. Since this experimental fishing proved to be a success, other fishing bases were started at Adhuan (1966) and Kirtania (1971). The pilot fishing programme operates trawlers and gill netters ranging between 9 and 13 m in length.

During the third Plan Period, the Orissa fisheries Development Corporation was established (1964/65) which attempted boat building, boat repair services and operation of four steel trawlers. The corporation is now liquidated. A canning factory was established at Majhidiha in 1964 and started production. A number of ice plants and cold stores were constructed along the coast around this time.

During the 4th Plan Period 40 gill netters, 3 trawlers and 4 deep sea steel trawlers were added to the Directorate's fleet; by the end of the fourth plan period (1973) the department owned 26 wooden

trawlers, 72 gill netters and 4 steel trawlers (deep sea). The latter vessels were sold shortly thereafter and the fleet of mechanized boats have been somewhat reduced through transfer of vessels to Cooperative Societies.

The Government has made strong efforts to introduce a new mechanized fishery which undoubtedly has had positive effects, but perhaps not in correspondence with the input, while the traditional sector has by and large developed by its own.

4 FISHERIES ADMINISTRATION

The State is directly responsible for the development of fisheries (inland and marine) within the State. The Central government has the responsibility for planning at national level and for coordinating the activities of the various State fisheries departments.

The Directorate of Fisheries is administratively under the Department for Forestry, Fishery and Animal Husbandry which is headed by a Secretary.

The Director of Fisheries is the Head of the Directorate and is the controlling officer of fisheries in the State. The administrative set up of the Directorate is shown in Appendix 4.1. The State is divided into three zones, namely: Central zone, Northern zone and Southern zone, and a Deputy Director of Fisheries is in charge of each zone. A Superintendent of Fisheries is also posted to the office of each Deputy Director of Fisheries to assist him in administrative as well as technical matters. The Central zone comprises four districts including the coastal districts of Cuttack, Balasore and Puri, and has its headquarters at Cuttack. The Northern zone comprises five inland districts. The Southern zone comprises four districts of which the coastal district Ganjam, is one. In each district the Fisheries Office is headed by an Assistant Director of Fisheries.

Furthermore, an Assistant Director of Fisheries, assisted by a Superintendent, is in charge of each of the two Marine Circles of the Directorate with headquarters at Cuttack and Balasore. These two units are under direct supervision of the Deputy Director of Fisheries (Marketing) posted at headquarters in Cuttack. Under the Cuttack Circle, the Directorate is operating 30 wooden trawlers from the Paradip fishing base and one ice plant in Majhidiha. In the Balasore Circle, the Directorate is operating 58 mechanized wooden gill netters from Chandipur and Dhamra, and the ice plants cum cold stores in Chandipur and Chandbali.

The Harbour and Berthing Development Unit prepares plans for landing facilities in Orissa and is responsible for establishment and management of these facilities. Presently there is one jetty in Chandipur and one fishing harbour under construction in Dhamra.

The Marine Extension Service in Orissa is administered by the Inland Section. The main occupation of the extension officers is collection of statistics.

The Marketing units (located at Cuttack, Bhubaneswar, Berhampur and Sambalpur) are collecting statistics on fish species, quality, wholesale and retail prices. They are also engaged in retail marketing of marine and fresh water fish produced by vessels and fish farms owned by the Directorate.

The functions of the Cooperative Section are to organize cooperatives, supervise their operation by accounting and auditing, second staff to assist the cooperatives and to prepare investment schemes. The staff is deputed from the Co-operative Department and headed by a Deputy Registrar.

Research and Training will be dealt with in chapter 5.

The total expenditures during the fiscal year 1976/77 amounts to about Rs 21 million of which the Central Government contributes about Rs 8 million. The allocation of funds to the Marine and Inland sectors is given as follows:

Table 4.1
(in million Rs.)

Expenditures (1976/77) - Directorate of Fisheries (in million Rs)

	Marine	Inland	Total
Non-plan			
Schemes	1.415	3.523	4.938
Admin.	0.800	1.808	2.608
Sub-total	2.215	5.331	7.546
5th Plan			
Schemes	3.914	1.343	5.257
Admin.	0.060	0.029	0.089
Sub-total	3.974	1.372	5.346
State total	6.189	6.703	12.892
Central	7.620	0.446	8.066
Total	13.809	7.149	20.958

Source: Directorate of Fisheries, Cuttack.

The bulk of expenditures incurred in the marine sector refer to the Dhamra harbour project, operation of trawlers and to the introduction of mechanized gill netters.

5 SPECIALIZED INSTITUTIONS

5.1 Research Institutes:

5.1.1 Processing Units

There are two research units; the first was established in 1948 and is now located at Balugan to where it was transferred from Cuttack in 1965; the other unit has recently been established at Kujang and is not yet operational.

The main purpose is to improve the utilization of uneconomic varieties of by-catches for human consumption by product development.

5.1.2 Brackish water fish farming; at Keshpur, Ganjam district

5.1.3 Central Research units

The following branches/units of central research institutes are located in Orissa :

(i) Research Units of the Central Marine Fisheries Research Institute (CMFRI) located at Puri and Gopalpur : Statistics

(ii) Sub-stations of the Central Inland Fisheries Research Institute (CIFRI) located at Cuttack and Bhubaneswar: Pond culture

5.2 Training Institutes:

5.2.1 Marine Fisheries Training Institutes.

There are three marine fisheries training institutes with the following particulars:-

Table 5.1

Particulars of Marine fisheries training institutes.

Location	Chandipur	Paradip	Ganjam
Established	1965	1971	1974
Annual capacity:			
(i) Deck hands	20	35	20
(ii) Launch Drivers	10	15	10
Output since established:			
(i) Deck hands	107	130	26
(ii) Launch Drivers	90	58	10

The purpose is to train local fishermen (mostly crew members of country boats) in mechanics, boat repair and maintenance, fabrication of gear, fishing methods and fish handling. The demand for training is much higher than the supply.

In selecting trainees, priority is given to members of cooperative societies and attempts are being made to arrange for loans to be given to successful trainees for acquisition of boats and gear through the cooperatives. The sea training is carried out on board the Directorate's vessels.

The trainees receive a stipend of Rs.75/- a month.

Administratively, the institutes are controlled by the Directorate of Fisheries and each has a staff of two teachers with the grade of Deputy Superintendent of Fisheries.

5.2.2 Inland Fisheries Training Institutes

There are three institutes located at Kausalyagang, Sambalpur and Jeypore.

5.3 Development Institutions:

There are no other State operated institutes for fisheries development than those mentioned above.

The Exploratory Fisheries Project (EFP) under the Central Sector has an Operations Base at Paradip (since 1974) with two exploratory fishing vessels of 17.5 m length and 200 hp.

6 FISHERIES CORPORATIONS

A corporation known as the Orissa Fisheries Development Corporation was set up by the State Government in the mid sixties, but has been non-operational for many years. The main purpose was to increase the fish production and to make adequate quantities of fish available to the population of Orissa. The activities ceased because of uneconomical operations of the fishing boats.

The Central Fisheries Corporation with its headquarters at Calcutta has regional offices for procurement in Balasore and Balugon.

7 COOPERATIVE SOCIETIES

The primary Fishermen's Cooperative Societies are engaged in marketing of fish and channels short and medium term credits to their members. The societies are also supposed to undertake schemes for improving the socio-economic conditions of the poor fishermen members and their families.

The General conditions to become a member of a Fishermen's Cooperative Society are:

- The applicant will be a member if he lives within the area of operation of the society, if he is over 18 years of age and if he is engaged in the catching and/ or selling of fish.
- The applicant shall agree to sell his fish through the society.
- The enrolment fee is Rs.10/-

In providing credits to the societies the State grants a subsidy of 25% on the wooden gillnetters (hull and engine) and 50% on the cost of nets. The loans are provided through the Agricultural Refinance and Development Corporation which also monitors those Societies which have received credits. To date, those societies are the Kirtania PFCS and Rajalaxmi PFCS (at Chandipur). Each scheme consists of 50 boats of which 10 have been commissioned for each society.

All other PFCS's are administratively controlled by the Directorate of Fisheries. A list of Orissa's Marine Primary Fishermen's Cooperative Societies is given in Appendix 7.1.

8 FISHERY RESOURCES

Seasonal climatic and oceanographic variations are determined by the two monsoon periods which largely influence the fisheries. The South West monsoon, which is the more powerful one, affects the coastal area from April through September with strong winds, rough sea, a northerly current and heavy rainfalls (about 150 cm) during the latter part of that season. The fair weather season is during the winter months (October - March) when there is a steady moderate North East monsoon blowing.

The fishing is very much restricted during the South West monsoon period because of the lack of sheltered landing sites and suitable craft to operate under rough weather conditions. There is also evidence that the availability of fish is lower in the first part (April - July), of the South West monsoon. An indicative difference is that the lean season yields about 50% of the peak season.

The continental shelf of Orissa has in the southern part (about 300 km long) a width of about 40 km and most of the area is suitable for trawling. The Northern part is shallow and muddy and largely affected by the river systems and tidal currents which continuously change the bottom configurations.

Some knowledge about the demersal fish has been obtained through exploratory fishing and surveys undertaken by the Exploratory Fishing Project (EFP). A recent summary of the findings concludes that the yearly yield along the upper coast of the Bay of Bengal is in the order of 2.55 tonne/km^2, which means a yearly potential of about 65,000 tonne for Orissa. The main species are Sciaenids (33%), Cat fish (14%), Pomfret (11%) and Shrimps (13%). The catch rate obtained by the (EFP) during trawling with 17.5 m vessels of 200 hp is about 250 kg/hour.

Very little is known about the magnitude of the pelagic resources. Species like Hilsa (41%), Seer (10%) and Pomfret (10%) are caught by gillnets from the northern district (about 5,000 tonne). The traditional fisheries of the southern districts are catching small pelagic species close to the shore (about 10,000 tonne). There is no evidence of large concentrations of pelagic fish at deeper waters. However no surveys or exploratory fishing has been undertaken and the information available only stems from observations of the commercial fleet operation in shallow waters.

9 PRODUCTION

The fish production in 1975/76 was as follows :-

Table 9.1

	Tonne		%	
Marine Fisheries		21,000		46
Traditional	17,000		81	
Mechanized	4,000		19	
Inland Fisheries		25,000		54
Chilka Lake	4,000		16	
Other Estuaries	6,000		24	
Rivers	15,000		60	
Total		46,000		100

The marine landings were composed of Elasmobranches (11%), Hilsa (8%), Clupeids (5%), Sciaenids (26%), Pomfrets (7%), Cat fish (9%), Miscellaneous fish (23%) and Prawns (11%). A detailed list of species with scientific, English and local names is given in Appendix 9.1.

There are great seasonal variations in the landings. The production during the summer months is about one third of that in the winter (see Appendix 9.2).

Orissa's share of the total all India marine fish production is 1.7%. In 1975/76 it was valued at Rs.75 million.

10 CRAFT AND GEAR

The following catching units were employed in fishing in 1976 :-

Table 10.1

Traditional craft (non-mechanised)				6,000*
Mechanized boats (wooden)				250
Gillnetters (30 - 32 ft.)			150	
Gillnetters (30 - 32 ft.)	Private	82*		
	Cooperative	10		
	Directorate	58		
Trawlers (30 - 38 ft.)			100	
Trawlers	Private	73*		
	Cooperative	-		
	Directorate	27		

* estimated.

The group of traditional craft consists of several different types where the plank built displacement boats are dominating in the northern districts and the log rafts in the southern districts. Reliable statistics about number of boats are not available. Most of them are using sails and paddles/oars for propulsion.

The wooden trawlers, public and private, are operated from the Paradip port. Many trawlers from neighbouring states, mainly Andhra Pradesh, have recently started to operate from this port during the peak season; in December 1976, there were about 200 including a few larger steel vessels. Nearly all mechanized gillnetters, public and private, operate off Balasore coast; only 4 of them are operating off Ganjam coast.

The Botali boat is common north of Dhamra in the Balasore district. They operate in the sea (September - April) and in the river creeks. A typical size would be: length 7 m, beam 1.5 m and depth 1.5 m. They have vertical and pointed stem and stern with a full midship section. They are built of planks with frames, and there is one carvel and one clinker type of construction. They carry drift gillnets of about 12 cm mesh size which measure 600 - 900 m in length and 5 m in depth (for Hilsa and Pomfret). There are about 5 fishermen on board. The cost of the boat is (1976) Rs.2,000 - 3,000. The yearly production is about 4 tonne per boat.

The Salti boat is common in the same area and has similar characteristics. Their operation is however more confined to the rivers. The hull has a more oval shape with extended and raised ends above the water (Bengali type). The salti boats also frequently operate set nets in the creeks.

The most common traditional craft is the log raft or Catamaran or as locally called the Teppa. It is operated from the open beaches in Puri and Ganjam and partly Cuttack. Regular fishing takes place from October - April, but occasionally during the rough season when the surf is negotiable. The length of the teppa varies from 4 to 6 m. It is a keel-less raft formed by pegging and tying together two, three or four logs of light wood. They mostly fish with small mesh gillnets at a length of about 300 m. Some of them are engaged in boat seining locally called "irrgali" which is a triangular mini-trawl towed by two sailing catamarans. Handlines are also occasionally used on these crafts. The crew consist of 2 - 3 fishermen. Catamarans cost (1976) between Rs.500 and Rs.800. The yearly production per unit is in the order of 2 tonne.

The Nawa boat is used exclusively by migrating Andhra Pradesh fishermen in the Puri and Ganjam districts. The operational period is restricted to October - March during the fair weather season. They are 8 - 9 m long, 2 m wide and 1 m deep. They are made of light wooden planks with frames and ribs. The bottom has a round form and both ends are pointed. The stem and stern are slightly raised from about one fourth of the length to reduce the risk of broaching in following waves. They appear to be close to an ideal surf landing craft. Gillnets are used, usually of small mesh size, of a length of 700 m and depth of 7 m. These boats are sometimes making longer trips than one day. The

crew consists of 8 men. The boat costs (1976) about Rs.4,000. The yearly production is in the order of 6 tonne.

The Bar Boat or locally known as Padhua, is used during the calm winter season for beach seining. The overall length is about 8 m and it is beamy (2.5 m) to give a high displacement. It is a non-rigid construction with light wooden planks (usually mango wood) without ribs or frames. The planks are stitched together with coir ropes and the inter-spaces between are filled with dry straw to make it tight. The crew of the boat is 5 - 8 men while the beach seine is dragged by 20 - 30 people. The Padhua costs (1976) about Rs.1,000.

Traditional fishing is also undertaken from the shore by :-

Set nets known as "maljal". The nets are operated by 12 - 20 persons. During the low tide the nets are set to enclose a portion of the shore. Fishes enter into the net with the high tide and are collected when the tide reverts. The method is common in the shallow waters along the Balasore coast.

The larger mechanized wooden boats introduced in the early sixties are of two types :-

Gillnetters which are mainly operating from the centres of Kirtania, Chandipur, Adhuan and lately Dhamra. They have a length of about 10 m with the engine aft and an open space for gear and fish handling forward. They are equipped with engines of 18 - 45 hp. A set of gillnets is 1500 - 2500 m long and about 9 m deep with a mesh size of about 12 cm. They are making one day trips and operate around the year although the fishing frequency is low during the S-W monsoon. The boats have a crew complement of about 5 men. The cost of the boat including engine is (1976) in the order of Rs.100,000 (nets included).

Trawlers which are all operating from Paradip. They have a length of 10 - 12 and are equipped with engines of 50 - 90 hp. 4-seam shrimp trawls are normally used since prawns are the principal commercial catch. They operate on a day-trip basis and fish in relatively shallow waters (30 m). They carry 5 crew members. An average cost of these boats is (1976) in the order of Rs.220,000.

11 LANDING CENTRES

There are 35 fish landing centres along Orissa's coast, 8 in Balasore district, 7 in Cuttack district, 9 in Puri district and 11 in Ganjam district. The major centres are listed below along with the landings and number of craft.

Table 11.1 Main Fishing centres, landings and number of craft.

District	Centre	Landings in tonne (1975)	Mechanized boats	Non-mechanized craft
Balasore			150	1,500
	Kirtania	300		
	Kasafal	500		
	Chandipur	4,000		
	Adhuan	500		
Cuttack			100	500
	Paradip	5,000		
Puri				2,000
	Konarak	1,000		
	Puri	4,000		
	Astrang	2,000		
Ganjam				2,000
	Ganjam	1,500		
	Gopalpur	2,000		
	Sonapur	200		

Source: Estimates.

In the Puri and Ganjam districts, fish is landed on open beaches, without any facilities for landing or further disposal of the fish.

Paradip is the only existing port in Orissa. It is deep enough to allow ocean liners. Provisional jetties and facilities have been provided in the inner harbour basin for the fishing fleet as a temporary measure until a planned fishery harbour is completed.

A new harbour for mechanized boats is under construction at Dhamra which will provide facilities for boat repair and maintenance.

In the Northern districts, fish is landed on river banks, near population centres. The boats often have to choose the high-tide period for their outward and inward voyages. A new jetty has been constructed in Chandipur which is being supplemented by an auction hall and other shore facilities. Similar facilities are planned for Kirtania and Adhuan.

12 HANDLING AND PROCESSING

The fishing craft, traditional as well as mechanized boats, do not carry ice for preservation of the fish. Most of them land the fish directly on the beaches without any facilities.

Ice is also not used for the fish consumed in the vicinity of the producing centres.

For long range transport by trucks the fish is packed in baskets with ice, with a full weight of about 40 kg. The cost of packing and icing is (1976) about 0.3 Rs/kg.

Shrimps are usually iced in baskets shortly after landing by arrangements through the freezing companies or their agents.

The supply of ice is adequate; there are some 30 ice plants in the coastal districts supplying the fishing industry (see Appendix 12.1).

More than 80% of the domestic production of marine fish is consumed in the fresh form. The remaining part is converted into cured and frozen products.

The fish used for sun-drying are mainly the small miscellaneous species. Most of the sun-dried fish is produced in the southern districts and only for a limited local demand. At some landing centres in the northern districts e.g. Kasafal, the fish is wet salted at times of gluts which cannot be absorbed by the traditional distribution channels for fresh fish.

There are several freezing plants, all of which are privately owned, processing prawns for export; they are listed in the table below.

Table 12.1 Freezing Plants.

Company	Freezing capacity tonne/day	Frozen Storage (tonne)
M/s. C.I. Foods, Cuttack	-	20
M/s. Orissa C.I. Foods, Puri	2	30
M/s. Indian Tobacco Company, Puri	5	40
M/s. Amardeep Marine Products, Puri	2	50
M/s. C.I. Foods, Pathara	2	50
M/s. C.I. Foods, Paradeep	6	120
M/s. Orissa Marine Industries, Balugon	2	?
Total	19	> 310

There is one government owned canning plant in the State, located at Majhidia, Cuttack. It's capacity is 1,000 cans of 8 oz. size per day but is not in operation.

13 MARKETING AND DISTRIBUTION

The marine fish landed in the State has three principal marketing outlets :

Nearly half of the production (about 10,000 tonne) is marketed through the Howrah wholesale market in Calcutta. The fish is purchased at the landing centres by middlemen or trade agents and supplied to the Howrah market on a consignment basis.

The demand for fish in Calcutta is quite stable over the year since fish is a daily ingredient of the diet of the population. Slight demand increases (10%) are noted during festive days. Prices are comparatively high but drop during periods of high supply. The consumer preference is for fresh fish and for brackish water species like Hilsa, Behkti and Mullets which is reflected in the high prices (Appendix 13.1).

The fish is transported by road and rail from Orissa. The transport costs are in the order of 0.6 Rs/kg from the northern districts and 1 Rs/kg from the southern districts.

The second outlet is the local markets in Orissa. Nearly all this fish is consumed fresh in the coastal areas. It is marketed by small traders buying the fish on the beaches and at landing centres and sold to the consumers from bicycles or hand carried baskets.

It is believed to be a high unsatisfied demand for fish but the purchasing power of the local population cannot compete with that of Calcutta. The dominant market in Calcutta largely influences the supply and prices in Orissa (Appendix 13.1).

The third outlet which is of high economic importance is the shrimp freezing companies which through their agents purchase prawns and also directly contract the fishermen to deliver the prawns to the plants.

Small quantities of dried fish is marketed in the interior of the state and in Andhra Pradesh and Tamil Nadu.

Since some years back the Directorate markets fish, from their own boats, directly to the consumer.

14 EXPORTS

Export of prawns was effected first in 1969 and during the last five years the export quantity has increased considerably.

Table 14.1 Annual export of frozen shrimps (1969 - 76).

Years	Quantity in tonne	Value in million Rs.
1969/70	4	-
1970/71	62	-
1971/72	179	5.1
1972/73	376	9.5
1973/74	392	11.6
1974/75	823	24.1
1975/76	1064	45.0

In (1973/74) one company produced frozen frog legs for export. The quantity was 16,766 kg valued at Rs.434,000.

15 ANCILLARY INDUSTRIES

There are 7 private boat yards in and around Paradip, manufacturing and repairing wooden trawlers and gillnetters :

Table 15.1 Boatyards.

Name	Location	Capacity (boats/year)
Kalinga Docking and Engineering	Choumuhani (Paradip)	15 - 20
Marine Engineering Works	Paradip	15 - 20
Orissa Boat builders	Jagatpur	15 - 20
Pressels Pvt. Ltd.	Paradeep	20 - 25
Near yard	Paradeep	10
Agean boat builders	Paradeep	8 - 10
Bharat Industrials	Paradeep	10

The boats are usually made of teak wood but also of Ainee wood from Orissa's forests. Indicative prices (1976) of hulls in the two materials are Rs.90,000 and 74,000 respectively.

All country boats like the salti, botali, catamaran and padhua's are locally made and maintained at the fishing centres.

Marine engines installed in fishing boats are manufactured in India but there are no such industries in Orissa. Service stations and workshops are limited to a few fishing centres (Paradip, Chandipur).

Most of the indigenous fishing gear are fabricated and manufactured by the fishermen themselves including a sizeable quantity of gillnets. The latter are also obtained from plants outside Orissa.

Several miscellaneous items for fishing and fish handling like baskets, ice boxes and sails are made locally.

16 SOCIO-ECONOMICS

Surveys of the socio-economic conditions of the fishing communities in Orissa have not been undertaken and practically no information or data are therefore available.

Indicative figures of their income in different types of fishing are as follows :-

Table 16.1 Indicative income of fishermen.

Category of Boats	Estimated Net Income * in Rupees per year	Estimated Crew Share in Rupees per crew member per year
Trawlers	10,000 - 15,000	5,000 - 8,000
Gillnetters	8,000 - 10,000	3,000 - 4,000
Botali, Salti	5,000 - 8,000	1,000 - 2,500
Catamaran	2,000 - 4,000	1,000 - 2,000
Nawa	5,000 - 10,000	2,000 - 3,000

Source: Estimates made during field visits.

* Net income is defined as the value of the landings minus running cost, maintenance and repair cost, crew share and capital cost.

Most of the fishing villages in the northern and central districts are remotely located without road connections and any social facilities such as schools, medical care, etc.

It is common that fishing households have additional income from agriculture (mainly paddy).

The most severe social problems are apparent in the temporary migrant fishing villages in the southern districts.

17 GOVERNMENT POLICY

The relative backwardness of the State of Orissa is reflected in nearly all sectors of the economy. The strategy for development in the 5th Five-Year Plan and its objectives emphasize (i) the development of the agriculture sector to increase the per capita income to the average level of the country and (ii) development schemes of labour intensive nature to create employment and satisfy consumption needs, (iii) the removal of regional imbalances and particularly, help to tribal populations and scheduled casts.

The fisheries sector will contribute to the achievement of these objectives; there is good potential for increased production, particularly in the marine sector; small-scale fisheries are labour intensive; the majority of the fishing communities are classed under scheduled casts.

The objectives and strategy for development are concentrated on marine fisheries which is reflected in the budget allocations. The primary concern is to utilize the untapped resources to increase production by encouraging investments in fishing boats and supporting shore facilities and by provision of harbours and other landing facilities.

Fishermen's cooperatives are to be developed by government assistance (organization, management) and subsidies.

Boats and shore facilities are envisaged to be operated mainly by the private sector to which subsidies may also be given.

Such a scheme has been started during the Fifth 5-year Plan:

> With a view to assist traditional marine fishermen who are unable to raise the necessary funds for craft and gear, a sum of Rs.3,700 is given as a loan through commercial banks. A subsidy of 25% is granted by the government. Administratively, the scheme is controlled by the Directorate of Fisheries. About 80 loans have been

granted since 1975 and it is proposed to assist 2,000 traditional fishermen through the scheme.

18 DEVELOPMENT PLANS

Development plans are prepared for five-year periods; the present plan is the fifth, running from 1974/75 through 1978/79. The plans are "need-based" and are not matched with the expected budget allocations. The detailed budgeting of proposed development schemes is made in an Annual Plan for those schemes selected for financing from the 5-year plan.

Within the broad objectives of increasing fish production, establishing fishing industries and improving the socio-economic conditions of fishermen the specific goals in the marine sector are to:

(i) increase marine fish production from 17,000 tonne to 30,000 per year;

(ii) increase the number of mechanized boats from 112 to 300;

(iii) increase the number of medium sized steel trawlers from 4 to 15;

(iv) establish boat building yards in the private sector by availing loans from financing institutions;

(v) support traditional fishermen and organize cooperatives;

(vi) train staff and operatives;

(vii) establish fishery harbours at Dhamra, Paradip, Gopalpur;

(viii) establish fishing jetties at Kirtania, Hansua, Astrang, Adhuan and Sonapur;

(ix) Provide infrastructure to coastal fishing villages.

In the inland sector the target is an increase of production from 23,000 tonne to 28,000 tonne mainly by increasing the areas for nursery and brackish water fish farming and by development of the Chilka lake fishery.

The total outlay for the Fifth Plan is estimated at Rs 67 million of which the central government contributes about Rs 40 million. The centrally sponsored schemes are mainly for landing and berthing facilities.

After modest expenditures during the first two years of the Plan they were Rs 13 million in the third year and are anticipated to increase to Rs 18 million and Rs 28 million in the fourth and fifth years.

The marine share of the Plan outlay is about 80%.

For further details see Appendix 18.1.

19 BIBLIOGRAPHY

1. ____ 1974 — Economic Review of Orissa, Bureau of Statistics and Economics, Orissa.

2. ____ 1975 — Export Potential Survey of Marine Products in Orissa, The Marine Product: Export Development Authority, Cochin.

3. West, W.Q.B. 1973 — Fishery Resources of the Upper Bay of Bengal, IOFC/DEV/73/28, FAO, Rome.

4. ____ — Results of Demersal Fisheries Resources Survey along the East Coast of India 1959 - 74, Bulletin No.V, Exploratory Fisheries Project, Bombay.

5. ____ 1966 — Orissa Fisheries Research and Investigation Bulletin, Vol.I, Directorate of Fisheries Orissa, Cuttack.

6. ____ — Dhamra Project Report for Small Mechanized Boats, Directorate of Fisheries Orissa, Cuttack.

7. ____ 1976 — Project Report on Development of Fishing Harbour at Paradip Port (revised), Paradip Port Trust, Paradip.

8. ____ 1975 — Preliminary Project Report on Marine Fisheries Development in Orissa Coast, Directorate of Fisheries Orissa, Cuttack.

9. ____ 1975 — Integrated Marine Fisheries Development Project in Orissa Coast, Directorate of Fisheries Orissa, Cuttack.

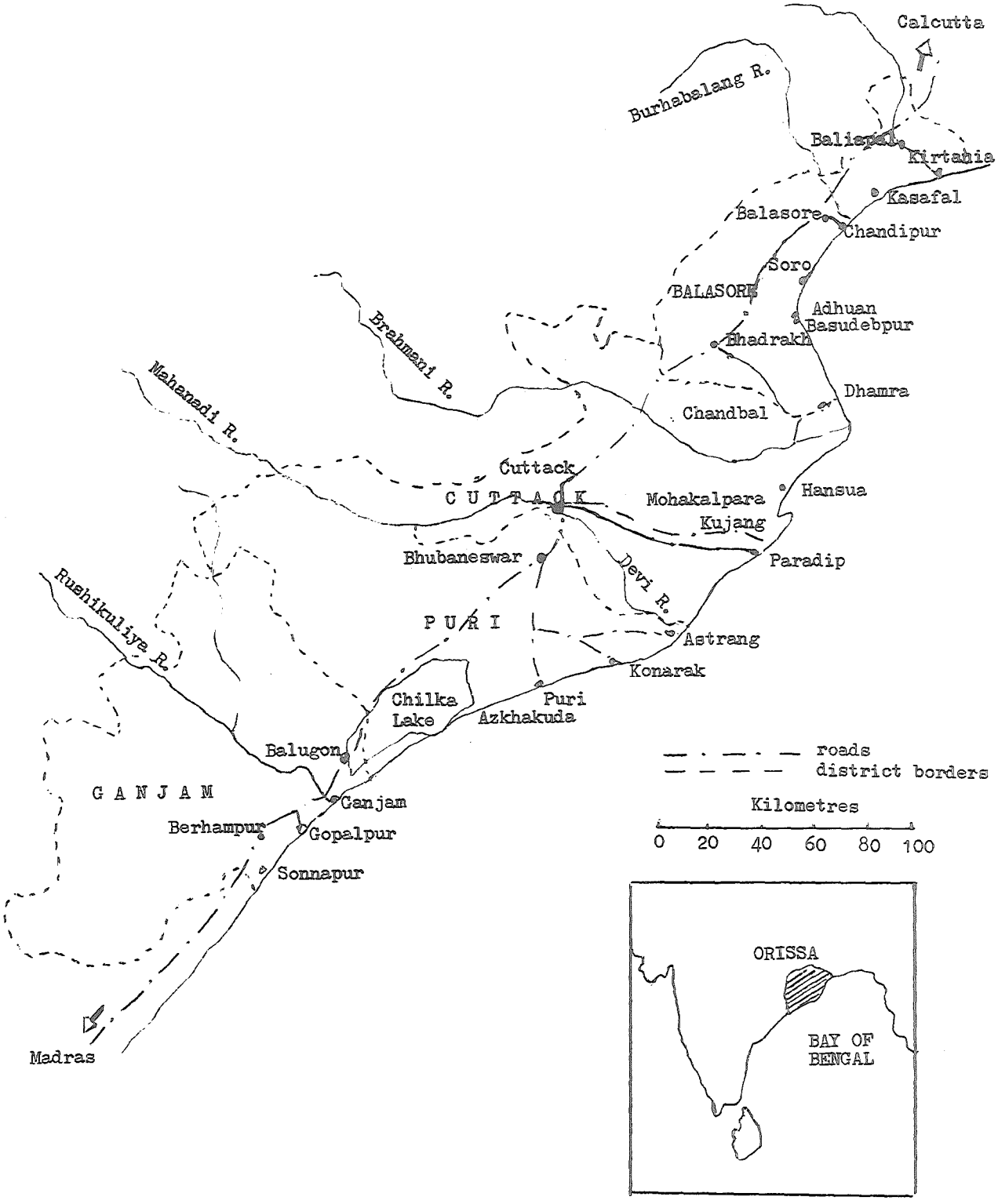
10. ____ 1976 — Annual Plan for Development in Fisheries 1977-78, Fisheries Department Orissa, Bhubaneswar.

11. ____ 1973 — Draft Fifth Five Year Plan, 1974-75 to 1978-79, Directorate of Fisheries, Cuttack.

12. ____ 1974 — Chilka Lake Fisheries Development Project, Orissa, Project Preparation Report IBRD/IDA, Department of Fisheries, Orissa.

Appendix 1.1

MAP OF ORISSA, COASTAL DISTRICTS.



Appendix 3.1

Total Fish Production 1960 - 76.

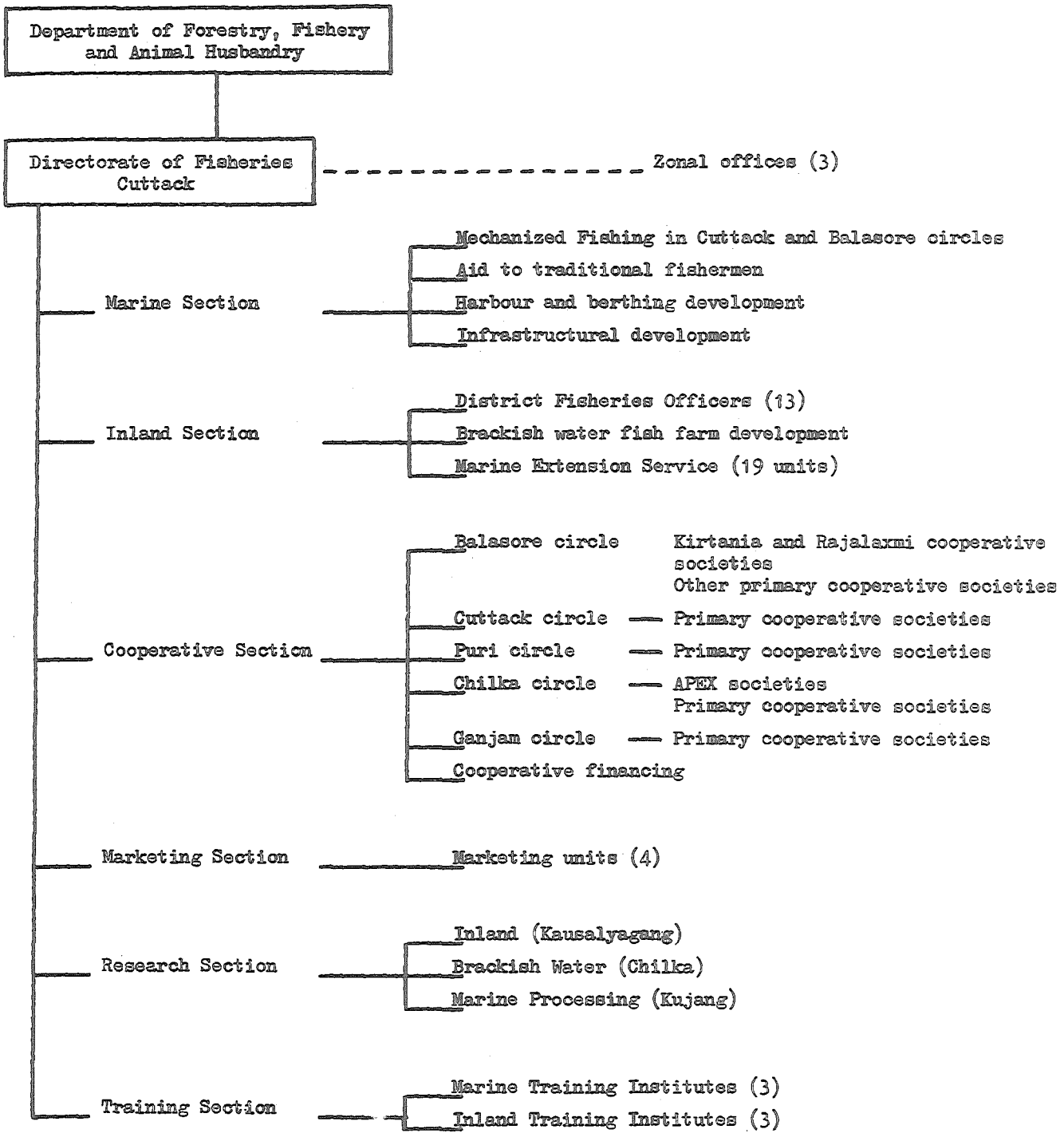
(in tonne)

Year	Marine Fish	Inland Fish	Total
1960/61	5,000	11,000	16,000
1961/62	5,000	11,000	16,000
1962/63	7,000	11,000	18,000
1963/64	7,600	11,400	19,000
1964/65	8,000	12,000	20,000
1965/66	8,500	12,600	21,100
1966/67	9,000	13,000	22,000
1967/68	9,500	13,600	23,100
1968/69	10,000	15,000	25,000
1969/70	10,760	15,000	25,760
1970/71	11,810	16,000	27,810
1971/72	11,000	19,000	30,000
1972/73	15,000	20,000	35,000
1973/74	17,000	23,000	40,000
1974/75	18,000	24,000	42,000
1975/76	21,000	25,000	46,000

Source: Directorate of Fisheries, Cuttack, Orissa.

Appendix 4.1

Fisheries Administration.



Appendix 7.1

Marine Fishermen Cooperative Societies.

SI No.		Name of the F.C.S.	Date of Establishment	Strength of membership
BALASORE DISTRICT:				
1.	**	Kirtania Primary Fishermen Cooperative Society.	22/ 2/1949	258
2.		Baliapal Panchayat Samitee P.F.C.S.	8/12/1964	110
3.	**	Rajalaxmi P.F.C.S.	21/ 2/1972	25
4.	*	Arhuanbad P.F.C.S.	22/ 9/1964	198
5.		Nuapur P.F.C.S.	14/12/1968	97
6.	*	Adhuan P.F.C.S.	31/10/1961	590
7.		Balasore Navigating P.F.C.S.	10/12/1968	160
8.		Laxminarayan P.F.C.S.	24/11/1970	33
9.		Haladipeda P.F.C.S.	14/12/1950	25
10.		Chandipurmal P.F.C.S.	18/ 8/1947	88
11.		Talapada F.C.S.	26/ 3/1966	106
12.		Ranasahi F.C.S.	8/ 9/1976	14
13.		Kasapal F.C.S.	15/ 9/1976	47
14.		Dhamra Marine P.F.C.S.	13/ 7/1976	41
CUTTACK DISTRICT:				
15.		Paradeep Marine P.F.C.S.	23/ 6/1976	50
16.		Balitutha P.F.C.S.	25/ 5/1976	15
PURI DISTRICT:				
17.		Puri Marine P.F.C.S.	19/12/1975	180
18.		Mangala P.F.C.S.	18/ 4/1960	109
19.		Ankapalanka P.F.C.S.	18/ 9/1962	236
20.		Burma repatriate P.F.C.S.	20/ 3/1970	221
21.		Arakhakuda P.F.C.S.	15/ 4/1965	298
GANJAM DISTRICT:				
22.	*	Patisunapur P.F.C.S.	20/10/1946	516
23.	*	Gopalpur P.F.C.S.	21/10/1946	1197
24.		Sena Arjyapalli P.F.C.S.	18/ 9/1963	139
25.		Bada Arjyapallu P.F.C.S.	7/ 3/1959	103
26.		Gokharkuda Marine P.F.C.S.	18/ 9/1963	169
27.		Nolia Nuagaon P.F.C.S.	20/ 9/1957	90
28.		Jayantigrama P.F.C.S.	28/ 8/1974	57

* Cash loans received during the Third Plan.
** Credits and subsidies received recently.

Appendix 9.1

Commercial Species of Marine Fish Landings (1975).

"Group"	Family	Species	Common English name	Local Oriya name	Quantity (tonne)	Percentage of total landings
Elasmobranches	Orectolobidae	Stegostoma Varius	Tiger Shark	Baghua Magara	2,297	10.9
	Carcharinidae	Carcharhinus Gengetius	Ground shark	Kolapora		
	Carcharinidae	Galeocerdo articus	Tiger shark	Chitta Magara		
	Carcharinidae	Scoliodon palasorrah	Dog fish	Dudhia Magara		
	Sphyrnidae	Sphyrna blochii	Hammer head, Shark	Jualia Magara, Hathurdia Magara		
	Rhinobatidae	Rhinobatus granulatus	Mud Skate	Sathora		
	Pristidae	Pristis microdon	Hammer head	Khonda Magara		
	Myliobatidae	Aetobatus narinari	Skates	Pakhi Sankucha, Harinia, Chili		
	Trygonidae	Himantura Uarnak	Rays	Sankucha		
Hilsa	Clupeidae	Hilsa ilisha, Hilsa Sinensis	Shads	Ilisi, Ilisa	1,619	7.7
Clupeids	Elopidae	Elops Saurus	Clupeids	Nahama, Jallunga	1,069	5.0
	Megalopidae	Megaops Cyprinoides	-	Panialmia, Nahan, Versa		
	Clupeidae	Kowala coval	Sardine	Kabla, Ranji, Patua		
		Sardinella fimbriata	Sardine	Kabla		
	Engraulidae	Anchoviella indica	Anchooy	Kokili, Balikokili, Chowli		
		Thrissocles purava	Anchovy	Poosri		
	Poly nemidae	Elutheronema tetradactylum	Indian Salmon	Sahale, Sahalia, Baisali		
	Sciaenidae	Johnius dussumieri	Jew fish	Borei	5,435	25.8
		Otolithes argenteus	-	Golari, landia		
		Pama pama	-	Silamundi, Bettoli		
		Pseudosciaena Coitor	-	Borog		
		Sciaena russelli	-	Golra, Konia		
Pomfrets	Stromateidae	Pampus argenteus	White Pomfret	Dhola Chandee, Ghee Chandee	1,537	7.3
		Pampus chinensis	White Pomfret	Dhola Chandee		
		Parastromateus niger	Black Pomfret	Kola Chandee, Mainsia Chandee		
	Formionidae	Formio niger	Black Pomfret	Bahaal		
Cat fish	Tachysuridae	Tachysurus arius	Cat fish	Konita, Singada, Gandia	1,802	8.6
		Tachysurus Caelatus	Cat fish	Konita, Singada, Gandia		
Miscellaneous	Synodontidae	Harpodon nehereus	Bombay duck	Newa, Bummalo	4,866	23.4
	Hemirhampidae	Hemiramphus gaimardi	Half Beak	Gania, Sarbara, Gongatordi		
	Latidae	Lates Calcarifer	Cockup	Bhekti		
	Ambassidae	Ambassis ambassis	-	Chandee		
	Lactaridae	Lacterius lactarius	-	Suduma		
	Carangidae	Caranx carangus	-	Horekura, Kanti		
		Scomberoides lysan	-	Parei		
	Menidae	Mene maculatus	-	Golchandee		
	Lutiani dae	Lutianus lutianus	-	Soosta		
	Gerridae	Gerres setifer	-	Jagiri		
	Leiognathidae	Leiognathus equula	Glass fish	Tonka chandee		
	Trichiuridae	Trichiurus haumela	Ribbon fish	Rupapatia, Patia		

Contd/...

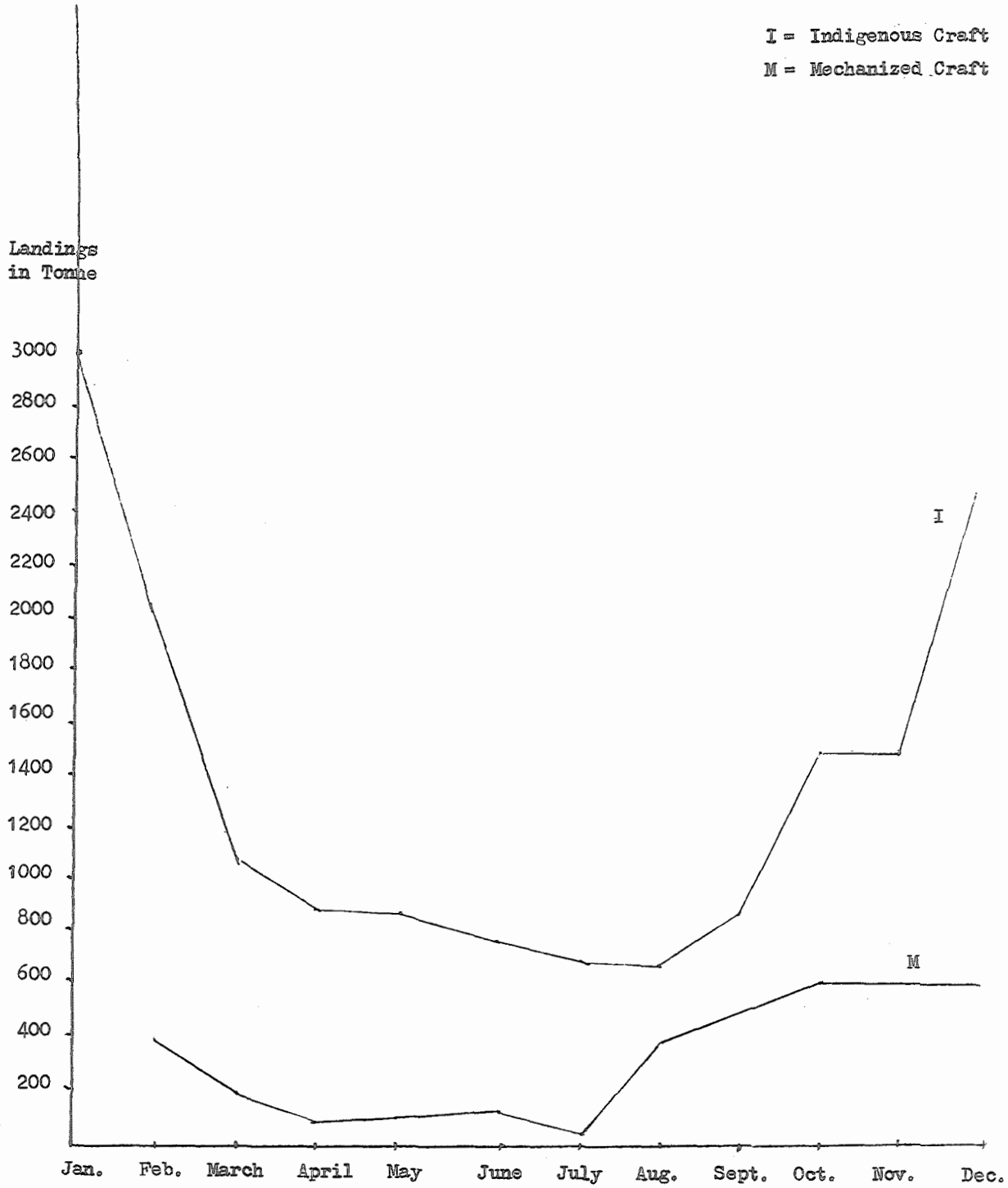
Appendix 9.1 (Contd/...)

"Group"	Family	Species	Common English name	Local Oriya name	Quantity (tonne)	Percentage of total landings
	Scomberomoridae	Scomberomorus commersoni	Seer fish	Koni		
		Scomberomorus guttatus	Seer fish	Binjram		
	Kurtidae	Kurtus indicus	-	Sankha muthia		
	Bothidae	Pseudorhombus arsius	Flat fish	Pot potia		
	Soleidae	Brachirus orientali	Sole fish	Dudh patua		
	Cynoglossidae	Cynoglossus bilineatus	Flat fish	Kukurajivo		
Prawns	Penaidae	Penaeus monodon	Tiger prawn	Bagda	2,375	11.3
		Penaeus indicus	White prawn	Chapra		
		Metapenaeus brevisonii	Brown prawn	Khoprra		
		Metapenaeus spp.	Shrimp	Chingudi		

Appendix 9.1 (Contd/...)

Appendix 9.2

Monthly Landings of Marine Fish (1975).



Appendix 12.1

Ice Plants in Coastal Districts supplying the fisheries.

Government owned:

Location		Ice plant (tonne/day)	Cold storage (tonne)
Balugon (Puri)		5	5
Majhidia (Cuttack)		5	15
Laximisagar (Puri)		2	5
Chandipur (Balasore)		5	2
Chandbali (Balasore)		2	5

Privately owned:

Kujang	Cuttack	5	
Paradeep		10	
Bhubaneswar		?	
Balasore	Balasore	10	
Balasore		5	
Balasore		4½	
Bhadrak		?	
Basudebpur		?	
Soro		?	
Chandipur		?	
Puri	Puri	8	
Puri		6	
Puri		10	
Puri		6	
Puri		?	
Balugon (Chilka lake)		20	
Kaluparaghat (Chilka lake)		10	
Kaluparaghat (Chilka lake)		5	
Ganjam		?	
Berhampur		10	

Source: Directorate of Fisheries, Cuttack.

Appendix 13.1

Wholesale and retail prices of fish (1976).

in Rs/kg.

Species	Wholesale (beach)	Retail (Cuttack)	Retail (Calcutta)
Marine			
Prawn (big size)	40/- to 45/-	Not available (exportable)	Not available variety
Prawn (medium)	13/-	- do -	- do -
Prawn (small)	3/-	5/-	6/-
Hilsa ilisha	7/-	10/-	15/-
Pomfret	2/50	4/50	5/-
Polynomids	5/-	7/-	8/-
Clupeids	2/-	4/-	5/-
Sciaenids	1/-	3/-	4/-
Seer fish	1/50	3/-	4/-
Perches (Bhekti)	7/-	10/-	12/-
Chorinemus	3/-	5/-	6/-
Chirocentrus	1/-	2/-	3/-
Cat fish	1/50	3/-	4/-
Harpodon neperus	-/50	1/-	2/-
Elasmobranchs	1/-	1/50	3/-
Inland			
Calta Calta Labeo Rohita Labeo calbasu Cirrhina Mrigala	6/50	10/-	15/-

Source: Directorate of Fisheries, Cuttack.

Appendix 18.1

Fisheries Schemes and expenditures in the Fifth Plan (1974/75 - 1978/79).

Expenditures in '000 Rs.

Name of Scheme	Revised outlay 5th Plan	Actual 1974/75	Actual 1975/76	Actual 1976/77	Proposed 1977/78	Balance 1978/79
State Sector						
Marine						
1. All India Co-ordinated Research Project on utilization of trash fish	280	-	7	55	107	111
2. Construction of Dhamra fishing harbour project	2,850	-	-	1,547	1,300	3
3. Construction of Fishery Jetty and Slipway at Chandipur	1,460	-	-	-	169	1,291
4. Assistance to Traditional Marine Fisheries	220	20	23	25	75	77
5. Purse-seining in Balasore Coast	900	401	102	90	80	227
6. Introduction of Medium trawlers for Sea Fishing (Polish)	1,297	134	1,163	-	-	-
7. Repair of Polish Trawlers	870	-	-	870	-	-
8. Expansion of Marketing of Fish and Bi-products	500	17	54	58	68	303
9. Establishment of Ice Plant and Cold Storage Facilities	620	-		-	300	320
10. Opening of P.L. Account for Exploitation and Marketing	1,200	1,000	200	-	-	-
11. Expansion of wooden mechanized boats (trawlers)	1,900	242	306	201	138	1,013
12. Development of Marine Fisheries in Balasore Coast under ARC (gillnetters)	2,700	292	21	539	924	924
13. Operation of Mechanized Boats by Rajalaxmi FCS under ARC	2,350	-	-	529	900	921
14. Infrastructure to Coastal Fishing Villages	350	-	-	-	40	310
Marine Total	17,497	2,106	1,876	3,914	4,101	5,500
Inland	8,353	807	862	1,208	2,812	2,664
Inland + Marine (Training in Fisheries + Administration at HQ)	1,150	177	167	200	387	219
State Total	27,000	3,090	2,905	5,322	7,300	8,383
Centrally Sponsored						
Marine						
1. Development of Infrastructure facilities in coastal fishing villages	5,600	-	-	4,200	-	1,400
2. Provision of landing and Berthing facilities at Minor Ports	30,000	447	-	3,420	10,400	15,733
Marine Total	35,600	447	-	7,620	10,400	17,133
Inland	4,105	-	-	446	782	2,877
Centrally sponsored Total	39,705	447	-	8,066	11,182	20,010
Grand Total	66,705	3,537	2,905	13,388	18,482	28,393

Assessment of Problems and Needs
in Marine Small-Scale Fisheries

O R I S S A
India

Prepared by
L. O. Engvall, Project Manager
in consultation with
Directorate of Fisheries, Orissa.

Development of Small-Scale Fisheries in Southwest Asia, Colombo, May 1977.

CONTENTS

		Page No.
1.	Introduction	1
2.	Fishery Resources	1
3.	Fish Production	2
4.	Fish Utilization	3
5.	Landing Facilities	4
6.	Fishing Communities	6
7.	Institutional Support	7
8.	Recommendations	7

Appendices

3.1	Costs and Earnings of fishing boats	9

1 INTRODUCTION

Orissa is in many respects, including fisheries, one of the least developed states in India.

This is recognized by the Union Government and strong efforts are made to channel national funds to the State and to obtain assistance from abroad to accelerate the development of the marine fisheries. The fundamental requirements for development, i.e. availability of resources and markets, are fulfilled; the fishery resources are under-exploited and there is an increasing demand for fish in the country.

The marine fisheries of the state show a steady but slow expansion. The landings of mechanized craft have increased recently as a result of harbour facilities made available within the commercial port at Paradip. Apart from this, very little incentives have been provided. There are however, several development schemes, under preparation and at early stages of implementation, which need financial support to materialise and become useful vehicles for the development.

In the process of the review, on which this report is based, it was found that although the level of development is low there are no serious over-riding constraints preventing an expansion and up-grading of the fisheries. By an integrated and concerted effort there are good prospects to increase the production considerably, thereby improving the protein supply situation and the socio-economic conditions of the fishermen and their families.

2 FISHERY RESOURCES

The area of the continental shelf of Orissa (25,000 km^2) is about 6% of the shelf area of all India while the marine fish production (21000 tonne) is only 1.7% of the all India production. This is an indication of under-exploitation of the resources and there might be potential for at least a threefold increase.

The Exploratory Fisheries Project (EFP) which has a base at Paradip with two exploratory fishing vessels has recently concluded that the sustainable yield of the demersal stock is in the order of 65,000 tonne per year. There are however uncertainties which warrant some concern.

The continental shelf consists of two distinct areas. The southern part, extending up to Palmyras Point at the mouth of the Dhamra river, has a width of about 40 km and an area of about 11000 km^2. The northern part (about 14000 km^2) is a shallow water area with a maximum width of about 150 km. Most of the exploratory trawling has been undertaken in the southern area in water depths of 20 to 70 m and the estimates of the resource are based on these results. The grounds in the northern area are affected by the tidal currents and are low-yielding for trawling. The estimates based on the exploratory trawling might therefore be too optimistic.

On the other hand the pelagic stocks are not included in the estimate. Species like Hilsa and Pomfret are caught seasonally in the northern area (about 5000 tonne/year) but the potential yield is not known.

The availability of pelagic species in the southern area is unknown apart from the inshore resources of sardine species being exploited by the traditional fisheries. There is no evidence of large concentrations of pelagic fish in deeper waters.

In conclusion it is believed that the fishery resources potential, although not quantitatively known, does not constitute a constraint for further development in the foreseeable future.

The rapid expansion of the trawl fishery may constitute a threat to the traditional inshore fisheries and a legislation to protect the latter should be considered not to aggravate the serious socio-economic problems in the low income groups as a consequence of reduced catches.

3 FISH PRODUCTION

The marine fish is produced by some 6,000 traditional craft and 250 mechanized (10 - 15 m) boats. Most of the former are of two different types, the plank built "botali" and "salti" boats in the northern districts and the "teppa" (lograft) in the southern districts. In the south there are also beach seine boats "padhua" and plank built boats "nawa" - the latter being operated only by migrant fishermen from Andhra Pradesh. The predominant fishing method is gill-netting. The traditional craft are driven by sail, oars or paddles and their range of operation is limited to a narrow coastal belt. All boats are making day (or night) trips only. Ice for preservation of the fish, is not used onboard the craft.

The main constraints related to most of the fishing craft are the low grade of mobility, low capacity and poor sea-worthiness. The long term policy of the government is to alleviate these constraints by replacing the craft by mechanized boats. This must be seen in a long time perspective and the traditional craft will continue, for the foreseeable future, to play an important role for the production of fish and as means of employment. The following areas have been identified where possibilities for improvements exist :

a. The botali boats, mainly used in the Balasore district, could be mechanized by small inboard engines with only smaller modifications of the construction. The earnings of a motorized boat would have to be doubled to compensate for the increased costs and to give the same return as the non-motorized boat (see appendix 3.1).

   Increased earnings are identified as follows:-

   The number of operating days per month could probably be increased to 25 (+5) during the peak season; the fishing period could be extended by about 3 months during which fishing could be undertaken for another 50 days. The total number of fishing days would therefore be 200.

   A larger quantity of nets (+50%) and increased mobility would bring the catch up to about 50 kg/day.

   The return to the boatowner does not increase but the crew earnings are higher and tax concessions on the engine could improve the economy considerably.

   A motorization appears to be feasible and worth testing. Experience of similar schemes in other countries indicate a threefold increase of production through mechanization.

   The salti boat, also used in the northern district, does not lend itself easily to mechanization because of its shape and construction. Furthermore, its area of operation is more restricted and additional earnings to compensate the costs of motorization would be more difficult to realize.

b. The lografts used along the open beaches in the southern districts are well suited to the difficult operational conditions and can be operated through heavy beach surfs where normal displacement boats fail. However, they are far from ideal as fishing platforms. Several attempts to develop better beach landing boats have been made elsewhere in India and in other countries. So far, they have been unsuccessful and no economically feasible solutions have emerged. Prospects for any drastic improvements of these craft or for introduction of better substitutes are not good.

   These rafts are common along the entire east coast of India south of Dhamra in Orissa. The number of catamarans in India is estimated to be about 50,000 and most of them appear in the east coast states. They are of great importance in terms of fish production and particularly as livelihood for fishermen and their families. The average production per boat is about 2 tonne/year, i.e. they produce in the order of 100,000 tonne of fish at a value of Rs.300 million per year. Furthermore, about 100,000 fishermen and half a million family members are dependent on fishing operations carried out by these craft.

Therefore, in spite of the fact that no solutions are presently in sight, it is felt justified to devote resources to find ways and means to improve this category of craft.

It is suggested that a concerted effort is made through a national technical institute (like CIFT) and that support from foreign sources is sought. It would be a research/development programme the scope and magnitude of which would be determined step by step as it progresses.

c. Regarding fishing gear it was observed during the field visits that most of the craft were under-equipped and that much of the gear was in bad condition. The maximum capacity for the different craft has not been assessed but there are clear signs of under-utilization. If the quantity of nets can be increased by 25%, which does not seem unlikely, it would mean an increase of production of the order of 5,000 tonne per year. After deduction of replacement costs of the extra amount of nets the yearly net benefit to the fishing population would be Rs.12.5 million. For a catamaran fisherman this would mean 650 Rs/year in additional income.

An active extension service coupled with credit facilities are required to achieve this increased efficiency of the existing fleet.

d. The mechanized gillnetters operating in the Balasore district, mainly Chandipur, are, like the traditional craft, only making one day trips. The high initial costs and operating expenses (fuel and fishing nets) make them barely economical. Reliable costs and earnings data are not available but a rough estimate indicates a net loss of about Rs.5,000 per year (see Appendix 3.1).

A first measure to improve the economy would be to extend the fishing trips to two or three days to reduce the costs for fuel. A prerequisite for this is the installation of insulated fish boxes onboard for preservation of the fish by means of ice. The reduced costs for fuel would be about Rs.4,000 and increased costs for ice about Rs.2,000. This leaves a net benefit of about Rs.2,000 per year not taking into account any realization of higher prices for better quality fish.

Since a high powered engine is not required in this type of fishery, efforts should be made to limit its size as much as possible to reduce initial costs and costs of fuel. This should be taken into consideration also for the boat investment schemes already planned for some of the cooperatives. Specialized technical expertise from institutes like CIFT, possibly with support from FAO or bilateral agencies, are required for the assessment of suitable power ranges.

4 FISH UTILIZATION

Generally speaking, the field of fish utilization which here covers the aspects of marketing, distribution, handling and processing, is not a constraint for development. No serious problems or specific needs have been identified except for the arrangement of fish distribution from remote landing centres as temporary measures until planned road connections have been completed.

Only one half of the marine fish production is consumed in the State itself while the other half is marketed in Calcutta where the purchasing power is higher than in Orissa. There is an unsatisfied demand for low cost protein in the state.

The Calcutta market is "unlimited" because of the large population and the fact that fish is a daily ingredient in the diet of the majority of the population. It is estimated that the yearly demand for fresh fish is about 80,000 tonne against which there is a supply of only 40,000 tonne. Orissa is a major supplier of marine fish for which an increasing gap between demand and supply is expected.

However, in order to benefit from the high prices the quality of the fish must be good which is often not the case for fish delivered from Orissa and other states.

It has been frequently stated that the trader's (middleman) exploitation of the fishermen is a common and serious problem in the State. Observations made during field visits to several fishing centres in all the districts do not support these statements. There are, no doubt, situations (remote areas) where the fishermen are in the hands of middlemen but, in general, there appears to be a competitive climate between the traders. "Auctions" were observed in several places where there even was an aggressive competition to acquire the fish. This impression was also confirmed by many interviewed fishermen.

The distribution of fish from fishing centres with road connections is not a problem. The production not consumed locally are efficiently transported by lorries in baskets with ice to distant markets in the State and to Calcutta.

In remote areas, where the supply of fish is greater than the traditional distribution channels can absorb, the distribution is a major constraint for development. The problem is aggravated in places like Dhamra where a fishery harbour is being built which will be completed long before it can be reached by road. In this particular case it is considered a must that the government steps in and provides transport of fish by boat (to Chandbali), as a temporary measure. Otherwise the utilization of the facilities and the entire development envisaged will be retarded. Initial damages of this kind may take a long time to repair.

The existing shore facilities like ice plants and chill rooms are catering for the present needs and the proposed establishment of new units in various development schemes seems to be sufficient. A proper assessment of the need and supply of these facilities is not available but it is suspected that there might already be a risk of over-capacity and over-investment in small, less economical units. Even if this is the case it is not a major problem warranting serious concern.

Nearly all fish is kept only for a few hours in the craft before landing and the quality is relatively good. The handling of fish onboard traditional craft and on the beaches without any facilities is naturally not a good practice but the turnover is quick and the quality deterioration is not a real problem. The handling of shrimp in the traditional fishing communities need further attention to ensure top quality because of its importance for the export.

In fishing centres where new landing facilities (jetties) are erected it is also provided for market halls. Consideration should be given to erect small market halls also in traditional centres to improve the handling of the fish. Adequate water supply for cleaning is necessary since a concentration of the fish handling without water will cause a situation worse than the present one.

5 LANDING FACILITIES

The heading landing facilities covers fishery harbours and jetties as well as supporting infrastructure, such as roads, water, etc.

From the point of view of establishing landing facilities, the coastal belt of the State can be divided into three areas :

a. In the northern district, Balasore, there are several river creeks in which facilities can be built at moderate costs. Expensive protection arrangements such as break-waters are not required. In most places the water depth is restricted allowing only smaller boats to operate from them. This is not a serious constraint since the need in terms of boats is considered to be within these physical limitations.

   A more serious problem is the lack of road connections from some of the remote villages which are suitable as fish landing centres. Fish Carrying services by sea may be a temporary solution as mentioned in Chapter 4 but in order to promote substantial development the roads are essential. In certain places the construction of roads is expensive because of the need for bridges across rivers and it appears that the implementation of road schemes have been delayed for these reasons. As temporary measures it might be

justified to improve the existing ferrying arrangement. The coastal area is quite intensively cultivated (paddy) and the needs for improved road systems stems only partly from the fishing population.

A concrete jetty has been constructed in Chandipur, and associated shore facilities are being erected. Similar schemes are planned for other centres at Adhuan and Kirtania. The costs of each centre is in the order of Rs. 4 million. Assuming an economic life of 20 years, the yearly costs, including maintenance, are about 0.6 million which should be compensated for by additional benefits in the form of increased landings. It corresponds to 200 tonne per year which is well within the reach without undue optimism.

Although it is recognised that this type of physical development is required in many places, a clear priority rating should be established, so as to accelerate the provision of facilities where they are most needed and likely to produce the largest benefits.

Finally, consideration should be given to the possibilities of constructing less expensive landing facilities, like simpler jetties or possibly ferro-cement pontoons which have many advantages at sites and in situations under discussion.

b. The central area i.e. Cuttack district, is characterised by an extensive river system in the outer delta and a coastline subjected to heavy littoral drift. Any development of landing facilities in this area is therefore bound to be costly and probably far in excess of anticipated benefits.

The commercial port at Paradip provides shelter and temporary facilities for the expanding fleet of shrimp trawlers. Thanks to the needs of the commercial port, this is probably the only site in the state where an "economical" fisher harbour can be established. A separate basin for fishing vessels and associated facilities for fish landing and vessel services should therefore be treate as a matter of urgency. This harbour is of vital importance for the development of both the mechanized small-scale fishery and the deep sea fishery.

There are two other sites, namely Hansua and Astrang, (Puri district) located north and south of Paradip which are proposed for construction of jetties and shore facilities to cater for mechanized trawlers. The justification for development of Hansua at this stage is questioned in view of its proximity to the two harbours of Paradip (30 km) and Dhamra (40 km), both of which are still far from completion. The same concern holds for Astreng although it is more justified because of its longer distance from Paradip (50 km) and due to the limited possibilities of building any fishery harbour further south in the State.

c. The southern area which covers the districts of Puri and Ganjam has open surf ridden beaches along which it is impossible to construct harbours without expensive breakwaters and arrangements to control the drift of sand. The only feasible solution would be to combine a fishery harbour with a commercial port like in Paradip. Such a scheme is under consideration for Gopalpur, but is still in early stages of planning.

Different systems for bringing small craft through the surf on to the beach have been proposed in India and elsewhere. No simple solution exists and it must be concluded that the prospects for any feasible (economical) system to be developed is very poor. Hauling systems to aid the handling of boats on the beach (from the waterfront and back) might be feasible but the benefits to the industry are only in the sav ng of man-power now employed in the manual transfer of the boats. The systems would not contribute to an increased production unless they facilitate the use of larger and more efficient boats, capable of passing through the surf, than those presently used.

It is important that these severe constraints for the development of open beach fisheries are fully recognized in planning for the future.

6 FISHING COMMUNITIES

There is hardly any documented information about fishing communities, their population and socio-economic conditions. Even such basic information as the number of people involved is uncertain. The given figure of 55,000 full-time and part-time marine fishermen is disputable and may be as much as three times too high considering the fish production which is 21,000 tonne/year.

The following account is based on observations and interviews in fishing communities and discussions with Fishery Officers of the Directorate and should only be seen as an indication of the problem areas.

a. In view of the large bank loans being given to cooperative societies for the purchase of boats, fishing gear, shore facilities and means for distribution the perhaps most critical issue at this point is the organization of fishermen. The weaknesses in the system are; that the cooperatives are government imposed paper products for the establishment of a formal body through which to channel the credits; that the functions of the cooperatives are too complex encompassing everything from the catching to the marketing which they are not capable of handling in spite of government assistance; that the ownership of the hardware and responsibilities for the operations are too dispersed and ambiguous to make the organizations work satisfactorily. The chances of achieving a successful and sustained development under the present system are remote.

   Consideration should be given to adjust the terms according to the following principles of functions and ownership.

   A cooperative society should be an association of fishermen which acts as an agent in strengthening their position viz-a-viz, competing interests such as the traders and in providing necessary facilities for the conduct of their profession i.e. fuel, ice, storage, etc. Experiences from most parts of the world clearly show that co-operatives set up by governments as small integrated enterprises are not likely to be successful.

   The productionmeans i.e. boat and gear should be assigned to individual fishermen who become owners of them when fully repaid. The fisherman-owner should be required to subscribe to a cooperative system pf marketing the catch through auction or on consignment basis and employing crew members at established minimum conditions but the investment in the boat should be a deal between the bank and the owner. The private ownership is an incentive which makes the difference between questionable welfare and sustained development.

b. The most severe social problems in fishing communities are found in the temporary and semi-temporary villages of the migrant Andhra Pradesh fishermen. These are located on the open beaches of the two southern districts Puri and Ganjam. The communities consist of filthy unorganized congestions of overcrowded small thatched huts where the fishermen and their large families live. Basic communal facilities and services are non-existant. The hygienic conditions leave everything to be desired. Because of the temporary nature of the settlements the State Government is reluctant to engage itself in the improvement of the conditions. However, the fishermen have been returning one season after the other for years and some of them have settled down permanently (Puri). Their contribution to the fish production of the State is also significant. It is strongly felt that a more active support to these communities in the form of land allocation and simple and basic communal services is warranteed.

c. The permanent fishing communities of Puri and Ganjam districts which are dependent on the "open beach" fisheries are maintaining a relatively good standard because of government support for credits and housing schemes. A matter of concern is the limited possibilities for development of fishing operations because of the physical conditions mentioned above under "Fish Production" and "Landing Facilities". A thorough analysis of future prospects and their consequences for the fishing population is needed to facilitate a proper long term planning.

d. Many small fishing villages in remote areas in the central and northern districts are by and large deprived of any social services mainly because of the lack of communication. Such services are unknown to the population and the level of living is low and primitive. They are furthermore largely dependent on a few traders who have

the means of transporting the products to distant markets.

A substantial development is not to be anticipated before the communication links have been opened. Any support to social development will have to be pure welfare until the villages have been integrated with the economy of more competitive markets. A first effort in assisting them to develop might be to arrange for regular and steady market outlets for their fish products by improved distribution facilities. In initial stages this must probably be undertaken by government organizations.

e. A particular problem which might rapidly become a critical social issue is the lack of housing and communal facilities for fishermen and their families in connection with the establishment of harbours at Dhamra and Paradip. Particularly in Dhamra, this has not received proper attention and need to be added to the present plans for the harbour scheme.

7 INSTITUTIONAL SUPPORT

Traditionally most of the institutional support was directed towards the inland sector which still maintains a large share. In view of the great potential for marine fisheries development the support to this sector is gradually being strengthened in the Directorate.

A major activity of the marine section is the operation of about 90 mechanized gillnetters and trawlers on a commercial basis. The boats were introduced by the state under a pilot fishing programme to promote the development of mechanized fisheries. The scheme has probably had positive demonstrational effects in the past but is now disappointing and is a financial burden on the Directorate. The boats are reported to fish at an efficiency which is less than 50% of that of privately owned boats. It is suggested that most of the boats owned by the Directorate are disposed of to the private sector. A small number of boats should stay with the Directorate to cater for the needs of the marine training institutes, experimental/demonstration fishing and possibly government supported fish carrying systems.

The "Mechanized Fishing" units in the Marine Section of the Directorate should be transformed from ineffective commercial operators to an active development unit with the objective of increasing the productivity and efficiency of existing and new mechanized boats.

In order to achieve an upgrading, on a broad basis, of the traditional fisheries the development/extension service need to be activated and expanded. There are 19 Marine Extension Service Units in the State (4 of these are for the Chilka Lake) consisting of an Extension Officer. His duty is mainly to collect statistics and information about the fisheries and the fishing communities. Samples of the data collection reveal inaccuracies and gaps of significance. The service needs to be improved which can be done by short term training of officers and strengthened monitoring from headquarters.

8 RECOMMENDATIONS

The following needs have been identified for an accelerated development and are suggested for further investigation and action as appropriate.

1. <u>Physical Development</u>

   1.1 Increased supply of material for fishing nets under credit schemes.

   1.2 Enlarged fleet of mechanized gillnetters (low power) with arrangements for proper fish handling and preservation onboard.

   1.3 Completion of connecting roads, communal facilities, etc., for the Dhamra fish harbour.

1.4 Construction of a fishery harbour within the commercial port area at Paradip.

1.5 Provision of landing facilities at Kirtania.

1.6 Establishment of fish carrier systems.

1.7 Provision of landing facilities at other sites such as, Adhuan and Astrang in a priority order to be assessed by pre-feasibility studies.

1.8 Basic communal services and facilities for temporary fishing settlements in the two southern districts.

2. Technical Development

2.1 Exploratory/experimental/demonstrational fishing to assess availability of fish and introduce improved and new fishing techniques.

2.2 Motorization of traditional craft (botali) in the Balasore district.

2.3 Improvement of log rafts and other beach landing craft.

3. Training/Extension

3.1 Strengthened extension service for management of cooperatives and their operation.

3.2 Training of development/extension workers for the coastal blocks.

4. Miscellaneous

4.1 Phasing out of the Directorate's commercial fishing operations and concentration on development work (ref. 2.1).

4.2 Introduction of legislative measures to protect the fishing areas of the traditional small-scale fisheries from over-exploitation by larger boats.

Appendix 3.1

Costs and Earnings of fishing boats (in Rs.)

1. Existing Botali boat

Earnings:		12,000
Gross revenue (3 Rs/kg, 30kg/day, 4 tonne/year)	12,000	
Costs:		7,220
Food (130 days x 10 Rs)	1,300	
Crew share: (130 days x 4 men x 5 Rs)	2,600	
Maintenance and Repair	300	
Net replacement (25%)	1,500	
Capital : Boat (Rs.3,000 x 0.277*)	800	
Nets (12% of Rs.6,000)	720	
Return :		4,780

2. Hypothetical motorized (10 hp) Botali boat

Earnings:		30,000
Gross revenue (3 Rs/kg, 50kg/day, 10 tonne/year)	30,000	
Costs:		25,830
Fuel: (200 days x 25 Rs)	5,000	
Food: (200 days x 10 Rs)	2,000	
Crew share : Driver (10 months x 270 Rs) + (200 days x 3 men x 5 Rs)	5,700	
Maintenance and Repair	2,000	
Net replacement (25%)	2,250	
Capital : Boat (Rs.3,000 x 0.277*)	800	
Engine (Rs.25,000 x 0.277*)	7,000	
Nets (12% of Rs.9,000)	1,080	
Return :		4,170

3. Mechanized Gillnetter (26 hp)

Earnings:		60,000
Gross revenue (3 Rs/kg, 100kg/day, 20 tonne/year)	60,000	
Costs:		64,750
Fuel: (200 days x 60 Rs)	12,000	
Food: (200 days x 20 Rs)	4,000	
Crew share : Driver (10 months x 300 Rs) + (10 months x 5 men x 250 Rs)	15,500	
Maintenance and Repair	10,000	
Net replacement	3,750	
Capital : Boat + Engine (Rs.100,000 x 0.177+)	17,700	
Nets (12% of Rs.15,000)	1,800	
Return :		- 4,750

* Capital Recovery Factor for 5 years at 12%.
\+ Capital Recovery Factor for 10 years at 12%.

Source : Interviews with boatowners and fishery officers.

General Description of Marine Small-Scale Fisheries

ANDHRA PRADESH
I n d i a

Prepared by
W.D. Hartmann, Sociologist (Associate Expert)
in consultation with
Directorate of Fisheries, Andhra Pradesh

Development of Small-Scale Fisheries in Southwest Asia, Colombo, December 1977.

CONTENTS

		Page No.
1	State Data	1
2	Introduction	4
3	Brief History	4
4	Fisheries Administration	5
5	Specialized Institutions	6
6	Corporations	7
7	Cooperatives	8
8	Fisheries Resources	9
9	Production	10
10	Craft and Gear	10
11	Landing Centres	11
12	Handling and Processing	12
13	Marketing and Distribution	13
14	Export and Import	14
15	Ancillary Industries	14
16	Socio-Economics	14
17	Government Policy	15
18	Development Plans	16

Appendices

1.1	Andhra Pradesh State - map	17
4.1	Organization of the Directorate of Fisheries	18
7.1	Cooperative Societies	19
9.1	Most common Marine Fish Species	20
11.1	Marine Population, number of Fishing Villages, number of Craft and Landings by Districts, Andhra Pradesh.	21
13.1	Fish Prices	22
18.1	List of Schemes included in the Annual Plan 1977/78	23

1 STATE DATA

1.1 Location: East coast of India bordering the state of Orissa in the north, the Bay of Bengal in the east and the state of Tamil Nadu in the south.

Latitudes: 13°40'N - 19°N; Longitudes: 80°E - 85°E

(Map in Appendix 1.1)

			All India*
1.2 Size:	Area:	277,000 km^2	(8.4%)
	Coastline:	970 km^2	(15.9%)
	Continental shelf (200 m depth) :	31,040 km^2	(7.5%)
1.3 Populations: (1971)	Total	43.5 million	(7.9%)
	Urban:	19.3%	
	Rural:	80.7%	
	Coastal:	45.3%	
	Density:	157 per km^2	(177)
	Birth rate per year (1961 - 70):	3.58%	(4.11)
	Death rate per year (1961 - 70):	1.47%	(1.89)
	Growth rate (1961 - 70):	20.9%	(24.8)
	Life expectancy:		

1.4 Education:

Table 1.1 Literacy rate (1971) in percentage

	All States	Urban	Rural	Coastal Districts	All India
Total	24.6	47.1	19.2	27.7	(29.5)
Males	33.2	57.3	27.3	35.6	(39.5)
Females	15.8	36.3	10.9	19.8	(18.7)

Table 1.2 School Enrolment

Level	Age Group	% of population of each age group	
		Andhra Pradesh (1969/70)	All India (1973/74)
Primary School	6 - 11	45.7	83.5
Middle School	11 - 14	30.5	35.6
Secondary School	14 - 17	34.1	21.2
Universities, Colleges	17 - 24	2.4	5.0

* Figures within brackets in this column give the state share (%) of All India or All India figures as applicable.

1.5 Health (1975/76):

All State:	Population per doctor:	11680	(4200)
	Population per hospital bed:	1898	(1809)
Coastal Districts:	Population per doctor:	13900	(4200)
	Population per hospital bed:	2302	(1809)

1.6 Nutrition:

Calorie intake of requirement (2200cal/day)		(78%)
Protein intake of requirement (60gms/day)		(75%)

1.7 Employment:

Table 1.3: Population by Category of Workers (1971)

Category	% of total population		% of total workers	
	Andhra Pradesh	India	Andhra Pradesh	India
1. Total Workers:	41.4	32.9	100	100
(i) Cultivators	13.3	14.3	32.2	43.3
(ii) Agricultural labourers	15.7	8.7	37.9	26.3
(iii) Livestock, Forestry, Fishing, Hunting, Plantations, Orchards.	1.4	0.8	3.3	2.4
(iv) Mining and Quarrying	0.2	0.2	0.5	0.5
(v) Manufacturing, Processing, Service, repairs.	3.7	3.1	9.1	9.5
(vi) Construction	0.7	0.4	1.6	1.2
(vii) Trade and Commerce	2.3	1.8	5.4	5.6
(viii) Transport, Storage and Communications	0.9	0.8	2.2	2.5
(ix) Other Services	3.2	2.8	7.8	8.7
2. Non-workers	58.6	67.1	-	-

1.8 Net National Product:

Table 1.4 Net National Product (1973/74)

	Andhra Pradesh	All India	Andhra Pradesh as % of India
. NNP * (1960/61 prices) Mill. Rs.	14,905	201,430	7.4
. NNP * (1960/61 prices) per capita Rs.	325	349	93.1
. NNP * (Current prices) Mill. Rs.	38,550	492,900	7.8
. NNP * (Current Prices) per capita Rs.	840	849	99.0

. State net national product at factory costs.

1.9 Trade:

Exports: Ore, Ferro products, Oil and Oil cake, Tobacco, Jute, Bone and Bone meal, Sugar, Rice Bran, Palmyra, Cotton, Sea Shells, Shark Fins, Coconut shells, Onions and Prawns.

Imports: Chemicals/Chemical fertilisers, Wheat, Kerosene, Diesels, Iron and Steel products, Electrical goods.

1.10 Prices:

Table 1.5. General Consumer Price Index numbers for agricultural labourers (base year 1960/61 = 100)

	1970/71	1971/72	1972/73	1973/74	1974/75	September '76
Andhra Pradesh	171	183	205	242	322	267
Annual changes %		7.0	12.0	18.0	33.1	-17.1
All India	192	200	225	283	368	295
Annual changes %		4.2	12.5	25.7	30.0	-19.8

1.11 State Administration:

Andhra Pradesh is divided into 3 Regions: Andhra, Telengena and Rayalaseema. Within each region, districts form administrative units. The executive head of a district is the District Collector. He is responsible for the general administration, law and order, internal security and collection of revenue and exercises full authority in these matters. There are 21 districts of which eight are coastal, i.e. Srikakulam, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Prakasham and Nellore.

2 INTRODUCTION

The fisheries sector contributes about 1.1% to the state's economy. All fishing in the state can be referred to as small-scale marine or inland fishing activities except for shrimp trawling by an increasing number of mechanized vessels which operate from the harbours at Kakinada and Vizakhapatnam (Vizag).

The total fish production in the state, in 1975, was 250,000 tonne out of which 155,000 tonne came from marine fisheries and 95,000 tonne from inland fisheries. Out of the 155,000 tonne marine production, about 146,000 tonne is landed by traditional craft.

The bulk of the state's population prefers fresh water fish. Marine fish is mainly consumed along the coast and by more affluent people in larger cities, e.g. Hyderabad. Nearly 70% of the marine fish is either cured or sun-dried and only 30% is marketed and consumed in fresh condition. There is a considerable export of fresh marine fish from some areas to markets like Howrah/Calcutta and Madras.

Most of the small-scale fishermen still operate traditional fishing craft (catamaran, masula (stitched) boat, nawa), but use in increasing numbers improved gear such as nylon gillnets.

Though an increasing number of mechanized shrimp trawlers are operating from the harbours at Vizag and Kakinada, the bulk of the shrimp export which was 1833 tonne in 1975, originates from the traditional fisheries.

Along the Andhra Pradesh coast there are 419 fishing villages. The estimates of the marine fishing population are varying from 166,500 to 637,500 and the estimates of the number of active fishermen from 39,600 to 140,500.

Fishermen are low caste, and are looked upon as part of the socially and economically weaker sections of the population; they belong to the group of the backward classes.

The fishing villages are to a large extent geographically isolated; adequate infrastructure facilities, proper road communication and sufficient fresh water supplies are lacking. The standard of housing is usually very low, a fact which is aggravated by frequent occurrence of fire and cyclones.

3 BRIEF HISTORY

Significant steps in marine fisheries development have been:

- the introduction of mechanized fishing boats;
- the support to the cooperation movement;
- the distribution of nylon-twine to marine fishermen through cooperatives;
- the provision of fishery harbours;
- the establishment of a fisheries corporation.

First attempts to improve traditional craft through mechanization were made in the late 50's, but with little success. Subsequently, new boats were designed ("Natya Rani", "Pablo") and constructed. Until 1974 all the mechanized boats operating from Andhra Pradesh (about 310) were constructed at the government boat building yard in Kakinada, which was transferred to the Andhra Pradesh Fisheries Corporation in 1974.

In 1960 a Central Cooperative Society for the coastal region, the Andhra Pradesh Fishermen Central Cooperative Society Ltd. (an apex Cooperative Organization) was established at Kakinada, which includes both marine and inland fishermen societies. In the following years the number of Primary Fishermen Cooperative Societies increased to 1172 (1977). It was through these Cooperative Societies that loans were issued for the purchase of cotton, nylon-twine and nylon-nets.

In 1974, the Andhra Pradesh Fisheries Corporation (APFC) was established in Kakinada. The Corporation operates a number of handling and processing facilities, a boat-yard for non-mechanized and mechanized boats, and competes with private fish traders in the procurement of fish and prawns.

In the last decade, the marine fish production of Andhra Pradesh shows a steady increase over the years and has doubled since 1970. The reasons for this are that the fishing effort increased by about 30% from 1970 to 1974 and that the catch per unit effort increased from 2.12 kg to 3.61 kg in the same period. The increased catch per unit effort may be attributed to the extensive use of nylon-twine supplied to the fishermen under various schemes.

4 FISHERIES ADMINISTRATION

The Government of Andhra Pradesh is responsible for the development of fisheries within the state, although the Central Government issues guidelines for the planning and finances some central and centrally sponsored schemes.

Since 1959 there is a separate Directorate of Fisheries under the Secretary for Animal Husbandry, Agriculture and Fisheries. The Directorate employs 1,120 people of which 645 are professional officers and 475 are administrative staff. Out of the total number, 109 are posted at the Headquarters in Hyderabad; the remaining 1,011 are stationed in the districts.

The state is divided into six zones, namely Nizambad, Warangal, Kurnool, Vizag, Kakinada and Guntur, the last three being coastal zones. On zonal (or regional) level a Deputy Director of Fisheries is posted to co-ordinate and supervise the activities in the fisheries sector entrusted to the Assistant Directors of Fisheries in the districts.

On district level each Assistant Director of Fisheries is assisted by administrative and professional staff (Fisheries Inspectors).

Under the Assistant Director there are Fisheries Extension Officers on block level. However, Fisheries Extension Officers are appointed in only 51 selected blocks out of the state's total of 324 blocks.

For the structural set-up of the Fisheries Adminstration see organization chart in Appendix 4.1.

The budget of the Directorate is given below.

Table 4.1 Budget of the Directorate of Fisheries
(in million Rs.)

	Actual 1975/76	Proposed 1976/77
5th Plan	6.8	7.2
Non-Plan	7.9	8.9
T o t a l	14.7	16.1

5 SPECIALIZED INSTITUTIONS

5.1 Research and Development

5.1.1 Marine Fisheries

(a) Central Marine Fisheries Research Institute, Vizag:

This station was established in 1956 and has on its programme: demersal fish, biology of commercially important species, hydrology of inshore waters, and tagging of cat fish.

(b) Off-shore Fishing Station, Vizag:

This station is conducting experimental fishing in the off-shore waters of Vizag coast.

5.1.2 Inland Fisheries

(a) Co-ordinate Project on Composite Fish Culture, Badampudi (ICAR).

(b) Prawn Culture Unit, Tadepalligudem (ICAR).

(c) Prawn Breeding Unit, Kakinada (ICAR).

(d) Co-ordinated Research Sub-station for Reservoirs, Nagarjunasagar (ICAR).

(e) Brackish Water Fish Farm, Kakinada (CIFE).

(f) Central Institute of Fisheries Education Fish Farm, Balabhadrapuram (CIFE).

(g) Central Inland Fisheries Technological Unit, Kakinada.

(h) Brackish Water Fish Farm, Kakinada. (Agricultural University)

(i) Fresh Water Biological Research Station, Nagarjunasagar. (Agricultural University)

5.2 Education and Training

5.2.1 University education

(a) Department of Marine Sciences.

A separate department was started for Marine Sciences in the Andhra Pradesh University, Waltair having a unit of Oceanography in the Department.

(b) Faculty of Fisheries Sciences.

In 1976 the Agricultural University, Rajendranagar started a Faculty of Fishery Science.

5.2.2 Fisheries Training Institute, Kakinada.

(a) Fisheries Training Institute, Kakinada.

The institute was established in 1958. Fishermen with basic practical knowledge of marine fishing are recruited for training in the general principles of navigation, seaman-ship and improved methods of fishing, especially trawling. The duration of the course is 6 months. Candidates are being given a stipend of Rs.75/- per month. The training produces suitable candidates for handling small mechanized crafts. The number of graduates since 1958 is 691. The majority of them are working on mechanized boats, both as crew members as well as owner-operators.

5.2.3 Training centres (inland fisheries).

(a) Inland Fisheries Training Centre, Warangal.

(b) Central Fisheries Extension Training Centre, Hyderabad (CIFE).

6 CORPORATIONS

6.1 Andhra Pradesh Fisheries Corporations Ltd.

The Andhra Pradesh Fisheries Corporation (APFC) was established in 1974 under the Companies Act (1956). Its headquarters is located at Kakinada. Upon establishment the APFC took over physical assets from the Directorate of Fisheries i.e. boat building yard, shore facilities (Visakhapatnam), ice plants and cold storages, a canning plant and trawlers. A brief account of the APFC's activities is given below.

(a) Boat building yard (Kakinada)

The yard has a design capacity to build 60 boats per year in the 10-12 m range. There are 233 workers employed in the yard. The production in 1975/76 was 57 boats and in 1976/77 90 boats. In order to meet the high demand for mechanized boats there are plans to establish another boatyard at Kakinada.

(b) Freezing plant (Visakhapatnam)

The plant went into production in February 1976 and has a capacity to freeze 4 tonne of shrimps per day. The storage capacity for frozen products is 50 tonne.

The Corporation is exporting frozen shrimp (to Japan and the U.S.A.) which in 1976/77 amounted to about 180 tonne.

A second freezing plant of the same capacity is being established at Kakinada.

(c) Ice Plants

Ice plants are operated by the Corporation in Visakhapatnam, Nellore, Padala and Hyderabad and a new plant at Kakinada of 10 tonne/day capacity is nearly completed.

(d) Cannery (Kakinada)

The cannery has an installed capacity to produce 1000 cans of 4 lbs a shift. The actual production is however much lower and amounted to only one tonne over an 18 month period ending 31st March 1977.

(e) Fishing Gear Unit (Kakinada)

The unit was established in February 1975 with the objective of creating employment opportunities for women. The unit is employing 30-80 people manufacturing gillnets and trawlnets. The turn-over is in the order of Rs.100,000 per year. There are plans for expansion of the activities.

(f) Fishing operations unit

The fleet consists of about 20 trawlers in sizes from 10 to 16 m in length. The vessels are operating from Kakinada and Visakhapatnam.

(g) Marketing

The Corporation operates retail stalls in Hyderabad, Vijayawada, Eluru and Guntur where mainly marine fish is marketed. The quantity sold in 1976/77 was about 190 tonne.

(h) Diesel oil out-let (Visakhapatnam)

With a view to supply diesel oil to mechanized boats operating in the Fishery Harbour at Visakhapatnam, the Corporation has opened a out-let where diesel oil, lubrication oil, grease, etc., required for day-to-day running of mechanized boats is supplied to the boats at reasonable rates. This facility has attracted a large number of boat operators, as is revealed by the quantum of sales. During the period 28/7/76 to 31/3/77, the Corporation sold 2.1 million litres of oil, lubricants, etc., valued at Rs.2.4 million.

7 COOPERATIVES

The formation of fishermen's cooperative societies in Andhra Pradesh dates back to the days before India's independence but it was in the 1960's and '70's that most of the now existing cooperative societies in the fisheries sector were established.

In 1960 a central society for the coastal region, the Andhra Fishermen Central Cooperative Society, was founded in Kakinada. It covers all the districts of the Andhra and Rayalaseema regions, i.e. it included both marine and inland fishermen.

There are 1182 primary cooperative societies (both marine and inland), with a total membership of 112,702 fishermen.

The number of societies, members and share capital are given in Appendix 7.1.

The main functions of the Primary Fishermen Cooperative Societies are the following:-

- to obtain loans from the banks for their members to purchase improved fishing gear and craft;
- to market the catch of the fishermen on better terms (i.e. by-passing the private fish merchants);
- to deal in fishing requisites, spare parts, diesel oil etc;
- to provide consumer goods to the members at a low price;
- to improve the socio-economic conditions of the fisherfolk;

The cooperatives are usually initiated by staff members of the Directorate of Fisheries. On district level the Assistant Director of Fisheries acts as Registrar of Cooperatives. To a certain extent cooperative societies are supported and controlled administratively by the Directorate through its various sub-sections.

The terms for an individual to join a cooperative society as a member are:

- the applicant should be of major age and of a sound mind;
- the applicant should reside in the village which is included in the area of operation of the society and should belong to the fishermen class;
- the applicant should pay an enrolment fee (Rs.10) and buy a share in the society's capital (minimum Rs.1).

The members of the cooperative society elect (according to the cooperative's regulations and by-laws) a Board of Directors and a President; the Board of Directors and the members of the society should meet regularly.

The Andhra Fishermen Central Cooperative Society, which to date comprises 252 Primary Fishermen Cooperative Societies, is mainly engaged in the distribution of nylon-twine, cotton-yarn and other fishery requisites to the coastal fishermen. In a phased programme (1973/74 and 1974/75) this Society implemented a mechanization scheme with a total of 45 mechanized boats which were issued to primary societies and are run by their members on a share basis.

The activities of most cooperatives concentrate on obtaining loans under various schemes, like MFALDA[1] and SFDA[2] for the purchase of nylon-twine and cotton-yarn for the fabrication of improved fishing nets, and for the purchase of traditional fishing craft (catamarans).

The conditions, under which these loans were given, vary considerably from case to case: loans have been given with and without subsidy, with and without a soft loan component, at different rates of interest, etc.

---

1) Marginal Farmers and Agricultural Labourers Development Agency.

2) Small Farmers Development Agency.

In several fishing villlages and nearby towns a variety of associations exist, which relate their activities in one way or the other to the fishing sector. Most of these associations are not registered and not officially recognized and very little information about them is readily available. An example is the Association of Fish Merchants, Vijayewada (Krishna District). This is an Association of fish merchants in the Vijayewada fish market; the main functions are to protect the commercial interest of the fish merchants (e.g. by restricting competition by fellow fish merchants, etc.).

8 FISHERY RESOURCES

Andhra Pradesh has a coastline of 970 km and a continental shelf of 31,040 km^2. The bottom is mostly sandy and muddy, except for a few places of rocky ground.

Seasonal climatic and oceanographic variations are determined by the two monsoon periods (the South-West Monsoon April - September, and the North-East Monsoon October - March), which largely influence the fisheries. Unlike the situation on the west coast, the South-West Monsoon does not render marine fishing completely impossible since the monsoon here only reflects in the form of cyclonic spells lasting for 3 to 4 days.

The peak season for fishing is from October to April, when 59% of the total annual marine catch is landed. May to September is the lean period. Except for cyclonic spells, fishing can be conducted at varying degree throughout the year.

The major groups of fish in the landings are :-

(1) Demersal: Elasmobranchs, Cat fishes, Soianeids, Leiognathus sp., Gazza, Perches and Prawns.

(2) Pelagic: Ribbon fishes, Seer fishes, Sardines and other Clupeids.

The shallow waters, less than 40 m depth are intensively fished all along the coastline. The concentration of fishing effort on prawn fishing has resulted in some of the other inshore stocks being underexploited or unexploited. Extensive trawling surveys carried out by the Exploratory Fisheries Project (EFP) on the shelf waters inside and beyond 50 m depth have identified considerable conventional demersal resources which remain virtually untapped. (Bulletin No.5 - Results of Demersal Fisheries Resources survey along the East Coast of India, 1959 - 74).

Assessment reports on some of these surveys, ("Proceedings of the Symposium on Living Resources of the Seas around India, C.M.F.R.I. 1973) indicate that with diversification of fishing effort there are opportunities for greater exploitation of thread-fin breams (Nemipterus sp.), Sharks, Rays and Catfishes (Tachysurus sp.).

Little survey work has been done on the pelagic species and the available resource data are sparse. However, there is every reason to be optimistic that greater seasonal fishing effort on small pelagic species, in particular Indian Mackerel (Rastrelliger Kanagurta), would result in increased production. (Bulletin No.24, CMFRI, 1970).

The estimated potential yield for the Andhra Pradesh fisheries is 201,000 tonne (Report of the National Commission on Agriculture 1976, Part VIII Fisheries, Ministry of Agriculture and Irrigation, Government of India, New Delhi). This estimate was based on production records from 1972 and broken down as follows:

Table 8.1 Fish production and potential yield

	Average production in '000 tonne			Potential yield in '000 tonne		
	Demersal	Pelagic	Total	Demersal	Pelagic	Total
Andhra Pradesh	21	59	80	47	154*	201
India	272	675	947	718	1690	2408

* Andhra Pradesh share, based on area of continental shelf to 200 depth, of the estimate of 670,000 tonne for the entire east coast.

9 PRODUCTION

The total fish production in Andhra Pradesh in 1974/75 was as follows :-

Table 9.1 Fish Production by Sector (1975)

	Quantity (tonne)	%
Marine Fisheries	155,638	62.1
Traditional fisheries	145,972	93.8
Mechanized craft	9,666	6.2
Inland Fisheries	94,943	37.9
T o t a l	250,587	100

The Andhra Pradesh share of the All-India marine fish production is 13% (1974).

The marine fish landings are composed of the following important species:

Sardines	(25%)	Cat fish	(6%)
Jew fish	(7%)	Pomfret	(4%)
Ribbon fish	(7%)	Seer	(3%)
Silver Bellies	(7%)	Perches	(3%)
Sharks, Rays	(6%)	Prawns	(6%)

A list of the most common marine fish species is furnished in Appendix 9.1.

10 CRAFT AND GEAR

The fishing fleet of Andhra Pradesh consists of the following craft :-

Table 10.1 Fishing Fleet

Traditional craft (non-motorized)	22000
Catamarans Nawas Masulas	15000 5000 2000
Mechanized/motorized	500
Small Trawlers (and gillnetters) (28 - 30 ft.) Trawlers (30 - 38 ft.) Others	350 70 80

The main characteristics of the traditional craft are :-

(i) Catamarans have a length of 7 to 8 m. They are keelless and made of wood from 'Albizia stipulata' or other wood that has good buoyancy; rough-cut logs (2 - 4) are pegged and tied together into a boat shape. The cost varies from Rs.800 to Rs.3000. They employ two fishermen, mainly in gillnetting. Catamarans can be found along the entire Andhra coast.

(ii) Masula (stitched) boats have a length of 8 to 9 m. They are keelless and made of mango wood planks stitched together with palmyrah leaf fibre, keeping a continuous rope in between the seams. They cost Rs.2,000 to Rs.6,000. The lifetime is short (2 years). The Masulas are engaged in gillnetting, boat seining and hand-lining and have a crew of 3 to 4 people. They are most common along the northern coast.

(iii) Nawas are 9 to 10 m long. They are keelless but constructed with frames and ribs in teak wood. The cost varies from Rs.4,000 to Rs.14,000 and the lifetime is about 5 years. The crew complement is 8 to 10. Gillnetting and shore seining are main fishing methods. These craft are most common along the central coast.

The gear mostly used on these boats are gillnets (cotton and nylon), boat seines and shore seines (cotton). Catamarans and stitched boats carry 400 - 600 m of gillnets (bottom-set), and about 300-400 m drifting gillnets. Nawas carry 1500 - 2000 m long gillnets.

The seasons of operation and the species caught with respective gear is outlined below :-

Table 10.2 Fishing gear, seasons and species caught

Type	Season	Main species
Gillnet (Kaflavala)	Throughout the year	Pomfret, Seer, Hilsa, Sardines, Prawns.
Boat seine (Iragavala)	September - April	Jew fish, Lactarians, Pomfret, Prawns.
Shore seine (Peddavala)	November - February	Jew fish, Cat fish, Ribbon fish, Prawns etc.

11 LANDING CENTRES

Along the Andhra Pradesh Coast there are 253 landing places of which 50 are considered as major landing centres. In appendix 11.1 details are given on number of villages, marine population, number of craft and amount of landings by district.

Most of the fish landing places and centres do not have any landing facilities; smaller fishing craft, catamarans and stitched boats are manoeuvred through the surf and landed on the open beach.

The catch of Nawas is often transferred to catamarans and then brought through the surf. This practice is also, at certain times of the year, applied to the unloading of prawn trawlers which operate from open beaches.

Where rivers and streams enter the sea, boats operating in the inshore waters cross the sand bars and enter the river mouths and land the fish on the banks. While smaller craft usually do not have much difficulties in negotiating the bar, larger boats (Nawas) have to wait for the high tide before entering into the river mouth. In order to facilitate the landing of these craft at important landing

centres (Krishnapatnam, Nizampatnam), experiments are being undertaken with temporary groynes to keep the river mouths open.

Except for the two fishery harbours at Vizag and Kakinada, there are no landing facilities provided for mechanized boats. The mechanized fishing fleet usually operates from these two harbours.

There are proposals and plans for the construction of additional landing facilities (harbours and jetties) at Baruva/Bhavanapadu (Srikakulam District), Nizampatnam (Guntur District), and Rameyapatnam (Prakasham District), and for the expansion of the capacity of the harbours at Vizag and Kakinada.

12 HANDLING AND PROCESSING

No measures for preservation of fish are employed on board traditional craft and shrimp trawlers making one day trips. The fish is simply dumped in the bottom of the craft or on deck without cleaning, gutting or icing.

In the southern area some of the nawas which go for longer trips (5 - 6 days) carry salt and land a wet-salted product.

Larger shrimp trawlers which make week-long trips carry ice for preservation of shrimps and more valuable fish species.

At some places along the southern coast, gillnets are left too long in the water resulting in rapid spoilage of the fish in the water; large portions of the catch is thus only suitable for curing.

Fish and prawn catches are generally displayed on the beach itself and immediately marketed to waiting fish traders; fish and prawns alike are packed in large round straw baskets. Rubbing of wet sand on to larger (blood) fishes is practised as a conservation method for the transport.

Fish is transported to fresh fish markets, up to 120 km distance, in baskets as headloads, shoulder loads, on bicycles, on bullock carts, and on passenger buses. There is no transport of fish in insulated vans from beach landing places to fish markets. During the prawn peak season wholesalers-cum-processors transport prawns in owned/hired lorries from the landing spot to their depots.

For far distance transport by rail to markets in Madras (24 hrs) and Howrah/Calcutta (48 hrs) fish is iced and packed in large baskets; this is done in small mud-walled and palm-roofed sheds. The lack of insulation and the long transport time results in the arrival of poor quality fish at the destinations.

About 70% of the fish caught in Andhra Pradesh is either salt cured or sun dried; the rest is marketed in fresh condition.

The following methods are employed for processing of fish and prawns:

(a) Salt-curing and sun-drying of fish is done at almost every fishing village and landing centre. The techniques applied are traditional and primitive, not geared for good quality production; government fish curing yards are usually functioning only as salt distribution centres;

(b) Canning of fish and crab meat at the canning plant of the APFC, Kakinada; (ref. section 6).

(c) Freezing of prawns at freezing plants (7), mainly at Vizag and Kakinada. The total capacity is 31 tonne/day.

(d) Processing of shark livers, extraction of shark liver oil and production of shark liver oil capsules etc., in a small plant of the Andhra Fishermen Central Cooperative Society, Kakinada.

Ice-making and cold-storage facilities are concentrated to Vizag and Kakinada, and the capacities are as given in the table below :-

Table 12.1 Ice-making and cold-storage facilities

Facilities	Vizag	Kakinada	Total
Ice plants (tonne/day)	55	67	122
Cold-storage (tonne)	50	63	113
Frozen-storage (tonne)	605	200	805

13 MARKETING AND DISTRIBUTION

Fish marketing data on demand for marine fish, marketing channels for fresh and dried fish, amount and mode of transport of fish and costs and margins are not readily available.

Most of the fresh fish is purchased on the beach from the fishermen through bargaining by a multitude of hawkers and small fish vendors (many of them women). They then transport the fish in baskets on bicycles and local buses to the fresh fish markets and sell it directly to the consumer. In general there are no separate wholesale and retail markets in food fish marketing in the coastal zones of the state. The fish is either sold to consumers directly or to fellow fish vendors who subsequently retail the fish in the very same or in other markets. In villages with reasonable communication links (roads- and rail) bigger fish traders buy certain species of fish and send them to wholesale markets in Madras, Howrah/Calcutta, etc.

The bulk of the dried fish is cured and dried by local fisherwomen. They take the dried fish to the weekly shandies in the neighbouring (agricultural) villages and sell it directly to the consumers, or they sell the dried fish to visiting fish vendors (many of them women), who then transport it to the inland retail/wholesale markets. In bigger wholesale/retail markets for dried fish one also finds dried fish imported from other states (Kerala, Bombay area).

Small quantities of prawns are purchased by the said small fish vendors but mainly by petty prawn wholesalers who transport and sell the prawns to wholesalers-cum-processors. There are cases of wholesalers having contracts with a number of fishermen to secure a supply of prawns against interest-free supply of credits. The price paid by these traders is usually not below the price paid by the APFC to fishermen. During the peak season and at certain important landing centres the prawn catches are purchased directly by wholesalers-cum-processors and transported by own/hired lorry to the processing plant. After processing, the prawns are sent either directly from Andhra Pradesh or via Madras and Kerala to foreign markets.

In general, the marketing of fish is very labour intensive and an important source of income for many people of the coastal population.

Regarding the consumer preference, dried fish figures stronger than fresh fish in the daily diet of most people because of a traditionally acquired taste and because of lower price and less perishable nature.

Some fish prices at different marketing levels and locations are furnished in Appendix 13.1.

14 EXPORT AND IMPORT

The total prawn export from Andhra Pradesh to foreign countries either directly or via Madras and/or Cochin is nearly 2,000 tonne. The record over the last few years is as shown in table 14.1.

Table 14.1 Prawn Export (1971 - 1975)

Year	Quantity in tonne
1971	1127.5
1972	1621.3
1973	1284.5
1974	1912.6
1975	1833.2

Fresh and dried fish are both exported to and imported from other Indian states, but no records are readily available.

15 ANCILLARY INDUSTRIES

Boatyards for construction of mechanized boats exist in Kakinada (2), Tallarevu and Machilipatnam of which the AFPC yard in Kakinada is the largest (ref. section 6)

Traditional craft (catamarans, masulas, nawas) are locally made in the villages.

Repair and service facilities for the mechanized boats are established in Vizag and Kakinada only.

Fishing nets are locally made in the villages by the fishermen themselves and their families. The APFC runs a fishing gear unit in Kakinada (ref. section 6).

16 SOCIO-ECONOMICS

The marine fishermen of Andhra Pradesh are of Andhra ("coastal people") origin and Telugu-speaking. Most of them belong to the fishermen castes of the 'vadabalajie' and 'jallari'.

Though sizes of households vary considerably within the fishing villages, one hardly finds the 'joint' or 'extended family' of the traditional Indian agricultural community; the prevailing family pattern is the nuclear family i.e. husband, wife and a number of children. All members of the family, of both sexes and all ages, take part in the fishing or related activities; especially the women play an important role in drying and marketing of fish.

In the fishing villages there are usually two different, but functionally complementary socio-political systems:

(i) the formal system of the administration of the village community (panchayat), with an elected president (sarpanch), and elected members of the village council (grama panchayat); their activities center on problems of physical infrastructure and the village's relations in the wider political and administrative set-up (samithi, zilla parishad);

(ii) the informal system of a village caste headman and a group of elders, who concentrate their attention on problems connected with caste, family, marriage/divorce and other intra-village affairs; the positions in the informal system are exclusively inherited.

Both systems are to a certain extent identical concerning their members and representatives; many office-holders in the formal set-up are members of the informal system.

Of a certain importance in village social affairs are associations called 'shangams' (the very word in Telugu-language for 'cooperative'), which are both religious groups as well as mutual help organizations; followers of a particular Hindu God meet regularly to worship, and help each other in cases of emergency (death, sickness) etc.

There is no reliable data obtainable on the average income of an active fisherman and his family, as the access to additional sources of income varies considerably along the Andhra Pradesh coast. While in the south and north, fishing is mostly the sole source of income, fishermen in the Central Districts (Guntur, Krishna, West Godavari) earn additional money by operating salt pans, growing paddy, tobacco and coconut. Earnings from fishing vary with type of craft and gear and ownership. Estimates of the average income range from Rs.2,500 to 3,000 per annum for a household of five members.

Most of the daily income (85%) is spent on food items, the rest on tobacco, alcohol, etc.

Surplus money is frequently used to purchase and stock-pile storeable food-stuffs (rice, millet), to pay-off debts, or it is invested in precious metals (gold, bell-metal, etc.).

The housing situation in most fishing villages is neither better nor worse than in most agricultural communities or crowded agglomerations in the outskirts of towns. However, the housing situation is aggravated by the exposure of fishing villages to extreme climatic conditions (cyclones, floods) and the scarcity of housing sites along the coast, which leads to congested settlements, where fire is a constant danger.

Though fishing villages are generally isolated, there are educational facilities available for the fishermens youth. In some fishing villages there is even a problem of unemployment among the educated young people, who, after high school and college education, do not go back to fishing for reasons of status.

The daily diet of the fishermen consists of coarse rice, millet and fish. Usually people suffer from heavy vitamin deficiencies. Malnutrition, especially with children, prevails. This, in addition to low hygienic standards in the villages and lack of proper water supply, is the main reason for the frequent occurrence of maladies. Medical services in fishing villages are lacking or are of very poor quality and coverage.

17 GOVERNMENT POLICY

The broad objectives of India's fisheries development programme during the Fifth Five Year Plan (1974 - 1979) are :

- to increase availability of protein rich food thereby contributing towards bridging the protein gap in the Indian diet;
- to improve the socio-economic conditions of fishermen who are among the economically weaker sections of the population through measures designed to provide more effective and remunerative methods of production and distribution;
- to tap on an increasing scale the vast potential for foreign exchange earnings through export of selected priced varieties.

Keeping in view these general guidelines and approaches given by the Government of India, the State Government proposed development schemes which are aimed at :

- increasing the inland fish production by production of fish to the tank lease holders;
- increasing the marine fish production by introduction of mechanized boats and assistance to fishermen fishing with non-mechanized boats;
- training of fish farmers and fishermen boys in marine and inland fishing by imparting latest improved technology;
- strengthening of fishermen cooperative societies in order to improve the socio-economic conditions of its members;
- providing margin money for cooperative organizations to enable them to get institutional finance for various productive schemes.

18 DEVELOPMENT PLANS

Development plans are prepared for five year periods; the present 5-year plan is the fifth running from 1974/75 through 1978/79.

The detailed budgeting of development schemes is made in annual plans.

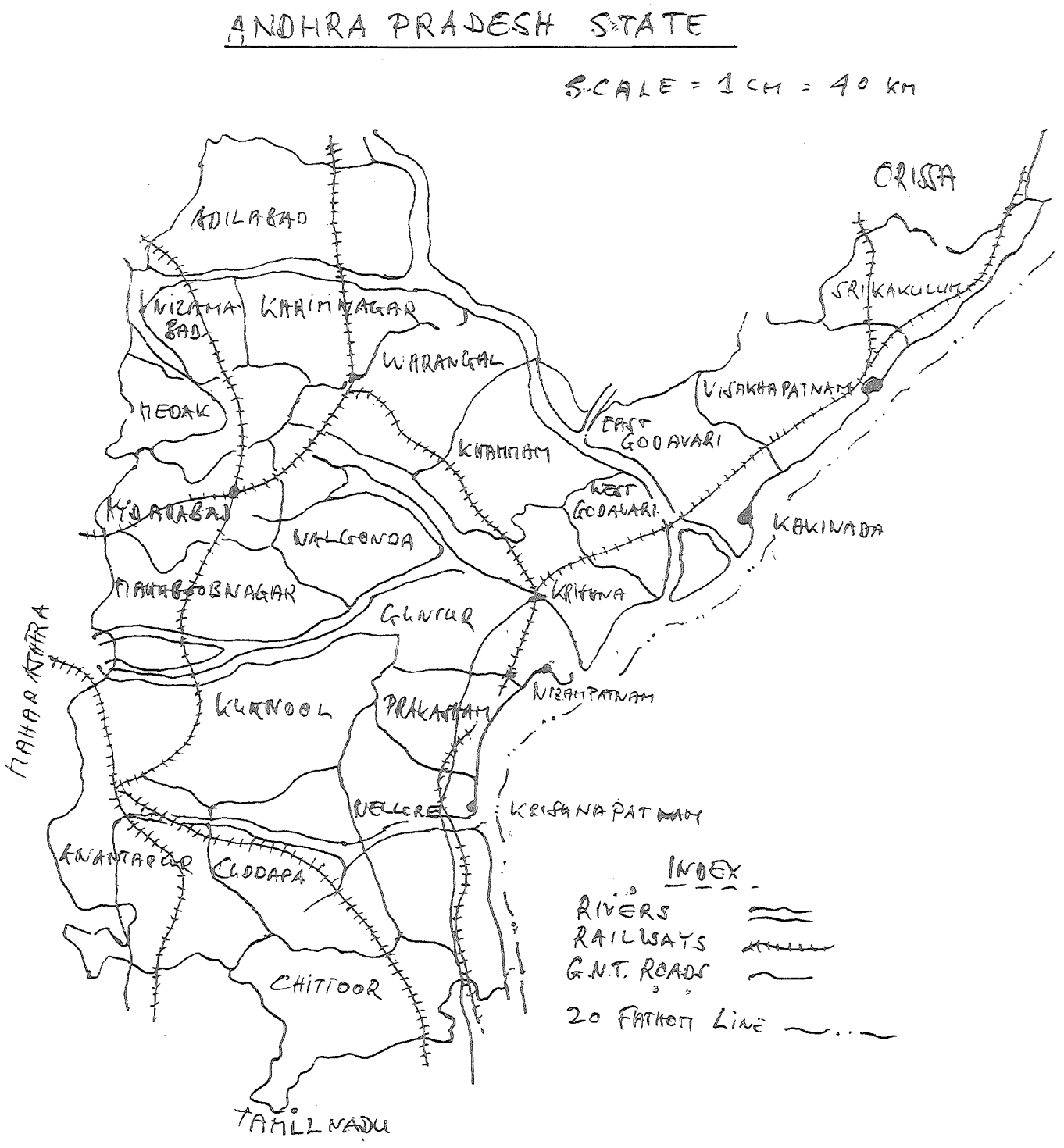
In the annual plan 1977/78 the financial outlay for major schemes in the marine fisheries sector was:

- training : Rs.0.73 million (1976/77 : Rs.0.28 million);
- introduction of mechanized boats : Rs.0.710 million (1976/77 : Rs.0.4 million);
- strengthening and supervision of cooperatives : Rs.0.72 million (1976/77 : Rs.0.1 million).

A detailed list of schemes included in the annual plans 1977/78 and covering the entire fisheries sector (inland and marine), is furnished in Appendix 18.1.

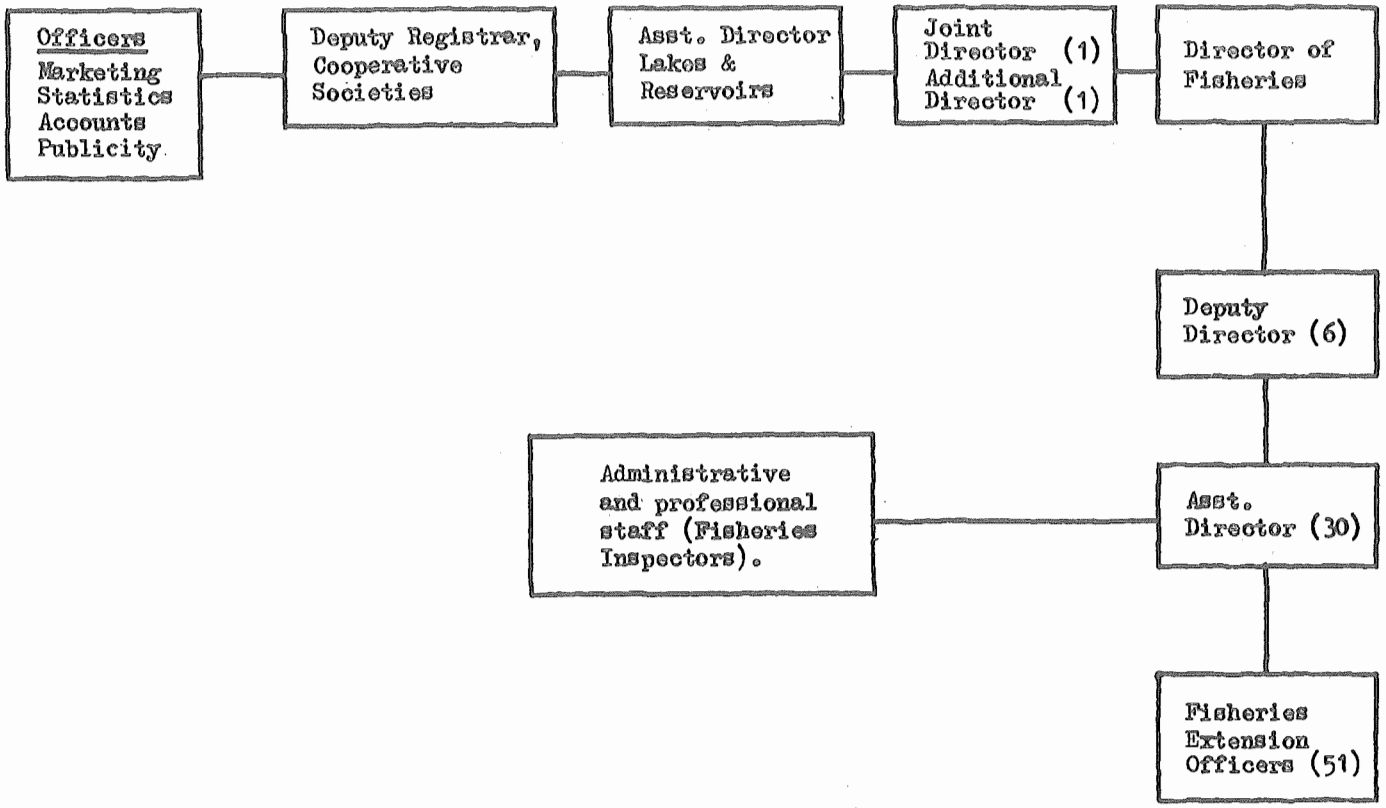
External support for the development of harbours and infrastructure and expansion (boats and shore-facilities) of the Andhra Pradesh Fisheries Corporation is being negotiated with the World Bank and the U.K.

Appendix 1.1


ANDHRA PRADESH STATE
SCALE = 1 CM = 40 KM
ORISSA
ADILABAD
NIZAMA BAD
KARIMNAGAR
WARANGAL
MEDAK
KHAMMAM
EAST GODAVARI
VISAKHA PATNAM
SRIKAKULUM
HYDERABAD
NALGONDA
WEST GODAVARI
KAKINADA
MAHABOOBNAGAR
KRISHNA
GUNTUR
KURNOOL
PRAKASHAM
NIZAMPATNAM
MAHARASHTRA
NELLORE
KRISHNAPATNAM
ANANTAPUR
CUDDAPA
CHITTOOR
TAMILNADU
INDEX
RIVERS
RAILWAYS
G.N.T. ROADS
20 FATHOM LINE

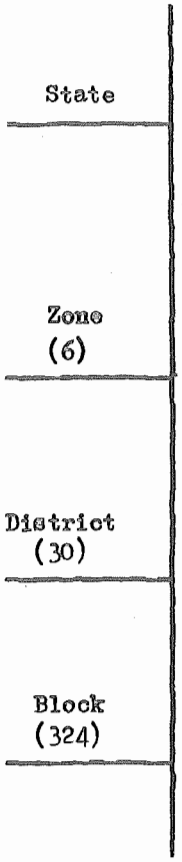
Appendix 4.1

Organization of the Directorate of Fisheries



The Numbers in brackets indicate the number of office holders and the number of administrative units.

Appendix 4.1



Appendix 7.1.

Cooperative Societies.

	Societies (Nos).	Members (Nos).	Share capital (Rs).
COASTAL DISTRICTS:			
Primary Fishermen Cooperative Societies	647	71,877	817,680
Primary Fishermen Marketing Cooperative Societies	5	3,572	57,041
District Fishermen Marketing Cooperative Societies	2	89	114,525
Central Fishermen Cooperative Societies	2	576	759,475
Sub-total	656	76,114	1,748,721
INLAND DISTRICTS:			
Primary Fishermen Cooperative Societies	521	35,585	429,104
Primary Fishermen Marketing Cooperative Societies	2	690	7,069
District Fishermen Marketing Cooperative Societies	2	50	13,875
Central Fishermen Cooperative Societies	1	263	347,600
Sub-total	526	36,588	797,648
Total	1,182	112,702	2,546,369

Appendix 9.1

Most common marine fish species.

English Name	Scientific Name	Telugu/Local Name
Pomfret (White)	STROMATEUS CINENSIS	Tella Chanduva
Pomfret (Black)	S. NIGER	Nallachanduva
Seer	SCOMBEROMOROUS COMMERSONNI	Konema
Seer	S. GUTTATUM	Vanjaram
Sardines	SARDINELLA LONGICEPS	Kavallu
Rain bow Sardine	KOWALA KOVAL	Marava
Anchovies	THRISSOCLES Sp	Poorava
White Bait	ANCHIVIELLA Sp	Nethallu
Hilsa	HILSA ILISHA	Killalu
Pellona	PELLONA Sp	Engallu
Thread fins	POLYNEMUS Sp	Maga
Ribbon fish	THRICHURUS Sp	Savallu
Cat fish	TACHYSURUS Sp	Jella
Mackerels	RASTRELLIGER Kanagata	Kanagarthalu
White fish	LACTARIUS	Sadumi
Jew fish	SCIANIDS	Gorasa or Goraka
Perches	Seranus and LUTJANUS Sp	Chamallu
	LUTJANUS Sp	Kataili
Soles	CYNOGLOSSUS	Adalam
Horse Mackerel	CARANGIDS	Para
Silver bellies	LEOGNATHUS	Kara
Sabre fish	CHIROCHENTRUS DORAB	Mulluvaluva
Sharks	SCOLIODON Sp	Sorra
Hammerhead Shark	ZYGENA	Sappa Sorrah
Saw fish	PRISTIS	Yalla
Skates	RHINOBATIS	Ulava
Rays	DASYATIS Sp. etc.	Teki Belugiri, Tenku
Eels	ANGUILLA and MURAENA Sp	Pamu chepa
Crabs	NEPTUNUS etc.	Peetha
Prawns	PENAEUS Sp	Royyalu
Lobster	PANULIRUS	Katchi
Flying fish	CYPSILURUS	Gobiranga
Mullet	MUGIL Sp	Moyya, Bontha
Bekti (Lates)	LATES	Pandugoppa
Ox-eyed Herring	MAGALOPS	Kannamgi
Milk fish	CHANOS	Palabontha
Bombay duck	HARPODON	Vanamattalu

Appendix 11.1

Marine Population, number of Fishing Villages, number of Craft and Landings by Districts, Andhra Pradesh

District	No. of villages	Marine Population	No. of Catamarans	No. of Country Craft	No. of Mech. Boats	Landings (in tonne)
Nellore	53	50,000	2200	280	1	24,000
Prakasham	53	25,000	2600	250	*	30,000
Guntur	18	21,000	400	850	*	6,750
Krishna	25	25,000	*	460	*	7,800
West Godavari	19	15,000	*	540	*	*
East Godavari	22	25,000	*	2400	3	12,500
Visakhapatnam	78	67,000	6000	2000	170	53,000
Srikakulam	103	150,000	6000	750	*	18,000

* Information not obtai

Appendix 13.1

Fish Prices

Variety	Landed price to fishermen	Auctioned price	Wholesale price	Retail price in the Markets					
				Hyderabad	Madras	Calcutta	Roukela	Kaaragpur	Guntur
Lates	2.50	Not Auctioned	2.70	4.50	4.50	6.00	5.50	5.50	3.20
Polynemus	2.25	"	2.50	3.75	3.75	5.25	4.75	4.75	3.00
Seer	2.25	"	2.50	3.75	3.75	5.25	4.75	4.75	3.00
Pomfrets	2.50	"	2.75	4.00	4.00	5.50	5.00	5.00	3.25
Lacterious	2.00	"	2.25	3.50	3.50	5.00	4.50	4.50	3.00
Jew fish	2.00	"	2.25	3.00	3.00	4.50	4.00	4.00	2.75
Eels	1.50	"	1.75	3.00	3.00	4.50	4.00	4.00	2.50
Mugil	1.75	"	2.00	3.25	3.25	4.75	4.25	4.25	2.50
Clupide	0.80	"	1.00	2.50	2.50	3.75	3.75	3.25	2.25
Sharks & Rays	0.40	"	0.60	2.00	2.00	3.50	3.25	3.25	1.50
Bombay duck	0.40	"	0.60	1.50	1.50	3.00	2.50	2.50	1.25

Appendix 18.1

List of Schemes included in the Annual Plan 1977/78.

		(in '000 Rs.)
Marine		
Introduction of Mechanized Boats		210
Introduction of Deep Sea Fishing Vessels		900
Provision of Landing and Berthing Facilities at Minor Ports		522
	Sub-total	1,632
Inland		
Fish Farming		2,284
Assistance to Fishermen Boys undergoing training at Inland Training Centre		30
	Sub-total	2,314
Schemes for both Marine and Inland		
Strengthening of Marketing, Statistics, Directorate and Divisions		1,000
Training of Fisheries Personnel		730
Strengthening and Supervision of Cooperatives		720
S.F.D.A. Scheme, Karimnagar		433
Six - Point Formula Scheme		945
Scheme for the Welfare of Scheduled Castes and Tribes		940
Formation of Roads		440
	Sub-total	5,208
	Grand Total	9,154

Assessment of Problems and Needs in Marine Small-Scale Fisheries

ANDHRA PRADESH
I n d i a

Prepared by

C. Ratcliffe, Fisheries Adviser
W.D. Hartmann, Sociologist (Associate Expert)
G.E. Lierens, Systems Analyst (Associate Expert)

in consultation with

Directorate of Fisheries, Andhra Pradesh.

Development of Small-Scale Fisheries in Southwest Asia, Colombo, October 1977.

CONTENTS

		Page No.
1	Introduction	1
2	Resources	1
3	Production	2
	3.1 Fishing Craft	2
	3.2 Fishing Gear	3
4	Catch Utilization	4
5	Infrastructure	6
6	Institutional Support	7
7	Fishing Communities	9
8	Recommendations	9

Appendices (in Working Paper No.15)

3.1	Types of Catamarans - East Coast of India	in WP/15
3.2	Modified Traditional Designs of Catamaran	in WP/15
3.3	Beach Landing Craft	in WP/15
4.1	Improved Fish Drying	in WP/15
4.2	Possible Lay-Out for Improved Low-Cost Fish/Prawn Handling Shed.	in WP/15

1 INTRODUCTION

The marine small-scale fisheries of Andhra Pradesh supplies 156,000 tonne of fish and prawns; this is 60% of the total (inland and marine) fish production in the State. The big increase of the marine production from 74,000 tonne in 1970 to 156,000 tonne in 1975 is mainly attributed to the traditional small-scale sector.

The traditional fishing fleet has a limited range of operation and there are indications that a substantial production increase can be realized by extending and expanding the small-scale fishing operations. Diversification of fishing gear and methods and introduction of improved craft should be the key elements in development programmes to further the growth in marine fish landings.

The lack of landing facilities and the remote possibilities of providing economically justifiable facilities along the open beaches is a serious constraint; the craft and gear development must be tailored to this situation i.e. closure of fishing during rough weather periods, beach landing, etc.

The greater proportion of marine landings are marketed in dried form. It is anticipated that the quantity of fresh fish consumed and earnings to fishermen will be increased by provision of facilities such as roads, ice plants, etc., and by improving the handling and marketing of iced fresh fish along with the creation of markets for this commodity in Andhra Pradesh. However, for foreseeable future dried fish will remain important and continued Government support is necessary to facilitate the trade and improve the quality of dried fish.

The promotion of further production increases will necessitate an enlargement of the existing institutional support available to the fishing industry through the Fisheries Directorate. The technical development extension programme need to be expanded under the sole control of the Fisheries Directorate; the liaison with all sectors of the fishing industry strengthened and the system for credit facilities improved.

The socio-economic situation in fishing villages is poor and needs uplifting. Better feeder roads to the villages, pure drinking water, cheap and good housing and medical facilities are needed.

2 RESOURCES

Quantitative information about the availability of stocks of commercially important food fishes forming the coastal resources are not readily available. Recent bottom trawling surveys carried out by the Exploratory Fisheries Project (EFP) Visakhapatnam, indicate that certain demersal stocks are underexploited and that production of such species as sharks, rays, cat fish, jew fish, pomfrets and perches could be increased from fishing grounds inside the 30 fathom line.

It is suggested that steps be taken to interpret the findings of the trawling surveys with a view to identifying possible new demersal fishing development opportunities for the small-scale sector.

Efforts should also be made to assess, from the available exploratory trawling data and commercial operations, the economical sustainable yield of the prawn fishery. This is required for the introduction of effective exploitation control measures, e.g. licencing to limit the number of vessels, closed seasons in breeding areas, trawl mesh size regulations and coastal trawling limits to protect the traditional fishing industry. These considerations are important since in many proposals for the construction of additional landing and harbour facilities the main justification centres on developing locally based trawler fleets. A further consideration is that during the prawn season the fishing grounds in the vicinity of these proposed landing sites are already being exploited by the small-scale sector and by annually increasing number of migrant trawlers from Madras, Kakinada and Visakhapatnam.

Whilst no fishing survey work has been done on the seasonally available large pelagic (e.g. tunas, seer fish) and small pelagic (e.g. mackerels, sardines) species, it is thought that the stocks of these species are also under-exploited. From various studies of the Indian Mackerel (Rastrelliger Kanagurta) fisheries (Bulletin No.24. C.M.F.R.I.; December 1970); it is clear that the distribution of effort and the intensity of fishing is not commensurate with the abundance of the mackerel shoals not only within the season but also during different fishing seasons. This situation does not result from the inability of the fishermen to detect good periods of abundance but is due to economic considerations

(Sekharan, 1958 and Banerji and Chakraborty, loc. cit). But the obvious effect of such a situation is that the fishing tends to be less efficient, thus yielding much less catch than what would be the case had the fishing intensity been increased proportionately during the period of abundance of shoals in the inshore waters".

Considering the great emphasis on prawn gillnetting, it is a fair supposition that this situation of under-exploitation applies to pelagic species in general.

In conclusion the resource base does not constitute an immediate constraint for development but there is a need to determine the additional production possibilities by exploratory/experimental fishing on both pelagic and demersal stocks related to small-scale fishing operations.

3 PRODUCTION

In 1975 the total fish production in the State was 251,000 tonne, of which 156,000 tonne came from the marine sector and 95,000 tonne from inland fisheries. Significant results have been achieved over the past 20 years in the development of a coastal, mechanized prawn trawling fisheries, but the bulk of marine fish production is still landed by the traditional small-scale non-motorized fisheries.

The marine fisheries landings by sector are :

- traditional small-scale fisheries	18,000 traditional non-motorized craft	146,000 tonne (94%)
- coastal mechanized fisheries	275 (9 - 12 m) 26 (20 - 30m) "prawn trawlers"	10,000 tonne (6%)

The 18,000 traditional craft consist of some 15,000 catamarans (log rafts), 2,000 Masula boats (plank, "stitched" boats) and 1,000 Navas (carvel, teak boats). The most important fishing method is gillnetting and fishing operations are generally confined to day or night trips on grounds adjacent or close to home centres within 20 km of the shore.

With the exception of the motorization of a small number of Navas no significant improvements or replacement of traditional craft has taken place. However, the catching efficiency of the units has improved considerably over the past 10 years as a result of greater use of synthetic fibre nets.

Because of the physical constraints of landing craft on surf beaten open coasts, future development efforts to increase production should be aimed at enabling the fishermen to make greater use of the fair weather season. Whilst it is desirable to increase the fishing effort during the bad weather season the degree of success will be dependent on the geographical conditions of the landings centres.

3.1 Fishing Craft.

The most difficult problem concerning boat development is that of finding improved substitutes for the low cost traditional catamarans and masula boats at present used on the open coast.

The sailing catamaran (log raft) is the most commonly used craft in the small-scale fisheries. Some 15,000 of these crafts, ranging in length from 3 m (one crew - costs Rs.700) to 7 m (three/four crew - costs Rs.2,500), operate from open beaches. The catamaran is well suited for the heavy beach surf conditions and the prospects of replacing these crafts with normal displacement boats are not encouraging. Repeated attempts in India and other countries to replace traditional beach landing craft with contemporary displacement hull surf boats have so far been unsuccessful and no economically feasible solutions have emerged. Whilst the catamaran is common along the east coast of India south of Dhamra in Orissa there is considerable variation in local designs. These range from a small (3 m) basic structure, comprising of a number of roughly shaped logs, to the larger (8 m) well shaped boat catamaran, fitted with drop keels and sometimes rudder, used in Palk Strait off Tamil Nadu. (See appendix 3.1 and 3.2 in Working Paper No.15 (WP/15) p.9 and 10).
Most of the catamarans used in Andhra Pradesh, except for a large version of boat catamaran found in Visakhapatnam district, are of the small basic design variety. The catamaran is an important specialized fishing craft in its own right and there might be opportunities to effect improvements by the introduction of the better designed larger catamaran and/or boat catamaren from other areas.

It is further suggested that trials be conducted to ascertain the economical and practical feasibility of outboard (petrol/kerosene) motorization of catamarans in suitable light surf locations during the fine weather.

The sailing masula boat (stitched boat) is the other type of craft used for operations through the surf on open beaches. This is a low cost frameless doubled ended keel-less boat made of mango planks stitched together with palmyrah palm leaf fibres. A continuous coir rope between the planks is used as caulking. The length of these boats varies from 7 m; beam 1.5 m; cost Rs.500 to 9 m; beam 2.5m; cost Rs.1,000. The larger craft are used for seasonal boat and/or beach seine operations. The smaller masula boats are mainly involved in gillnet fishing; the gear carrying capacity is greater than that of the smaller catamarans. The weak construction of the masula boat limits its use to the fair weather sea conditions or to light surf beaches. Several of these craft, equipped with prawn gillnets, were introduced by the Fisheries Directorate in the open coast fishing village of Bandaravanipeta where previously only catamarans were used. The stitched boats were operated quite safely and effectively during the fair weather season November - February. However, there has been instances of the craft breaking up at sea during bad weather, with a resultant loss of lives. Consequently the fishermen are now fearful to use them during bad weather and heavy surf conditions and revert to using the catamaran. The possibilities of replacing the masula boat with a stronger, framed, carvel built or marine plywood double ended craft of light construction should be explored. Another possibility of providing a craft for use from beaches during fair weather periods or from light surf beaches, could be the introduction of fibre glass beach craft similar to the type used in Sri Lanka. A mould for the construction of this model is available in Madras. It is suggested that a small number of these fibre glass boats be obtained and their performance tested under the different local conditions. (See appendix 3.3 in (WP/15) p.11).

A further possibility worthy of consideration is the introduction of low cost traditional double-ended sailing craft designs from other east coast areas e.g. the various types of "vallams" used in the Gulf of Mannar (Appendix 3.3 in WP/15 p.11).

There are no great technical problems associated with the introduction of a small class, e.g. 6 - 8 m, open or decked boats, of standard displacement hull design, for use from harbours or shallow river mouths. The "Kakinada Nava"is the traditional craft used from the more sheltered fishing centres. This craft is a keel-less sailing boat of 8 - 10 m (2 to 3 tonne capacity) made of teak and carvel built. The craft which are built in small traditional boatyards, cost between Rs.8,000 and Rs.10,000 and are used for drift-net, set-net, stake-net and shore-seine fishing.
The Fisheries Directorate instigated the motorization of a few of these craft for gillnetting in the past. For economic reasons the development did not take root and, apart from a small number of motorized navas engaged in prawn trawling, they are still propelled by sail. Considering the nature of design and heavy construction of the nava, i.e. narrow upswept bow and thick pit-sawn timbers the possibility exists of gradually replacing this craft with a lighter shallow draft boat of contemporary design. It is however unlikely that such new craft could be constructed in modern boatyards at costs competitive to those of the small traditional yards. Therefore, in order to keep construction costs as low as possible and/or in line with the cost of a traditional nava it is recommended that the introduction of new types of wooden boats be implemented through the traditional boat builders. The development and extension of suitable designed craft and short courses for boat builders could be carried out, for instance, at the Andhra Pradesh Fisheries Corporation Boatyard at Kakinada.

In effecting a craft development programme there are two problems concerning the supply of materials and equipment which need attention :

(i) Supplies of suitable timber for the construction of catamarans are not readily available. In the northern districts, Albesia stipulata, the most popular timber and other timber suitable for constructing catamarans are becoming increasingly difficult to obtain. Likewise the southern districts are reliant on catamaran timber supplies from Tamil Nadu and Kerala.

(ii) A major constraint against effecting motorization of existing or future types of small craft is the lack of suitable size outboard motors and low horse-power light weight inboard engines of Indian manufacture.

3.2 Fishing Gear

The composition of the important food fish species in the landings appears to be governed more by the amount/or type of gear used in different districts and the limited operations range of the craft, rather than the relative abundance of the various species comprising the total resource. Thus, further increases in production can be anticipated from diversification of fishing methods on less exploited

stocks. However, the introduction and general acceptance of new innovations of craft and gear, by the fishermen, will be dependent on the resultant financial returns being supplementary to, or greater than, those presently obtained from prawn fishing.

The Fisheries Directorate is already achieving diversification and better usage of existing fishing methods by encouraging: increased use of prawn gillnets from catamarans; increased use of large mesh bottom set gillnets from navas.

Other areas for diversification of gear that can be explored by experimental/demonstrational fishing activities are :

(i) increased use of small-mesh, surface drifting, cotton or nylon gillnets for small pelagic species (e.g. sardines and mackerels);

(ii) introduction of combination monofilament/multifilament nylon gillnets for prawns and mackerels. This type of gear is in use by catamaran fishermen on the Coromandel Coast in Tamil Nadu. It comprises a bottom panel of multifilament netting for prawns, and a top panel of monofilament netting for mackerels.

The advantages of this type of net are that, monofilament nylon twine is at least 50% cheaper than multifilament nylon twine; the catching efficiency of monofilament is twice or three times that of multifilament; the fishermen are still able to benefit from the prawn fishery but also have additional earning opportunities if prawns are not available.

(iii) Introduction of other possible mesh permutations of combination gillnets, e.g. small mesh (prawns) - big mesh, (large fish species); or trammel nets with small mesh centre walls (prawns, small and large fish species).

(iv) Increased use of big mesh surface drifting gillnets for large pelagic species (e.g. tunas and spanish mackerels).

(v) Introduction of small light weight purse seines and/or surround gillnets for mackerels or sardines.

In order to effect an overall increase and/or diversification of fishing effort, a steady and ample supply of twine at reasonable cost for replacement and introduction of gear is essential. Due to the narrow profit margins, the fishermen experience difficulty in replacing or increasing their complements of nets. The Fisheries Directorate has recognized that this situation constitutes an inhibiting factor against future development, and limited supplies of subsidized materials have been supplied through Fishermen's Cooperative Societies to recipients of departmental sponsored bank loans. However, in order to provide a continuous overall measure of development support a reasonably priced, subsidized if necessary, and adequate supply of nylon twines, ropes, etc., should be made available to all bonafide fishermen.

4 CATCH UTILIZATION

In Andhra Pradesh, 65% of the landings (94,000 tonne) is sold in dried form and 35% (62,000 tonne) is marketed fresh. Some 9,000 tonne (6%) of the total marine landings are prawns, of which 70% is frozen and exported.

Fish landings, whether marketed fresh or dried, are categorized into class groups according to retail sales value, i.e. Class 1, 2, 3 and trash fish (prawn trawler by-catch). The bulk of landings fall into the three latter lower priced groups and Class 1 fish forms only some 10% (16,000 tonne) of total landings.

A large portion of the 65% dried fish comprises fish species which are traditionally consumed in dried form (e.g. anchovies, white baits). The remainder, much of which is 1st and 2nd Class fish, e.g. seer, pomfrets, cat fish, mackerels, sardines, is dried because it is not possible to market it fresh at a reasonable price. This situation is mainly due to absence of handling and distribution facilities.

Dried fish is distributed to both coastal and internal district markets. The market price structure of dried fish trade is more stable than that of the fresh fish trade which is mainly attributed to the less perishable nature of the dried product and the large steady continuous demand for this nominal price commodity by the lower income groups who are the main consumers.

At present there is very little economic gain in icing the lesser value species. Consequently the use of ice is chiefly confined to transportation of prawns, earmarked for overseas export, from landings centres to processing plants. Ice is also used during distribution of better class fish by rail and road to urban markets in Andhra Pradesh and other states where higher prices are obtained. The unfavourable economics of the use of ice can be seen from the operations of the big prawn trawlers where only prawns and Class 1 & 2 fish are iced on board. The bulk of the by-catch from these larger vessels is dumped, since it is not economical to land it in iced condition. The main consumers of the low class fish are the lower income groups as in the case of dried fish.

The gradual linking of fishing villages by feeder roads to the coastal highway will result in an overall increase in the utilization of the lower valued fishes for fresh consumption in the Coastal Region. The opportunities of greatly increasing the internal fresh consumption of low value marine fish by distributing and marketing it iced are more limited because of the high cost of preservation. Landings of such species, surplus to coastal fresh fish demands, will continue to a large extent to be distributed internally in dried form.

Better utilization of fresh 1st and 2nd class fish offers opportunities to increase the earnings of the fishermen. The "high income" urban markets are often far from the coastal fishing villages. In order to further benefit from these markets the fish handling need to be improved to reduce waste and to meet the quality requirements.

In the southern districts particularly, where large mesh gillnets are employed, a proportion of the catches of 1st and 2nd class fish is landed in poor condition and unfit for sale as fresh. This situation results from nets being left in the water too long and lack of ice on board the craft. The fish further deteriorates on shore because of the unhygienic handling in poorly designed, traditional ice storage cum fish packing sheds at the beach and market centres.

There is therefore a need for

(i) demonstrational activities in respect of handling and preservation of fish on board the craft;

(ii) introduction of better designed and simply constructed fish handling sheds with wooden or concrete insulated cum fish storage containers and cement floors (Appendix 4.1 in WP/15, p.12) and distribution facilities.

Despite the considerable development and extension work carried out by the Fisheries Directorate over the past years to upgrade dried fish processing by encouraging the use of concrete drying plinths and concrete brine tanks, handling and quality of the products is still, on the whole, very poor. Fish is dried on the ground, and is often heavily contaminated with sand and dirt.

The dried fish processing is generally conducted as a cottage industry by the fishermen's wives and small traders in close proximity of their houses and is an important source of employment. Because of the scattered nature of the industry and the low amount of capital available to the people concerned it is difficult to achieve widespread improvements in the short term.

In consideration of the continued future importance of the dried fish production, efforts to improve the quality and hence the nutrient value of the products should be intensified. The dried fish development work being carried out by the Fisheries Directorate in some of Government curing yards needs to be expanded in order to achieve development/extension coverage of the entire coastline.

Possibilities for improvements exist in the following areas, which are illustrated in Appendix 4.2 in WP/15 (p.13).

(i) quicker and more hygienic handling and processing by the use of low cost drying racks made from local materials (e.g. bamboo poles, rattan matting);

(ii) increased storage life of the products by introduction of simply constructed, well ventilated fish store rooms and "off the ground", wooden or basket woven household storage bins;

(iii) better processing by the use of smooth surfaced concrete brine tanks for the larger fish curing operations and suitable sized, hard wood or plastic brine tubs for household curing operations;

(iv) provision of properly laid out general public dried fish processing areas at Visakhapatnam, Kakinada and other important landing centres to cater for the prawn trawler by-catch surplus to fresh fish requirements.

Items (i), (ii) and (iii) could be introduced as a technical development extension input in fishing villages where housing schemes have been, or are to be implemented. Facilities should as far as possible be set up on a community basis with controlled handling practises.

The handling of prawns on board and at landing centres need to be improved. In an attempt to reduce annual quality losses in export production of prawns the Central Government is introducing new statutory quality control standards for processing plants. The effectiveness of these regulations will be low unless steps are taken to effect some measure of improvement to the handling prior to the prawns reaching the processors. Inspite of extension efforts by the Fisheries Directorate to create an awareness of the need to use ice throughout the prawn production chain only the large trawlers are using ice on board. Also the handling techniques employed are not conducive to obtain high quality. On landing, the prawns are sorted and/or beheaded on the ground or sand and kept sparsely iced in open bins in unhygienic poorly constructed holding sheds whilst awaiting transportation to the processing plants.

The main problem associated with obtaining better pre-processing handling is the lack of control that the processors and Government have on the operations of the select circle of merchants responsible for procuring the prawn at landing centres or neighbouring markets. As a result of the absence of effective quality control measures it is possible for persons involved in these intermediate business activities to obtain substantial financial returns without the necessity to invest much capital in more hygienic, better constructed facilities.

The large number of small traders and merchants involved in the prawn procurement business and the isolated location of the numerous landing centres will make the task of upgrading the present handling techniques both difficult and long-term. However, the economic importance of the prawn industry and high market quality requirements overseas necessitate an upgrading of the pre-processing handling techniques. Pilot operations in selected areas might be a suitable way to gradually effect some measure of improvement. This would include:

(i) The introduction of better designed low cost handling sheds, with covered insulated ice cum prawn storage bins, at landing centres (See appendix 4.1 in W/P 15, p.12).

(ii) The use of insulated boxes on board (tailored to size of daily catches) and during transportation.

(iii) Discouragement of the practice of sorting and beheading the prawns on the beach.

(iv) The introduction of a licencing system, for prawn handling sheds with issues subject to the adherence to a code of simple low cost operation practices.

5 INFRASTRUCTURE

a. Roads: The majority of fishing villages are situated very close to the shoreline. Most villages are not linked to each other by roads and only a few main villages of the many groups of hamlets along the coast have access roads joining them to the coastal highway.

In most cases the usage of existing and future access roads is not confined to the fishing communities since such roads are passing through agricultural areas. The justification for providing these roads would in many cases be greatly strengthened if construction projects were worked out to serve agriculture, fisheries and other sectors.

An expanded road construction programme is needed; the road, integrating the village with the outer world, is a most important component to achieve development and perhaps a pre-requisite for it. The Fisheries Directorate should collaborate with other departments and district administrations to determine the order of priority (i.e. social and economic) in which roads are to be provided. The linking of at least one village in a group of villages to an existing road appears to be a minimum requirement. Many of the existing feeder roads are in poor state of repair and the provision of funds and procedures for regular repair and maintenance need more attention.

b. Distribution Facilities: With the exception of the ice and freezing plants and cold stores belonging to the Andhra Pradesh Fisheries Corporation (APFC), the existing industrial facilities, are privately owned. The private sector appears responsive to the needs of the industry and at present several new ice plants and cold stores are under construction or are being planned. The private sector also caters for the distribution of the bulk of the production, whether it be by headload, bicycle, bullock cart, van, lorry, bus or train. The State Government/Fisheries Directorate encourages the private sector to come forward by giving financial assistance and technical advice.

The rate of increase of a trade of iced fish will be determined by the rate of development of internal state markets and provision of market/distribution facilities. The private sector may not be spontaneous in expanding the market for iced fish and it will be necessary for the Fisheries Directorate to foster the development. The future provision of ice plants and quick transport facilities for this purpose through Cooperatives and Corporations are already included in proposed District Master Plans for fisheries development. In areas where private ice plants already exist or are planned, the Government development support need only be of a demonstrative nature comprising of insulated ice cum fish stores at landing centres and fish markets, and suitable transport facilities.

c. Landing Facilities: There are harbour facilities at Visakhapatnam and Kakinada. They are intended for mechanized craft and not used by small craft which are either not allowed entry or unable to pay the high harbour dues (Visakhapatnam).

There are hardly any landing facilities such as jetties for small craft. Furthermore, the mouths of the river creeks and lagoons along the coast where fishing centres are situated e.g. Krishnapatnam, Nizampatnam are obstructed by shifting sand bars.

The heavy littoral drift prevalent on the East Coast makes the construction of small fishing harbours with deep water approach channels at such locations very often impossible or uneconomical. The Fisheries Directorate is currently carrying out depth stabilization experiments with temporary groyne structures at Nizampatnam in Guntur District, and a further study is proposed for Bhavanapadu in Srikakulam District. The results to date are not promising; in the event that the construction of groynes is not feasible, consideration might be given, especially if improved shallow draft craft are introduced, to build low cost jetties with connected, simply constructed shore facilities at such sites.

6 INSTITUTIONAL SUPPORT

a. Credit facilities: One of the important activities of the Fisheries Directorate is to assist the fishermen to obtain loans from the Banks. The Directorate recommends and often acts as a guarantor for the fishermen. Furthermore the Directorate advises on the inputs of aid funds from other Government bodies.

However, the bulk of credit to finance fishing operations is still provided by private individuals (i.e. friends, traders, prawn processors and professional money lenders). The system is by tradition an integral part of the industry which caters for personal and business requirements. Apart from the pawn broking arrangements with money lenders, loans are given subject to personal creditworthiness without the surety of fixed assets and consequently the interest rates are higher than those charged by State Banks.

In recent years the Scheduled Banks have come forward to offer short and medium terms loans for fishing craft and gear to members of fishermen's cooperative societies at interest rates of 11 to 14% (2% lower than the prevailing bank rates). The loans are subject to fixed asset or guarantor surety, and when given to cooperatives on the recommendation of the Director of Fisheries. In recent years the amount to be repaid on loans issued through NCDC, SFDA and AMFAL was reduced considerably by including 20% grant and 4% soft loan element.

Most of the credits have been used for the purchase of trawlers. The prawn trawl fishery is now well established and the Directorate has discontinued its credit service. Boats and credits are supplied by the APFC and private entrepreneurs.

There is however an unsatisfied demand for credits in the traditional sector and the Directorate should streamline and expand its services along the following lines.

(i) Fishing equipment - Careful selection of suitable individuals. Fixed asset security of the loanees craft. Smaller amounts of materials and shorter repayment periods. Relief on interest as for farmers.

(ii) Replacement of traditional craft - as above but longer repayment period and fixed assets surety on craft and land if possible.

(iii) Introduction of traditional or new types of craft - In cases where it is proposed to introduce traditional craft or new craft into an area, development subsidies should only be given in the early stages in order to encourage local acceptance of the new innovations. Otherwise conditions as per (ii).

(iv) Introduction of new fishing gears - conditions as above.

(v) First ownership of craft and gear - As such loans would have to be secured on purely guarantor security, very careful selection of individuals and close departmental and bank support will be required. Loans to be granted with interest relief as for farmers.

b. Technical Support: During the past 20 years much of the Directorate's development efforts have been directed towards the development of the prawn fisheries e.g. introduction of trawlers and small-mesh gillnets for prawns. There are indications that, as a result of the past development inputs and lucrative returns, the prawn industry, apart from continued training support plus nominal technical and management advice, is now capable of fending for itself. In the future the Directorate should cater more for the further development of the traditional fisheries with a bias towards food fish production.

Granting that improvements can be made in this sector in the short term, the development of the traditional fisheries needs to be considered as a long term programme. Therefore, in order to facilitate orderly structural development, an overall plan containing both the short and long term priorities will be essential. The already prepared Fisheries Master Plan Proposal covers most of the physical development inputs mentioned in this report and should be used as basis for such a plan. All sectors of the fisheries, e.g. production, handling, distribution and marketing, should be integrated into the development plan. The Directorate should continue to act as a coordinating body and encourage, whenever possible, private enterprises to provide the various new facilities required. The implementation of different schemes, introduction of innovations, and provision of extension, technical and credit services, should be consistent with the overall plan.

In order to provide effective, continuous development support, it will be necessary to :

(i) engage the technical/research units in developing suitable fisheries technology related to the prevailing needs and economics of the small-scale fisheries;

(ii) strengthen administrative units in order to provide the overall data essential for accurate policy decision making and continuity of development planning;

(iii) improve the extension service under the control of the Directorate by increasing the number of properly trained Extension Officers, (1) in the Block Development Schemes and (2) at important marketing and processing centres for fish and prawns, in order to provide effective continuous development extension coverage along the entire coastline.

7 FISHING COMMUNITIES

The provision of social infrastructure requirements should be considered in the context of the priorities of the State development plan. Considering the diverse nature of the required facilities, e.g. communication, water and medical, there is a need for a properly planned community development programme. Such a programme should be drawn up by the Fisheries Directorate in collaboration with Departments concerned.

Several improvements could be achieved by properly organized communal effort (e.g. maintenance of wells, village roads). More emphasis should be placed on identifying simple innovations which could improve the living conditions in the village (e.g. pit latrines, separate kitchens). Such activities should be carried out along Block Development lines.

The main needs are adequate water supplies, improved housing, schooling and medical services.

In most villages drinking water supplies are inadequate or not available. In places where there are existing tube wells many of these are brackish, poorly constructed and badly in need of cleaning and/or repair. There is an urgent need for adequate supplies of sweet water by the provision of properly sited, constructed and maintained tube-wells or piped water systems. Taking into account the large number of villages involved, the facilities must of course be provided in some order of priority.

The main housing problem in the fishing communities are damages by cyclones/floods and fire. Whilst cyclone and flood damage is a regular natural phenomenon in the coastal belt, damage by fire is due to over-crowding on the limited village sites. The structural damage to the houses can be mainly contributed to the kind of indigenous materials available to this low earnings group. There is a need to develop a low cost stronger traditional style houses able to withstand cyclonic weather conditions. In conjunction with such a development more suitable housing sites should be allocated for re-settling the communities.

8 RECOMMENDATIONS

From the discussion in previous sections the following recommendations are identified for further preparation and/or appraisal.

1. Physical Support.

   1.1 Ample supply of nylon twine at controlled prices to bonafide fishermen.

   1.2 Construction of feeder roads to link main villages to existing roads and repair of damaged existing feeder roads.

   1.3 Provision of low cost landing facilities, making use of the natural topographic conditions.

   1.4 Provision of appropriate drinking water facilities in fishing villages.

2. Technical Support.

   2.1 Exploratory and Experimental fishing on both pelagic and demersal stocks related to small-scale fishing operations.

   2.2 Experimental and demonstration fishing to diversify fishing methods and operations and to determine optimum types of fishing gear for particular fish species, seasons and craft.

   2.3 Phased craft development related to the geographical conditions of landing centres and including outboard and/or inboard motorization.

   2.4 Identification of present and future requirements of the fishing industry as to timber and engines for fishing craft.

2.5 Improve and expand the fresh fish trade by demonstration of better fish and prawn handling and the use of suitable equipment and facilities.

2.6 Improve the dried fish trade by demonstrating the use of low cost facilities.

2.7 Development of a low cost cyclone resistent house.

3. Training/Extension.

3.1 Restructuring and strengthening of extension service under the control of the Fisheries Directorate.

4. Miscellaneous.

4.1 Expansion of credit facilities.

4.2 Implementation of an effective accurate production and marketing data collection system.

4.3 Planning Co-operation with other Departments concerning the supply of infrastructural facilities (e.g. roads, education, medical facilities).

General Description of Marine Small-Scale Fisheries

TAMIL NADU
India

Prepared in collaboration with
Directorate of Fisheries, Tamil Nadu.

Development of Small-Scale Fisheries in Southwest Asia, Colombo, November 1977.

CONTENTS

		Page No.
1	STATE DATA	1
2	INTRODUCTION	4
3	BRIEF HISTORY	5
4	FISHERIES ADMINISTRATION	5
5	SPECIALIZED INSTITUTIONS	6
6	CORPORATIONS	9
7	COOPERATIVES	10
8	FISHERY RESOURCES	12
9	PRODUCTION	13
10	CRAFT AND GEAR	14
11	LANDING CENTRES	15
12	HANDLING AND PROCESSING	16
13	MARKETING AND DISTRIBUTION	17
14	EXPORT AND IMPORT	18
15	ANCILLARY INDUSTRIES	18
16	SOCIO-ECONOMICS	19
17	GOVERNMENT POLICY	21
18	DEVELOPMENT PLANS	22
19	BIBLIOGRAPHY	23

Appendices

1.1	Map of Tamil Nadu	24
3.1	Marine Fisheries Development Schemes, Expenditures and Achievements	25
3.2	Marine Fisheries Production (1950 - 1975/76)	27
3.3	Quantities and Values of Fishery Exports (1964 - 1975)	28
4.1	Organization of the Directorate of Fisheries	29
8.1	Fishing Grounds	30
9.1	Marine Fish Production by Species and Districts (1974/75)	31
11.1	Marine Population, Craft and Landings by District and major centres	33
11.2	Landing and Berthing facilities	34
12.1	List of Private Processing/Storage facilities in Tamil Nadu for fisheries purposes (registered with MPEDA)	35
12.2	Details of State Fisheries Departmental Ice plants and Cold storages and capacity, etc.	36
13.1	Flow of fish from producer to consumer (1975/76)	37
13.2	Average Producer, Wholesale, Retail and CFC prices of marine fish at Madras (1975/76)	38
16.1	House construction schemes	39
17.1	Subsidy schemes	40
18.1	Fisheries 5th Five Year Plan: Financial allocations	41
18.2	Fisheries Development Schemes in the 5th Plan	42

1 STATE DATA

1.1 **Location:** Southeast of India bordering the state of Andhra Pradesh in the north, the Bay of Bengal (and Palk Bay) in the east, the Indian Ocean (and Gulf of Mannar) in the south and Kerala in the west.

Latitudes: 8° 5' N - 13° 35' N Longitudes: 76° 15' E - 80° 20' E

(Map in appendix 1.1)

			All India*
1.2 **Size:**	Area:	130,069 km^2	(3.96%)
	Coastline:	960 km	(15.7%)
	Continental Shelf (200 m depth):	41,400 km^2	(10.0%)
1.3 **Population:** (1971 Census)	Total population	41.2 million	(7.52%)
	1976 estimate:	45.1 million	(7.46%)
	Urban:	30.45%	
	Rural:	69.55%	
	Density:	317 per km^2	(177)
	Growth rate (1961-1971):	22.3%	(24.8%)
	Birth rate (1973):	23.42%	
	Death rate (1973):	8.17%	
	Infant mortality rate (1973):	49.45%	
	Life expectancy (1971-1975):		
	Males:	56.1 years	(57.3)
	Females:	54.2 years	(56.0)
1.4 **Education:**	Literacy rate (1971):	39.53%	(29.45%)
	Males:	51.32%	(39.45%)
	Females:	26.87%	(18.69%)

Table 1.1 **School Enrolment.**

Level	Age group (years)	% of population of each age group	
		Tamil Nadu (1974/75)	All India (1973/74)
Primary School	6 - 11	90.0	83.5
Middle School	11 - 14	52.2	35.6
Secondary School	14 - 17	33.4	21.2
Universities and Colleges	17 - 24	4.5	5.0

* Figures within brackets in this column give the State share (%) of All India or All India figures as applicable.

1.5	Health (1974):	Population per hospital bed:	1037	(1809)
		Population per doctor:	907	(4200)
1.6	Nutrition (1974):	Calorie intake of requirement (2200 cal/day)	80.5%	(78%)
		Protein intake of requirement (60 gms/day)	76%	(75%)

1.7 Employment (1971):

Table 1.2 Working Population by category (1971).

Category	% of total population		% of total workers	
	Tamil Nadu	India	Tamil Nadu	India
1. Total workers	35.8	32.9	100	100
(i) Cultivators	11.2	14.3	31.3	43.3
(ii) Agricultural labourers	10.8	8.7	30.5	26.3
(iii) Livestock, Forestry, Fishing, Hunting, Plantations, Orchards	1.0	0.8	2.7	2.4
(iv) Mining and quarrying	0.1	0.2	0.3	0.5
(v) Manufacturing, Processing, service repairs	4.8	3.1	13.3	9.5
(vi) Construction	0.8	0.4	1.6	1.2
(vii) Trade and Commerce	2.8	1.8	7.8	5.6
(viii) Transport, Storage and Communications	1.1	0.8	3.2	2.5
(ix) Other Services	3.2	2.8	9.3	8.7
2. Non-workers	64.2	67.1	-	-

1.8 Net National Product (1974/75):

Table 1.3 Net State National Product.

	Tamil Nadu	India	Tamil Nadu as % of India
NNP * (1960/61 Prices) Million Rs.	14,501	200,750	7.22
NNP * (1960/61 Prices) per capita Rs.	326	341	95.60
NNP * (current Prices) Million Rs.	41,913	601,200	6.97
NNP * (current Prices) per capita Rs.	942	1,022	92.17
Index of wholesale prices (Base 1964) 1975 average	340	260	

* Net State National Product at Factor costs.

1.9 Trade (1973/74):

Table 1.4 Exports of main Commodities.

Commodity	Value in million Rs.	% of total exports
Leather	1,282.8	42.3
Tobacco	427.1	14.1
Handloom piece goods	293.4	9.7
Iron, ore & concentrates	141.9	4.7
Fish and fish preparations	73.7	2.4
Others	811.0	26.8
Total	3,029.9	100

Table 1.5 Imports of main Commodities.

Commodity	Value in million Rs.	% of total imports
Machinery (not electric)	1,000.3	21.9
Iron and Steel	549.2	12.0
Wheat and other cereals	427.3	9.4
Petroleum products	346.7	7.6
Electric machinery & appliances	332.4	7.3
Transport equipment	306.7	6.7
Urea and rock phosphate	246.7	5.4
Copper	176.8	3.9
Drugs and chemicals	170.5	3.7
Newsprint paper	92.0	2.0
Others	914.3	20.1
Total	4,562.9	100

Trade balance (1973/74) Rs.1,533 million.

1.10 Prices:

Table 1.6 General Consumer Price index numbers for Agricultural labourers.
(base year 1960 - 1961 = 100)

	1970/71	1971/72	1972/73	1973/74	1974/75	August 1976
Tamil Nadu	174	187	192	242	405	292
Annual change %	7.5	2.7	26.0	67.4	-37.9	
All India	192	200	225	283	368	295
Annual change %	4.2	12.5	25.8	30.0	-19.8	

1.11 State Administration:

The Tamil Nadu state is divided into 4 divisions.

Districts form the administrative units within each division. There are 15 districts altogether, which are divided into blocks. The following are the districts (coastal districts are underlined).

(1) Madras	(2) Chingleput	(3) South Arcot
(4) North Arcot	(5) Thanjavur	(6) Salem
(7) Coimbatore	(8) Madurai	(9) Tiruchirapalli
(10) Tirunelveli	(11) Ramanathapuram	(12) Kanyakumari
(13) Nilgiris	(14) Dharmapura	(15) Pudukkottai

2 INTRODUCTION

This paper deals primarily with marine small-scale fisheries, but reference is frequently made to inland fisheries in order to put the marine sector in a proper perspective.

The value of the production of the entire fisheries sector in 1975/76 was Rs.382.4 mill. which is about 0.75% of the state income. The contribution from marine fisheries is about 70% and from inland fisheries about 30%.

The objectives for development of marine small-scale fisheries are manifold and the most important are to (i) provide protein, (ii) earn foreign exchange and (iii) provide employment.

(i) The yearly production of marine fish amounts to about 220,000 tonne (inland about 150,000 tonne) which is a significant contribution to the supply of animal protein. About 80% of the population is fish eating and their per capita consumption of fish is in the order of 9 kg/year which is equivalent to a protein intake of 6.2 gms/day.

(ii) High value products like prawns and lobster are exported and their value, about Rs.135 mill. represents more than one third of the total value of fishery products in the State. The export earnings are about 13% of the total marine export earnings of all India.

(iii) The marine fisheries employ some 130,000 people in the primary sector, i.e. fishermen. This means that more than half a million household members are directly and indirectly dependant on the marine fisheries for their living.

The institutional support to fisheries is well provided for in the field of research and training. Most of the effort is devoted to the trawl fishery. Extension activities at beach level to the benefit of traditional fishermen has so far received less attention.

Of the total marine landings the traditional fishing craft viz: catamarans and sailing canoes produce 60% (135,000 tonne) while small mechanized 30' and 32' boats produce 40% (85,000 tonne). There are no larger vessels operating in Tamil Nadu except for a few trawlers used for training and survey purposes.

Almost all the mechanized boats are bottom trawling for prawns, a stock which appears to be already heavily exploited. The non-mechanized boats are employed in different types of drift and set net operations and recently also in trawling.

About 60% of the landings are consumed in fresh form; 30% is cured and 8% is frozen for export (mainly prawns). The balance is used for manufacturing fishmeal, oil, manure, etc.

The estimates of the potential of fishery resources are affected by a high degree of uncertainty; this refers particularly to the pelagic species. Some of the near coastal areas are close to, or already fully exploited and an expansion of fishing effort will have to be diverted to more off-shore areas.

Very little is known about the socio-economic conditions of the fishermen, but it is believed that except for the owners of the mechanized trawlers, most of the fishermen live below the poverty line. Income accrued to fishermen is almost entirely from fishing. Fishing villages generally lack services, which results in poor living conditions.

3 BRIEF HISTORY

The main thrust for the development of marine fisheries was the introduction of mechanized fishing boats which started in 1956, together with the training of fishermen in handling of modern craft and gear. To date some 2,000 boats, the bulk of them in the 30-32 ft. class, have been put into commercial operation through the public sector under credit and subsidy schemes. The subsidies (50% on engine and 25% on hull) were discontinued in 1972/73.

About 4,000 fishermen have been trained in connection with the boat development programme.

Also in the mid-fifties nylon twine was introduced and supplied under subsidy (25%).

To create suitable conditions for operation of mechanized fishing boats, service centres and landing facilities were developed by the Department. The work on the first minor fishery harbour at Cuddalore started in the second Five Year Plan; a shore jetty at Nagapattinam was commenced in the third Five Year Plan; two jetties at Rameswaran and Mandapam were completed in the fourth Five Year Plan; work on two major harbours at Tuticorin and Madras was started in that period; two jetties are being constructed at Kodiakarai and Mallipattinam.

Already in the first Five Year Plan the need for ice plants was recognized. Since then 35 government ice plants have been erected with a total capacity of 82 tonne/day and 180 tonne of cold storage. Private ice plants followed later and their total capacity stands now at 125 tonne/day.

Freezing facilities were first established in 1968/69.

Further details about marine fisheries development schemes, expenditures and achievements under the various plan programmes are given in Appendix 3.1.

In 1951 the marine production was 85,900 tonne while in 1975/76 the estimated production was 220,000 tonne/year. Until 1957 all landings were produced by the traditional small-scale fisheries while their share of the total production is now about 60% (ref. Appendix 3.2).

The export of marine products from Tamil Nadu shows a marked change over the years. In 1964 only 2% of the export was high valued products and 98% was dried fish. In 1975, 66% of the export was prawns, lobsters, etc., while 34% was dried fish. The value of the dried fish export was only 4% of the total export in 1975 (ref. Appendix 3.3).

In order to improve the socio-economic conditions of the fishing communities, efforts have been made to provide link roads to fishing villages to facilitate quick transport and marketing of the products. In total, 41 link roads have been constructed prior to the present Five Year Plan. Under the housing programme, for which in the Fourth Plan a special scheme was designed, 7,432 houses were constructed. 1,787 houses are in different stages of construction.

4 FISHERIES ADMINISTRATION

The State Government is responsible for the development and administration of fisheries within the State. The Central Government has the responsibility for planning at national level, for co-ordinating the activities of state fisheries departments and for allocation of funds for large scale investments such as fishery harbours.

The Directorate of Fisheries is under the control of the Forest and Fisheries Department of the Secretariat. It is organized in two technical sections, one dealing with research and extension, and the other one with deep-sea fishing. The former also assumes responsibility for training and inland fisheries (ref. Appendix 4.1).

The staff of the Directorate at its Headquarters is about 150 persons and at other stations about 600 persons.

The budget of the Directorate of Fisheries is given below :-

Table 4.1 Budget of the Directorate of Fisheries

		Actual 1976/1977	Proposed 1977/1978
Fisheries	(i) non-plan 1/	10.054	12.863
	(ii) state plan (iii) centrally sponsored 2/ (iv) Central sector 3/ (v) Autonomous bodies	4.891	5.797
Capital outlay	(i) non-plan	0.152	0.003
	(ii) state plan (iii) centrally sponsored (iv) Central sector	3.932	5.056
Loans & Advances	(i) non-plan	4.827	0.031
	(ii) state plan	6.024	2.416
Housing	(i) state plan	10.000	0.002
Total		39.880	26.168

5 SPECIALIZED INSTITUTIONS

5.1 Research and Development Institutions.

The yearly budget for Research and Development in the state amounts to Rs.1.65 million and is allocated under twelve headings.

1/ Carried over from previous planning period.

2/ Funded by Central Government for implementation by the state.

3/ Funded and implemented by Central Government.

Table 5.1 State Budget for Fisheries Research & Development (1976/77).

	Name of the Scheme	Budget '000 Rs.
1.	Inland Fisheries Research	276
2.	Research on Marine Biology	198
3.	Research on Utilization of trash fish	99
4.	Estuarine Fish farm	223
5.	Technological Research Station	161
6.	Ferro-Cement craft Research Project	325
7.	Study on Ecology in Reservoirs	14
8.	Brackish Water Fish Farming	84
9.	Development of Estuarines	102
10.	Research on Pearl Oyster & Pearl Oyster culture	78
11.	Research Programme on Technological improvements in Processing of Dried fish	49
12.	Scheme on Limnological of the Cauvery River System	40
	Total	1,649

5.1.1 State Marine Research & Development Stations:

(a) Marine Biological Station at Madras with sub-centres at Ennore, Portonovo, Kazhuveli (South Arcot District) and Krusadai (Ramnad District) and at Tuticorin with a sub-centre at Cape Comorin. Research is carried out on culture of edible oysters and green mussels; fishery resources of inshore waters, planktology, culture of unicellular algae, culture of prawns and Mugil cephalus, fishery resources in the backwaters, mari-culture experiments of prawns, mullets and chanca, pearl oyster population in pearl banks, chank marking and emigration, hydrobiological studies of inshore seas and development of the Cape Comorin fishery.

(b) Fisheries Technological Station, Tutioorin, with sub-centres at Nagapattinam and Cape Comorin. Studies are undertaken on canning, freezing, utilization of seaweeds and prawn waste, preparation of fish ensilage, isinglass, preparation of fish feeds and on dry salting of flying fish.

(c) Shrimp mariculture at Kovalam for studying the commercial possibility of shrimp mariculture in the State.

(d) Pulicat lake fishery development scheme for developing the fisheries in the lake and constructing a fish farm for rearing prawns, mullet and other estuarine fishes. The farm is almost completed.

5.1.2 State Fresh Water Research & Development Stations:

(a) Hydrobiological Research Station, Chetput, Madras.

This station is currently executing research on inland fisheries with special reference to sewage ponds, fertilizer experiments, ecology of irrigation tanks and reservoirs, fish diseases and toxicity of agrochemicals and weedicides to fish.

(b) Fresh Water Biological Research Station, Bhavanisagar.
and
This station is doing research on biology/study of reservoir fisheries, collection, rearing, breeding and culture of fresh water prawns and study on survival of carp hatchlings in nurseries.

(c) Hydrobiological Research Station in Ootacamund:

This station does research on food for trout, hydrobiological conditions of hatchery stream, and the growth and survival of grass carp.

5.1.3 Central Research and Development Institutions:

The following branches or stations of central fisheries institutes are located in Tamil Nadu. (For details see General Description of Small-Scale Fisheries in India).

(i) The Central Marine Fisheries Research Institute (CMFRI) at Madras and Mandapam.

(ii) The Central Institute of Fisheries Technology (CIFT) at Madras.

(iii) The Exploratory Fisheries Project (EFP) at Madras and Tuticorin operating 4 nos. of 17.5 m trawlers.

(iv) The Marine Products Development Authority (MPDA) at Madras.

(v) The Integrated Fisheries Project (IFP) at Mandapam comprising boatyard, training centre, storage and processing facilities and vessel servicing facilities.

(vi) The Central Inland Fisheries Research Institute (CIFRI) at Perambur.

5.2 Training Institutes.

5.2.1 Fishermen Training Centres:

The Directorate operates six Fishermen Training Centres in the maritime Districts at Madras, Cuddalore, Nagapattinam, Mandapam, Tuticorin and Colachel. The Centres provide training to fishermen between the ages of 18 and 35 who know to read and write in Tamil. The intake capacity of each Centre is 50 trainees (Mandapam has capacity for 60). To date 3,972 fishermen have been trained. Most of these are now employed on mechanized boats.

All the training centres conduct training in fishing technique and methods, navigation and seamanship, elementary marine engineering and boat management and allied subjects. The Tuticorin centre also conducts a course for junior mechanics. Training on board fishing vessels in actual operation is included in the programme. The fishing gear employed by these boats are made by the students themselves. The duration of all the courses is 10 months.

An Assistant Director of Fisheries is in charge of each training centre and has an Inspector of Fisheries, Sub-Inspectors of Fisheries and a Marine Foreman on the staff. Each centre has boats for practical training at sea. Total staff including clerks, peons, watchers, etc., is 121 for all centres. Total expenditure of all centres for 1976/77 amounts to Rs.631,800. This includes an inland fisheries training centre located at Nettur Dam.

In the past there was competitive demand for training courses at these centres as successful candidates were given preference in the allotment of mechanized craft under departmental sponsored grant/loan scheme. It was then stipulated that at least one of the group of fishermen, allocated the craft should have undergone training. As the departmental scheme no longer exists, the monthly stipend is only Rs.50/- and the course is of rather long duration, there is no longer the same keen competition to obtain admission in the Fisheries Training Centres.

5.2.2 Central Training Institutes:

The Central Institute of Fisheries Nautical and Engineering Training (CIFNET) Cochin, operates an Unit at Madras since 1969. The institute trains technical personnel for medium and distant water fishing vessels and supporting staff in

ancillary establishments required to operate the fishing industry.

The Madras Unit has capacity for 40 students in each of the two 15 months courses for Skippers and engine drivers. Courses are also available for boat building foreman (15 months), for shore mechanics (12 months), gear technicians (9 months) and radio telephone operators (9 months). There is capacity for 10 students in each discipline. Until March 1977, the Unit had trained 206 skippers, 191 engine drivers, 53 Radio telephone operators, 11 Gear technicians and 6 shore mechanics.

The institute also offers refresher courses for skippers, engine drivers and deck hands to appear for the respective competency certificate examinations conducted by the Mercantile Marine Department.

The Unit at Madras has a staff of 87 and operates two training vessels of 28 m and 17 m in length. The expenditure in 1976/77 was Rs.2.0 million.

6 CORPORATIONS

There are two corporations concerned with the marine fisheries namely the Tamil Nadu Fisheries Development Corporation Ltd., and the Central Fisheries Corporation Ltd.

6.1 Tamil Nadu Fisheries Development Corporation Ltd. (TNFDC).

The following assets and functions of the Fisheries Directorate were transferred to the TNFDC when it was formed in 1974: (i) Four boat building yards, (ii) distribution of boats, (iii) ice plants, cold storages and freezers in Ennore, Mandapam and Tuticorin, (iv) fish meal plant at Mandapam, (v) canning factory at Tuticorin, (vi) acquisition, operation and maintenance of fishing vessels, (vii) organization of marketing of fish and fishery products.

The four boatyards have a staff of 812 persons of which 693 are workers. Most of the boats built at the yards are financed by the Agricultural Refinance Development Corporation (ARDC).

The processing centres at Ennore and Mandapam are under temporary lease to private enterprises. The centre at Tuticorin has a corporation staff of 21 persons. The Corporation is proposing to take up the processing of prawns and fish from Pulicat and Tuticorin areas. When the deep-sea fishing gets underway the Corporation will need ice and processing facilities and the plants under lease will be taken back. The Corporation has plans to put up additional processing facilities at Tuticorin and at the Madras fishery harbour.

The Corporation is importing two trawlers of 23 m in length from Mexico. The trawlers were expected to arrive in India late 1977. They are being imported under a Central Government sponsored scheme at an approximate cost of Rs.4 million each. The trawlers will be operated from Madras, Tuticorin and Mandapam. Each trawler is expected to land about 650 tonne per year valued at Rs.1.4 million. According to the terms of the import, two trawlers of similar specifications are to be constructed within India for which the Corporation has already placed orders.

The Corporation proposes to take up marketing in the Pulicat area near Madras. Pulicat lake is a compact area where 3 to 4 tonne of prawns a day are landed in the season. In this connection the Corporation has proposed to take up a 20 point programme for the benefit of the fishermen of the area by procuring their prawns and arranging for internal as well as export marketing. The profit will be shared with the fishermen for their village improvement schemes such as roads, schools, wells, housing, etc.

The Corporation has set up six retail selling booths in Madras where the Saidapet Co-operative Fish Marketing Society acts as agent for the Corporation and retails the fish. It is proposed to expand this scheme by providing ten more retail selling booths in Madras City. Fish from Pulicat and Tuticorin will be supplied to the booths by the Corporation. In addition, the Corporation has taken over the fish stall in the premises of the Office of the Director of Fisheries on Mount Road which was previously run by the Integrated Fisheries Project of the Government of India. At this stall high quality products (frozen fish and prawns) are sold at reasonable prices.

The headquarters staff of the Corporation is 52 persons. The budget for 1976/77 was Rs.6.1 mill. of which the capital expenditure was Rs.3.5 mill.

6.2 Central Fisheries Corporation Ltd. (CFC).

The CFC, located at Calcutta, has operated a sub-station in Madras since 1966 which covers the four southern states of India viz; Tamil Nadu, Kerala, Andhra Pradesh and Karnataka.

In 1976/77 CFC procured 320 tonne of fresh water fish in Tamil Nadu of which 285 tonne was sold in Calcutta. In the same period 250 tonne of marine fish was purchased from Government and State training vessels and from private fishermen and sold in the state itself through CFC fish stalls (12).

The yearly turnover of CFC in Tamil Nadu is about Rs.1.5 mill and in the other states about Rs.6 mill. The total staff consists of 50-60 people.

7 COOPERATIVES

The Fishermen Cooperative Societies in Tamil Nadu are under the Administrative control of the Director of Fisheries and provide financial assistance and relief measures to the member fishermen. There are cooperatives in nearly all of the 300 fishing villages along the coast.

The Societies depend largely on modest financial support provided by the State Government. An amendment of the Reserve Bank of India Act places the Fishermen Cooperative Societies on par with the Agricultural Cooperative Institutions. This is likely to lead to an increased availability of credits from Banks and institutions like the National Cooperative Development Corporation.

The Fishermen Cooperative Societies in Tamil Nadu are classified as follows:-

Table 7.1 Fisheries Cooperatives.

Type	Societies (Nos)	Membership (Nos)	Share capital '000 Rs.
1. Primary Fishermen Cooperative Society.	470	71,500	840
2. Cooperative Fish Marketing Union.	10	319	25
3. District Fishermen Cooperative Federation.	9	600	901
4. Fisheries Cooperative organised under Half-a-Million Job Programme and Employment Promotion Programme.	27	718	1,942
	516	73,137	3,708

(a) There are 278 Primary Societies in the Marine sector and 192 in the Inland sector. All these are at the village or kuppams level and their members are individuals. A member must live in the area covered by the society, be connected with the fishing industry, be older than 18 years and pay a share of Rs.5.

The main function of these Societies is to channel Loans from the Government to their members.

(i) Long term loans are issued for purchase of craft and equipment and for discharge of prior debts. Maximum amount is Rs.400 per member repayable in 10 years at current rates of interest.

(ii) Medium term loans are issued for the same purpose as the long term loans, but are repayable in 5 years. In the Inland Fishermen Cooperative Societies the maximum amount is Rs.300 per member.

(iii) Short term loans are given to members of both Marine and Inland Fishermen Cooperative Societies to meet urgent needs during off seasons. The maximum amount is Rs.400 (Marine) and Rs.200 (Inland), and is repayable within one year.

(iv) Working capital loans are sanctioned to both Marine and Inland Fishermen Cooperative Societies upto a maximum of Rs.5,000 per society to enable them to run fair price shops to meet the domestic requirements of their members. Such a loan is repayable in 10 years.

Loan schemes for Fishermen Cooperative Societies were started in 1956/57. Since then about Rs.7.1 million has been granted, the details of which are given below. The amount recovered is about Rs.4.7 mill leaving an outstanding balance of Rs.2.4 mill.

Table 7.2 Loans issued to Fishermen Cooperative Societies (1956/57 - 1975/76)

Long term loans	Rs. 3,624,070
Medium term loan	Rs. 1,448,833
Short term loan	Rs. 33,700
Working capital loan	Rs. 706,800
Godown loan	Rs. 89,450
* Elimination of Middlemen scheme	Rs. 1,190,575
Total	Rs. 7,093,438

Other activities undertaken by the primary societies include purchase and distribution of nylon, production and sale of fishing nets, fishing by mechanized boats, marketing, supply of fuel and spare parts, and disbursement of distress relief loans.

Members of the Fishermen Cooperative Societies only are allotted mechanized boats by the Tamil Nadu Fisheries Development Corporation.

The Inland Fishermen Cooperative Societies render services to their members by taking lease of inland waters and sub-leasing them to their members.

(b) The Cooperative Fish Marketing Unions were established with a view to arrange for the marketing of fish and fishery products for members of the constituent Fishermen Co-operative Societies. The ventures have not been very successful since the fishermen are not cooperating and agreeing to sell their catches through the unions.

(c) The District Cooperative Federations are Central Societies of which there are six marine federations and three inland federations. They deal in nylon yarn, craft, gear, marine engine spares, etc., and all state assistance to affiliated cooperative societies is routed through them.

The Tirunelvelly District Federation for instance possesses considerable experience in the construction of mechanized boats and has been regularly supplying these boats to the Directorate. It has successfully implemented an Agricultural Refinance Corporation (ARC) scheme by constructing 60 mechanized boats for its members. The financing was provided for by the State Government (Rs.1 mill) and the ARC (Rs. 3.15 mill). The Madras Fishermen Cooperative Federation has completed a similar scheme for 50 mechanized boats (30 ft.). The competition from the private sector, however, is very much limiting the future prospects of the federations.

(d) The Half-a-million Job Programme and the Employment Promotion Programme schemes were launched in 1973/74 to provide self-employment to the educated unemployed youth. There are four types of societies:-

(i) Fisheries Cooperative Boat Operation Societies (15 nos.) operating 31 mechanized boats.

(ii) Fisheries Cooperative Boat Construction Societies (4 nos.) which have built 4 boats and have another 20 boats under construction. Most of the boats constructed are purchased by the TNFDC.

(iii) Fishermen Cooperative processing and Freezing Societies (4 nos.) which have recently become non-functional.

(iv) Fisheries Cooperative Service Centre (4 nos.) which are dormant because of lack of regular work.

Each member of these societies has taken one share in the society at a value of Rs.100. The societies have secured finance from the Government of India through the Government of Tamil Nadu and the Banks. The State Bank of India supports 19 societies and Indian Overseas Bank, Central Bank of India and United Commercial Bank support 3 societies each.

8 FISHERY RESOURCES

Tamil Nadu with a coastline of 960 km can be divided into three natural major regions namely (i) the Coromandel Coast, (ii) the Palk Bay and (iii) the Gulf of Mannar. The most abundant fish species in these regions are as given below:-

Table 8.1 Most Abundant Species

	Demersal	Pelagic
Coromandel Coast	Ribbon fish Prawns Silver bellies	Clupeids Anchovies Flying fish Tuna Mackerel Seer fish
Palk Bay	Silver bellies Miscellaneous	Clupeids Seer fish
Gulf of Mannar	Silver bellies Miscellaneous Prawns Deep sea prawn and lobster	Clupeids Anchovies Tuna

Several good fishing grounds have been located through surveys undertaken by State and/or Central Government Institutions. Their location and most abundant species are shown in Appendix 8.1.

In 1967 the Ministry of Agriculture estimated a potential yield for Tamil Nadu of 880,000 tonne. A more recent estimate in 1972 by the Indian Council of Agricultural Research (ref. table 8.2) is that the potential yield is in the order of 323,000 tonne (upto a depth of 200 m). Whilst estimates of potential yield vary considerably with different organizations it is generally considered that the present production of 220,000 tonne can be greatly increased. The bulk of this increase is likely to come from the pelagic resources and the stocks of demersal species in the deeper, unexploited or lesser exploited, waters of the continental shelf. The shrimp resources usually found within depths of less than 30 m are intensively fished and believed to be nearing maximum exploitation.

Table 8.2 Fish production and potential yield (upto 200 m).

	Average production in '000 tonne			Potential yield in '000 tonne		
	Demersal	Pelagic	Total	Demersal	Pelagic	Total
Tamil Nadu	44	91	135	73	250*	323
India	272	675	947	718	1,690	2,408

* Tamil Nadu share, based on length of coastline, of estimate for the east coast.

9 PRODUCTION

The production of Marine and Inland Fisheries is given in the table below:-

Table 9.1 Fish Production by sector (1974/75 - 1975/76).

	1974/75			1975/76 (provisional)		
	'000 tonne	%	% of all India production	'000 tonne	%	Value of production (beach price) Million Rs.
Inland	120	37	15.3	150	41	114.0
Marine	192	63	15.8	220	59	268.4
Total	312	100		370	100	382.4

Since there are no deep-sea fishing operations the production of marine fish comes entirely from small-scale traditional coastal operations and from 30' - 32' mechanized trawlers. An estimated breakdown of this production by category of craft is given in the table below:-

Table 9.2 Marine fish production by category of craft (1975/76).

Type of craft	No. of boats (less 10%) operational	Landings in tonne	Species
Catamarans (gillnetting, drift netting	30,420	110,000	Sardines, Ribbon fish, Mackerel, etc.
Sailing canoes (longlining, drift/gillnetting, trawl netting)	7,020	25,000	Perches, Ray, Shark, Cat fish
Mechanized boats (trawling)	1,800	85,000	Prawns, Silver bellies, Sardines, Scianieds, Upenoids, Gerres.

The most important species and their share of the total catch are Sardines (12%), Sharks (5%), Cat fish (5%), Perches (4%), Leiognathus (13%) and Penaeid Prawn (6%).

The marine landings by species and district are given in Appendix 9.1.

Fishing is carried out all around the year, but less frequent along the Coromandel coast during the Northeast monsoon (November - January) and in the outer part of the Gulf of Mannar during the South-west monsoon (May - October).

10 CRAFT AND GEAR

The following catching units were employed in fishing in 1976:-

Catamarans	33,106
Country crafts	7,711
Mechanized boats (30 ft.)	1,268
Mechanized boats (32 ft.)	600

(for distribution of the boats by district refer Appendix 11.1).

The catamarans consist of 3 or 5 logs varying in length from 4 m to 6 m. The approximate cost of one 4 m log is Rs.200 and of one 6 m log Rs.400. The Catamarans are operated from the open beaches especially along the Coromandel coast and the very southern part of the state. They have a crew of 2-3 men. The gear used by this type of boat is mainly drift net, set net and wall net, and in some areas hooks and lines. Recently also small trawls have been brought into use which are towed by the power of sail.

The country crafts are outrigger canoes (Masula boat) and the Tuticorin type of boats. They are common in the Palk Bay and Gulf of Mannar. They use more or less the same type of gear as the catamarans.

The mechanized boats are planked wooden boats. They operate from harbours and protected sites all along the coast. The 30 ft. boat has an engine of 40 hp and the 32 ft. boat has an engine of 65 hp. The cost of a fully equipped boat is Rs.115,200 and Rs.177,000 respectively. The only gear used by these is bottom trawls for prawns.

The following fishing gear was operated in 1965.

Table 10.1 Fishing Gear in use (1965).

Type	Number	Unit Cost
Boat seines	10,500	Rs. 4,000
Drift nets	26,900	Rs. 500 (per webbing of 150' in length)
Other gillnets	32,000	Rs. 300 - Rs. 600 (idem)
Shore seines	2,200	Rs. 4,500
Trawl nets *	3,700	Rs. 5,000 - Rs.6,000

*(estimated figure: each mechanized boat carries 2 nets).

The shore seine net is operated mainly along the Coromandel coast. About 15 people are involved in this operation and they make use of a special beach craft (Masula boat). The value of the net is of the order of Rs.2,000 and the labourers receive a share of 60% of the fish landed.

The boat seine (Paindaivalai) is operated by 4 catamarans towed by a 30 ft. mechanized boat. The net is set around a shoal and then lifted by the 4 catamarans ("scooping net").

The average earnings per season (February - May) is Rs.120,000. 60% of the proceeds is for the owner of the craft and gear and 40% is for 12 fishermen. (Income per fisherman is about Rs.3,600).

A smaller boat seine net (Thoorivalai) is operated by 2 catamarans. This net is more widely used than Paindaivalai. The cost of this net is Rs.400, the length on average 200 ft. The season for this net is generally from June to October.

The trawl net is operated by the mechanized boats. They catch 40-60 tonne of fish of which about 10% are prawns. The revenue for about 200 days of fishing is about Rs.150,000 (the income is Rs.8,000 per fisherman).

The gillnet is operated by catamarans and country craft. The main season in the north is February - May, in the south September - January. The annual proceeds of the catch are about Rs.10,000. When craft and gear are not operated by the owner, 60% of the proceeds accrue to him and the balance is for the fishermen. Different types of gillnets are: bottom set net, drift net and wall net; the latter is a surface drift net extending in the air to catch flying fish. Most of the nets are operated in water depths upto 25 m, but the wall net in waters upto 70 m depth. The Catamarans go out for a distance upto about 30 km from the coast for these operations.

The fishing season for hook-and-line is July - October. The traditional craft go out as far as 60 km to reach the rocky bottom patches. The gross revenue from this fishing is about Rs.12,000 shared by three fishermen.

11 LANDING CENTRES

The majority of craft, i.e. the traditional ones, are operating from open beaches without any facilities. The distribution of craft, production and fishing population is given in Appendix 11.1

In the wake of introduction of mechanized fishing boats it became necessary to develop suitable landing and berthing facilities for the mechanized fishing craft to protect them from the weather and to provide facilities for landing their catches. After a survey conducted on instigation of the Government of India, several harbours, landi g and berthing facilities have been and are being developed along the coast.

A major harbour has recently been completed at Tuticorin and another one is under construction at Madras. Proposals for establishing a major fishing harbour at Chinnamuttom in Kanyakumari District costing approximately Rs.20.00 million are awaiting the approval of the Government of India. Smaller

facilities (jetties and quays) have been completed at Cuddalore, Nagapattinam, Mandapam and Rameswaram, and are under construction at Kodakarai and Mallipattinam. For details see Appendix 11.2.

12 HANDLING AND PROCESSING

All fishing craft, including the mechanized boats of 30' - 32' length, make daily fishing trips only. They do not use ice for preservation of the fish at sea although there is provision to carry ice boxes in the 30' boats and built-in insulated hold in 32' vessels.

Generally fish is not stored in cold storages or preserved by ice after landing. For marketing at nearby places, say within 10 km, the fish is transported in baskets by means of cycles, or as head-load without icing. Fish loaded in baskets, gunnies or bundles and transported by truck to markets, say within 100 km distance from the place of landing, is usually also not iced. For despatch to distant markets by train, over 12 to 18 hours, fish is packed in baskets or in leaf-mats with layers of ice and strongly bound by ropes.

Most of the ice produced is used for long distance transport of fish and for shrimps. The Fisheries Directorate has established 35 ice plants with cold storages. Details of these facilities are shown in Appendix 12.1. The total capacity is 82 tonne/day of ice, 65 tonne of cold storage. The ice production capacity in the private sector is about 125 tonne/day (ref. Appendix 12.2).

About 60% of the total marine production is marketed fresh; 30% is cured; 8% is frozen. The balance which is only 2% is used for manufacturing of fish meal, oil, manure, etc.

Fish curing is practised all along the coastline of Tamil Nadu on a cottage industry basis in the fishing villages. It is mostly done under unhygienic conditions.

(i) Small varieties of fish like Anchovies, Silver bellies, white sardines, small Jew fish, Flying fish, etc., are sun-dried on the beaches in the sand and sometimes spread over mats without addition of salt. Occasionally Silver bellies are also salted in 1:6 (salt:fish) proportion for 12 to 16 hours and then dried.

(ii) Other slightly bigger varieties of fish like Mackerels, Jew fish, small Perches, Cat fishes, etc., are salted (1:3 or 1:4) after evisceration and washing at fish curing yards.

(iii) Bigger varieties like Shark, Rock cod, Skates, Perches, etc., are gutted, beheaded and split and individually rubbed with salt in the ratio of 1:3, and left for 18 - 24 hours. The salted fish is then rinsed with fresh or sea water and dried on cement platforms or on mats or on the sand. A sun-drying of 8 hours spread over two days is the usual procedure.

The salt cured products are stored in store rooms or in warehouses either in the loose form or in leaf mat bundles till they are transported to the markets for sale. Mechanical driers have not been tried in the State.

Shark fins are collected at the landing sites, and are sun-dried without or with slight lime and salt in the cut portions where flesh is exposed. They are graded for size and colour for export.

Fish maws are prepared from the air bladders of the biggest cat fish, jew fish and eels. The bladders are washed well in fresh water, and spread out in the sun for drying. These maws are exported and used for culinary purposes or for the preparation of isinglass.

There is only one canning factory in the State established in 1964 by the State Government at Tuticorin. The plant used to can Sardines in oil and prawns in brine, mostly for Army requirements, but was closed after a few years because of high costs of tins and packing material and lack of demand for the products.

Private entrepreneurs have established 25 freezing plants with a capacity of 110 tonne/day and 27 cold storages with a capacity of 2,900 tonne. These plants are primarily used for processing of frozen products (shrimps) for export (see Appendix 12.1). The department has also established freezing plants (at Ennore, Mandapam and Tuticorin) with a capacity of 20 tonne/day and cold storages of

150 tonne capacity (see Appendix 12.2).

13 MARKETING AND DISTRIBUTION

About 80% of the Tamil Nadu population eat fish which has resulted in a high demand for fish. The per capita consumption requirement, established by the Government, is 50 gr/day. The actual per capita consumption is only 20 gr/day (40%) implying a deficit in the supply of nearly 400,000 tonne. See table below.

Table 13.1 Actual fish consumption versus requirements (1975/76).

Centre	Requirements based on 50 gr/day/capita (tonne)	Actual consumption (tonne)	Supply deficit (tonne) and (%)
Madras city	44,000	29,000	15,000 (34%)
Tamil Nadu	672,000	275,000	397,000 (59%)

Marine fish is landed at more than 300 centres along the entire coastline. About 25% of the landings are marketed to retailers close to the landing centres. The bulk is sent to wholesale markets operated by corporations and municipalities, or private individuals and auctioned on a commission basis. At times of glut, surplus fish is disposed of for curing. Fish auctioneers are frequently money-lenders advancing funds to the fishermen. The flow of fish from producer to consumer is shown in Appendix 13.1

In the entire state there are about 1,500 wholesalers and large traders (turnover ± 100,000 tonne/year), 2,000 smaller traders and wholesalers (turnover ± 65,000 tonne/year). Their net income per month would be in the order of Rs.7,000 and Rs.3,000 respectively. Those retailers handling smaller quantities of fish, of which there are thousands, would earn around Rs.500 per month, but this may vary from Rs.300 to Rs.1,000 per month.

In Madras City which is the biggest population centre, there are five wholesale markets and some 50 retail markets. The deliveries of fish to Madras City are given below.

Table 13.2 Fish Deliveries to Madras City (1975/76).

Month		Production in Madras City (tonne)	Arrivals from other stations by rail (tonne)	Total (tonne)
April	1975	1,538	475	2,013
May	1975	1,340	639	1,979
June	1975	1,815	501	2,316
July	1975	1,787	503	2,290
August	1975	799	513	1,312
September	1975	2,104	536	2,640
October	1975	1,358	524	1,882
November	1975	1,476	529	2,005
December	1975	1,458	552	2,010
January	1976	947	507	1,454
February	1976	956	529	1,485
March	1976	1,036	541	1,577
Total		20,214	6,349	26,563

The mark-up between produce level and retail level is in the order of 100%. See Appendix 13.2.

14 EXPORT AND IMPORT

In 1976 the export of fishery products, mainly frozen prawns, from harbours in Tamil Nadu was 5,876 tonne, valued at Rs.133.3 mill.

Table 14.1 Export of Marine Products.

Year	Tamil Nadu (tonne)	% of Indian total Marine Export	Tamil Nadu ('000 Rs.)	% of Indian total Marine Export value
1974	4,520	9.7	88,922	11.7
1975	5,865	11.0	133,372	12.7
1976 (Jan. - May)	5,163	16.7	119,589	14.8

(Source: The Marine Products Export Development Authority).

In the past, much of the prawn catch was shipped to Kerala for processing and export and it is estimated that in 1975 about 7,000 tonne of export prawns were still being sent there. This is reflected in the export records of Kerala and not in those of Tamil Nadu.

Dried fish was exported to Sri Lanka from Tuticorin. In 1975 the quantity was about 2,000 tonne at a value of Rs.5.8 mill. Exports to Sri Lanka during 1976 and beginning of 1977 were negligible.

Shark fins and fish maws are exported mostly to Hong Kong and Singapore. In 1975 the quantity was 90 tonne, valued at Rs.3 mill.

About 300 tonne of fresh water fish is marketed in Calcutta by the Central Fisheries Corporation and another 4,700 tonne by private traders in other states.

Marine fish is regularly coming from Kerala, Mysore and Andhra Pradesh to Tamil Nadu, but it is believed that about equal quantities are going out from Tamil Nadu to the states mentioned and others.

15 ANCILLARY INDUSTRIES

Four Boat Building Yards, two situated at Royapuram, Madras, one at Nagapattinam and one at Mandapam are operated by the Tamil Nadu Fisheries Development Corporation. The 30' and 32' boats are constructed in these yards. The capacity of the boat yards in terms of 30' and 32' boats is 188 and 97 respectively.

There are also 10 private boat yards and their capacity in terms of 30' and 32' boats is 228 and 151 respectively. They are located at Madras (6), Cuddalore (3) and Tuticorin (1). The particulars of numbers of boats constructed at small private yards are not available.

There are four "Half-a-million-job" boat constructing societies and their capacity in terms of 30' and 32' boats is 51 and 33 respectively. They are located at Ennore, Cuddalore, Tuticorin and Colachel.

The total capacity of all boat building yards is thus 748 boats - 467 of 30' and 281 of 32'.

The Fisheries Directorate is trying suitable alternative materials for the construction of boats to replace timber which is becoming scarce and expensive. A study of the use of Ferro-Cement has been initiated. The designs for the construction of 38' ferro-cement boats were obtained from Canada and 8 such boats with marine diesel engines of 90 - 105 hp have been constructed. The boat yard concerned has suspended this programme pending a study of the performance and stability of these boats.

There are two private boat building yards where fibre glass construction of mechanized fishing boats has been started.

The engines used for the boats are manufactured in India. 30' boats are fitted with marine inboard diesel engines of 40 - 45 hp and 32' boats of 50 - 66 hp. Outboard engines are not used in marine fishing in Tamil Nadu.

The Government has established service stations at the following places: Madras, Cuddalore, Nagapattinam, Mallipattinam, Mandapam, Rameswaram, Tuticorim and Colachel.

The manufacture of fishing gear has been a cottage industry in Tamil Nadu. Fisherwomen make webbing to be tailored into suitable nets. However, webbing is now also fabricated by means of imported machines, and there are three firms producing machine-made nets in the State. Two private firms also produce about 6 tonne of webbing a year. The Agro Industries Corporation, Madras, has, since September 1976, taken up the manufacture of nets with imported machines on a large scale; they produce 50 tonne/year, and their capacity is 150 tonne/year. The webbing is then made up by the fishermen themselves.

16 SOCIO-ECONOMICS

(a) Fishing Population: Most Marine fishermen are considered by the State Government as living below the poverty line. However, this may not be true in the case of owners of mechanized boats, who are able to acquire new boats through outright purchase.

Marine fishermen are full-time fishermen except for 3 months during the rough season (October-December). Almost all fishermen depend solely on fishing for their livelihood. The marine fisheries population of the eight marine districts is 390,000 and details are given below.

Table 16.1 Marine Fisheries Population by District and Religion (1977).

District	Hindus	%	Christians	%	Muslims	%	Total	%
Madras	53800	88.7	5843	9.3	1035	2	60678	100
Chingleput	34376	96.6	14	0.1	1176	3.3	35566	100
South Arcot	27647	100	-	0	-	0	27647	100
Thanjavur	72664	85.9	70	0.1	11802	14	84536	100
Pudukottai	5737	47.7	976	8.1	5318	44.2	12031	100
Ramanathapuram	24064	42.9	9303	16.6	22676	40.5	56043	100
Tirunelveli	726	2.2	31745	95.9	646	1.9	33117	100
Kanyakumari	692	0.9	80533	99.1	-	0	81225	100
Total	219706		128484		42653		390843	
%	56.21		32.87		10.92		100.00	

The following castes are engaged in marine fishing: Chettiar, Naicker, Reddiar, Mudaliar, Panicker, Rawther (Muslim), Thevar, Sembadavar, Paravans, Valayan, Nadars, Pattamkattiar and Mukkva (Christians).

The most important castes among fishermen are: Chettiar, Naicker and Mudaliar among the Hindus; Paravans and Mukkva among the Christians and Rawther among the Muslims.

The following table based on data collected in Madras City in 1966 showed the number of fishermen employed on the various types of boat at that time, but ratios have undoubtedly changed since then.

Table 16.2 Employment by type of craft (1977).

Type	Number	Operational	Crew	Total
Mechanized boats	1,868	1,700	5	8,500
Catamarans	33,106	29,000	2	58,000
Country crafts	7,711	7,000	4	28,000
Total	42,685	37,700		94,500
Shore seines *	2,200	2,000	20 **	10,000
				104,500

* 1965 figures

** These are mostly casual labourers, only employed part-time.

Source: Estimates by the Fisheries Directorate.

(b) Political organization: The leader of the Kuppam (village) is chosen by the villagers themselves. Usually he is influential because of his wealth, reputed wisdom, or strong trading capacities.

(c) Social organization: In the past the joint family pattern was dominating along the coast. Nowadays there is a trend to the nuclear family pattern. The caste system is still in vogue in the villages. Inter-marriage even among the sub-castes in marine fisheries is not very common, but the caste differences seem to be declining and inter-caste marriages have become common.

The women assist their husbands in manufacturing and braiding nets, weaving baskets for trade, acting as traders and doing the household work.

Children, already at the age of 10, are often going to sea together with their fathers to learn fishing, seamanship, net mending, etc. In the larger population centres they go to school till the age of 11 or 14 and then mostly try to gain employment outside the small-scale fisheries sector.

(d) Economic organization: Most of the mechanized boats are issued under a hire purchase scheme to a group of fishermen (3 - 4), of which at least one is trained at a State training centre, and who are members of a cooperative. After repayment of the loan the boat is owned by the fishermen. The income of a group of fishermen who possess a mechanized boat would be (estimated in 1973) about Rs.25,000 per year, or on the average Rs.8,000 per fisherman.

True quantitative information about ownership of catamarans, country craft and gear, and about fishermen's income in the traditional sector is scarce. When the craft is owned by the operator, the proceeds of the catch accrue to him and his family, who normally comprise the crew. When the craft is not owned by the crew, about 60% of the earnings goes to the owner of craft and gear, and 40% to the crew.

The income from fishing is seasonal and the bulk of the earnings are often realised during a few months of the year. The margins for saving or for distribution of expenditures are small and the fishermen get indebted to traders and other money lenders to survive during the off-season. The fishing family income is often supplemented through other occupations - e.g. braiding of nets.

The major part of the income is spent on food and related items. The information about household expenditures given in the following table, dates back to 1966, but it is believed that there are no significant changes in the pattern in recent years.

Table 16.3 Fishermen household expenditures (1966).

Item	% of income
Food	65.5
Clothing	2.5
Education	0.2
Medical	0.3
Coffee/tea, refreshment	10.5
Fuel	6.6
Tobacco	4.5
Drinks	4.0
Religious ceremonies	0.9
Other	5.0

(e) Housing: The kuppams along the coast suffer from unplanned growth. They lack proper lay-out and houses are built in a haphazard manner. Most of the houses are merely huts, providing crude shelters. The land along the sea coast belongs to the State Government. The fishermen usually construct their huts on this land and in course of time succeed in securing the ownership from the Government.

During 1961-63, under the Slum Development Scheme, the Madras State Housing Board constructed 23 blocks of 12 tenaments each for fishermen families who were previously occupying the Fore Shore Estate area known as Mullikuppam. There are now 260 families in Mullikuppam and all of them are occupying the houses constructed by the Housing Board. Each tenament has two rooms and separate bathroom and lavatory. Tap water supply is shared. A monthly rent of Rs.5/- is collected for each tenament. Similar schemes have been or are undertaken in other areas, the details of which are given in Appendix 16.1.

17 GOVERNMENT POLICY

The Fisheries Policy of the Government of Tamil Nadu as expressed in the 5th Five Year Plan is as follows:-

- to increase the fish production in the state, both in inland and marine sectors, especially by increasing the number of mechanized boats and the acquisition of big trawlers.
- to develop a better infrastructure by setting up ice plants, cold storages and harbours.
- to continue the training of fishermen in the latest technology.
- to establish an extension service to:
  a) Assist in increasing the production of freshwater food fish by conducting an educational programme among the fish farmers on the availability of new techniques and methods.
  b) Improve the handling, distribution and marketing of fish.
  c) Improve fishing gear and methods.
- to improve the socio-economic conditions of the fishermen.

Different types of subsidy schemes are operated by the Central Government and by the State in implementing the policy. See Appendix 17.1 for details.

18 DEVELOPMENT PLANS

The sub-group of the Central Planning commission dealing with Fisheries which considered the programmes proposed by the State, tentatively fixed the expenditure on Fisheries in Tamil Nadu for the Fifth Five Year Plan at Rs.188 mill, broadly classified under the following headings:-

i)	Marine Fisheries	Rs. 114.3 mill
ii)	Inland Fisheries	15.5
iii)	Processing and Storage marketing	8.8
iv)	Training and education	2.2
v)	Research	27.2
vi)	Extension and Administration	4.0
vii)	Socio-Economic Betterment	1.0
viii)	Other schemes	3.5

The approved expenditure for Fisheries in the Fifth Plan has subsequently been fixed at a Rs.134.2 mill. Details of allocations and expenditures are given in Appendix 18.1.

The objective of the Fifth Plan is to step up the marine fish production to 400,000 tonne and the inland fish production to 230,000 tonne. The main physical targets for the Fifth Plan are:-

i)	Construction of mechanized Fishing boats	1,000 Nos.
ii)	Acquisition of trawlers	50 Nos.
iii)	Establishment of Ice Plants and Cold Storages	10 Nos.
iv)	Development of landing and berthing facilities	12 Nos.

The mechanized fishing boat construction (i) and the establishment of ice plants and cold storages (iii) have gradually been taken care of by the private sector.

A complete list of the development schemes with physical and financial targets is given in Appendix 18.2.

19 BIBLIOGRAPHY

1. ——— 1975 — World Bank Project for Fisheries Development in Tamil Nadu, Tamil Nadu Fisheries Development Corporation Ltd., Madras, second revision.

2. ——— 1977 — Fisheries 1977 - 1978, Narrative Note, Department of Fisheries, Madras.

3. ——— 1976 — General Description of Small-Scale Fisheries India, Development of Small-Scale Fisheries in Southwest Asia, UNDP/FAO RAS/74/031, Working Paper No.2, Colombo.

4. ——— 1977 — Tamil Nadu, An Economic Appraisal 1976, Finance Department, Madras.

5. ——— 1969 — Draft fourth five year plan "Fisheries", Madras State Department of Fisheries, Government of Madras, Madras.

6. ——— 1976 — First Annual Report 1974 - 75, The Tamil Nadu Fisheries Development Corporation Ltd., Madras.

7. ——— 1976 — The Tamil Nadu Fisheries Development Corporation Ltd., Budget 1976 - 1977, Madras.

8. Sri A.P. Jegaraj, et al 1965 — A brochure on Fishermen Cooperative Societies in Madras State, Government of Madras, Madras.

9. Sri. A.D. Venkataswamy, et al 1974 — Statistics of Marine Fisheries of Tamil Nadu (1970-71), Government of Tamil Nadu Marine Fisheries Statistics, Report No.78, Madras.

Sri A.D. Venkataswamy, et al 1974 — idem (1971 - 72) Report No.79.

M.V. Natarajan, et al 1975 — idem (1972 - 73) Reports No.80

M.V. Natarajan, et al 1976 — idem (1973 - 74) Report No.81.

10. V.D. Spurgeon, et al 1964 — Statistics on Fish Marketing in Madras State and Fish Retailing in Madras City, Madras Fisheries Statistics Report No.61, Madras.

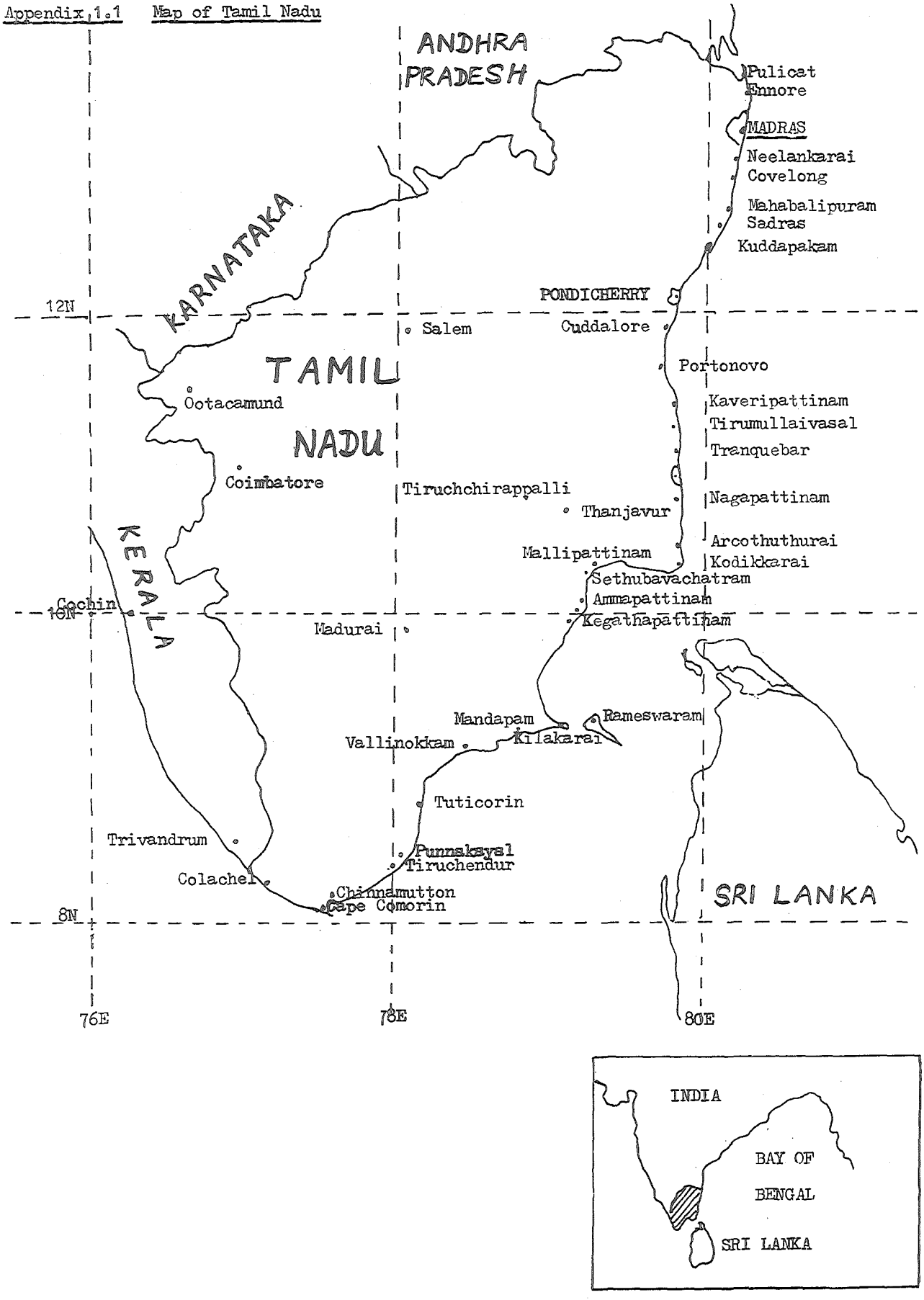
11. ——— 1959 — Fish Marketing in Madras, Bombay and Mysore States, Second Report to the Government of India, FAO TA Report No.1167, Rome.

12. ——— 1976 — Statistics of Marine Products Exports 1975, the Marine Products Export Development Authority, India, Cochin.

13. ——— 1972 — Towards a Blue Revolution, Report of the Task Force on Fisheries 1972 - 1984, the Perspective Plan for Tamil Nadu, State Planning Commission, Ezhilagam, Madras 5, Plan document No.5, Madras.

14. ——— 1973 — Report of the Working group on Fifth Five Year Plan (1974-1979) Fisheries, Ministry of Agriculture, New Delhi.

Appendix 1.1 Map of Tamil Nadu



Appendix 3.1 Marine fisheries development schemes, expenditures and achievements.

(expenditures in million Rs.)

1	2	3	4	5	6	7
Name of the Schemes	1st 5 year plan 1951/ 52 - 55/56 expenditure	2nd 5 year plan 1956/ 57 - 60/61 expenditure	3rd 5 year plan 1961/ 62 - 65/66 expenditure	one year plans 1966/67 - 68/69 expenditure	4th 5 year plan 1969/ 70 - 73/74 expenditure	Achievements/Remarks
Construction and supply 1/ of boats and engines	0.261	0.823	11.758	22.512	61.656	1,778 boats have been supplied. More than 50% of the boats were allocated after 1966/67.
Supply of fishing 1/ requisites	0.440	0.605	7.714	1.365	3.954	143,186 Kg. Nylon for the mechanized boats. 113,698 Kg. Nylon for the Cooperatives (non-mechanized boats).
Deep sea fishing 3/ (department)	-	-	0.037	0.547	5.692	2 trawlers for survey.
Setting up of Ice 1/ plants and Cold storages & Freezing units	0.094	0.298	1.930	1.456	0.641	18 Ice plants cum cold storage 2 Freezing units 8 Walk-in-coolers.
Transport of fish 1/	0.157	0.248	0.808	1.275	0.092	40 trucks and 3 three wheelers.
Assistance to Fishermen 2/ Cooperative Societies and to private entrepreneurs (partly marine)	-	2.619	2.193	1.382	0.723	Cooperative loan scheme 6 private people received Rs.177,800
Demonstration and 1/ training (partly marine)	-	0.168	0.465	1.387	1.497	2,731 fishermen and 10 officials trained.
Research, investigation, 1/ statistics and extension (partly marine)	-	-	-	0.099	0.245	Research scheme
Setting up of Canning 3/ and fish meal plant	-	0.041	0.445	0.062	0.798	1 Canning plant and 1 agar-agar plant.

Contd/...

Appendix 3.1 (Contd/...)

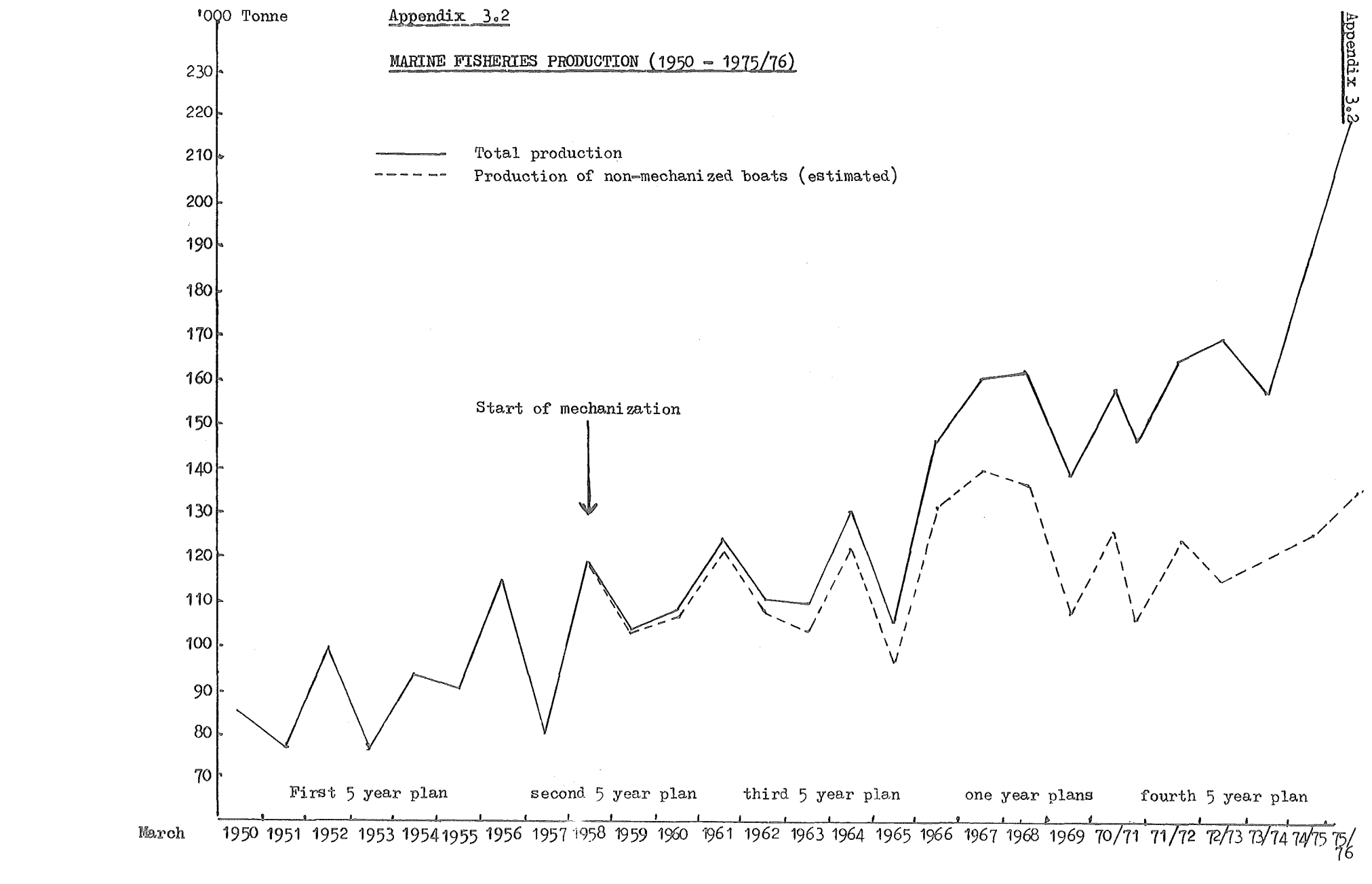
1	2	3	4	5	6	7
Planning, Direction and supervision 1/	0.036	0.030	0.164	0.203	0.174	Staff Expenditure.
Boat building yards, workshops 1/	-	-	1.020	0.267	1.234	5 yards and 7 service centres.
Service centre Cuddalore	-	-	-	-	0.013	Converted into base workshops.
Housing schemes 1/	-	-	-	0.005	0.134	647 houses.
Road and communications to fishing centres 1/	-	-	-	-	0.711	21 roads.
Other loans (partly marine) 1/	-	-	-	-	0.042	
Fishery Development (with ICAR) 1/	-	-	-	-	0.098	
Fishing Harbours and landing jetties (centrally sponsored schemes) 1/	-	0.176	1.143	5.124	20.645	2 Harbours completed 2 Jetties completed 2 Harbours in progress

1/ These schemes are continued in the 5th five year plan.

2/ This scheme is discontinued during the 5th five year plan.

3/ These schemes were discontinued before the 5th five year plan.

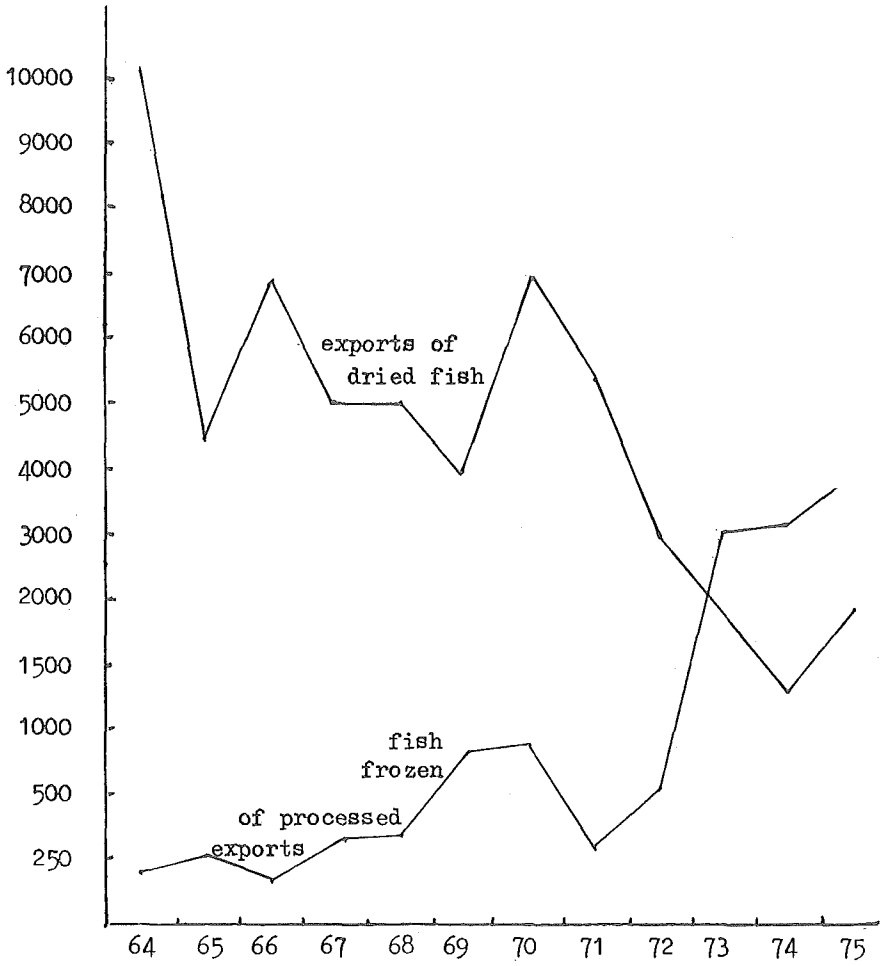
Appendix 3.1 (Contd/...)

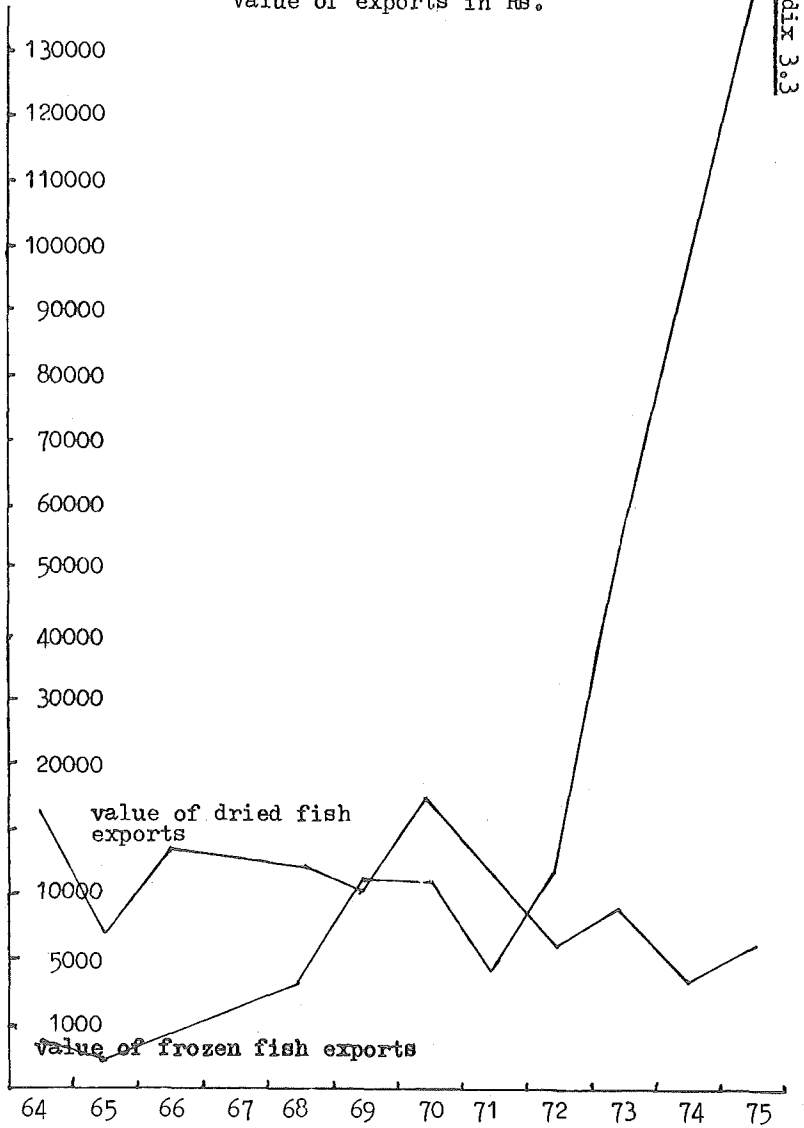

'000 Tonne
Appendix 3.2
MARINE FISHERIES PRODUCTION (1950 - 1975/76)
Total production
Production of non-mechanized boats (estimated)
Start of mechanization
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
First 5 year plan
second 5 year plan
third 5 year plan
one year plans
fourth 5 year plan
March
1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 70/71 71/72 72/73 73/74 74/75 75/76

Appendix 3.2

Appendix 3.3

Quantities and values of fishery exports (1964 - 1975)

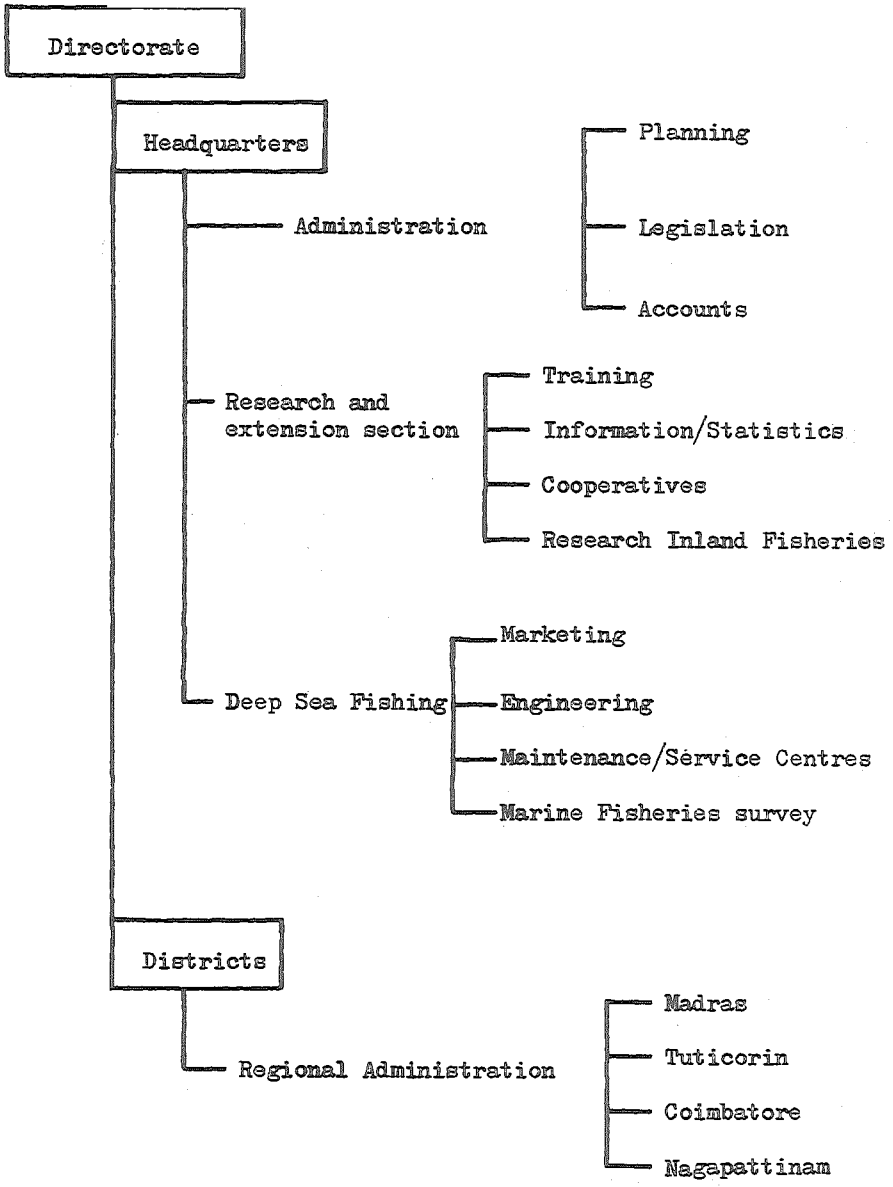




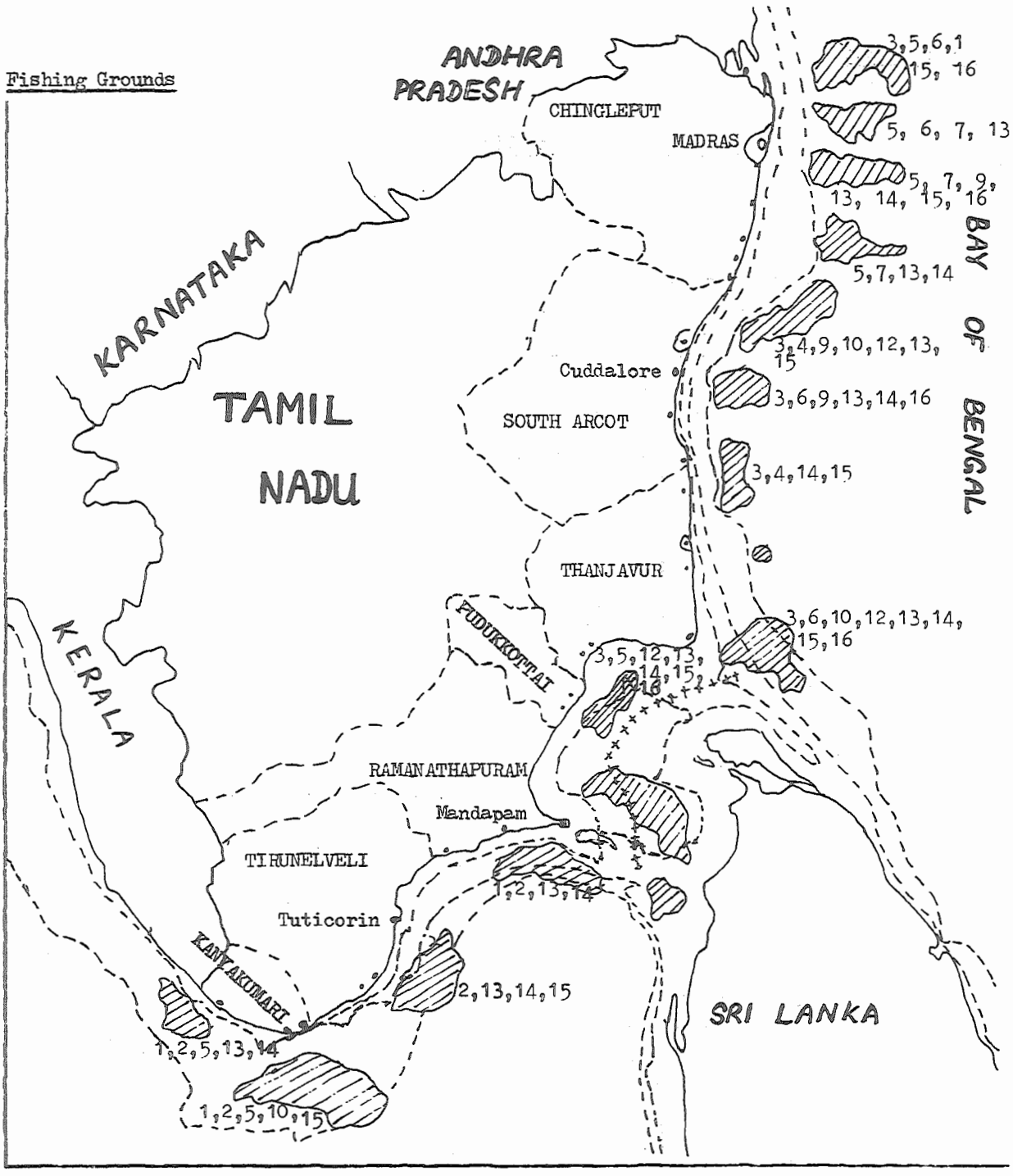
Appendix 3.3

Appendix 4.1

Organization of the Directorate of Fisheries



Appendix 8.1



Fishing grounds

1. Seer
2. Perches
3. Mullet
4. Lactarius
5. Horse Mackerel
6. Jew fish
7. Barracuda
8. Silver Bellies
9. Ribbon Fish
10. Pomfrets
11. Cat fish
12. Cock Fish
13. Shark
14. Rays
15. Prawns
16. Pristipoma

Appendix 9.1

Marine Fish Production by Species and districts (1974/75).

weight in tonne

SL. No.	Name of Fish	Madras	Chingle-put	South Arcot	Than-javur	Pudukot-tai	Ramana-thapuram	Tirunel-veli	Kanya-kumari	Total	%
1	Sharks	1,526	1,298	453	1,610	135	1,044	2,231	1,108	9,405	4.89
2	Skates and Rays	596	799	151	2,525	57	1,522	1,267	553	7,470	3.88
3	Cat fish	538	607	391	1,362	216	1,746	301	3,937	9,098	4.73
4	Sabre fish	300	344	132	586	172	1,112	300	461	3,407	1.77
5	Sardines	1,065	2,801	972	1,900	38	3,449	7,729	3,927	21,881	11.38
6	Hilsa ilisha	91	-	241	232	-	-	-	1	565	0.29
7	Anchoviella	1,010	1,506	911	599	-	29	635	2,120	6,810	3.54
8	Other clupeids	11	766	244	347	1	398	655	319	2,741	1.43
9	Saurida and saurus	492	40	112	48	-	-	1	-	693	0.36
10	Hemirhamphus and Belons	8	84	1	159	434	832	1,669	216	3,403	1.77
11	Flying fish	-	207	134	636	22	-	-	4	1,003	0.52
12	Perches	1,261	1,201	66	1,654	182	463	1,366	2,868	9,061	4.71
13	Red Mullets	687	557	414	37	220	168	29	122	2,234	1.16
14	Polynemids	199	155	36	340	29	46	138	9	952	0.49
15	Sciaenids	345	854	213	2,421	102	288	103	28	4,354	2.26
16	Ribbon fish	290	1,076	103	1,455	203	375	93	2,352	5,947	3.09
17	Caranx	732	691	260	739	205	537	348	650	4,162	2.16
18	Chorinemus	-	12	1	35	317	298	165	382	1,210	.63

Contd/...

Appendix 9.1 contd.

weight in tonne

Sl. No.	Name of Fish	Madras	Chingle-put	South Arcot	Than-javur	Pudukot-tai	Ramana-thapuram	Tirunel-veli	Kanya-kumari	Total	%
19	Elacate	-	1	3	4	192	-	89	33	322	0.17
20	Leiognathus	2,502	403	1,635	3,455	24	13,886	2,229	379	24,513	12.74
21	Lactarius	72	845	12	755	-	36	157	181	2,078	1.08
22	Pomfrets	644	549	119	172	1	94	11	131	1,721	0.89
23	Mackerel	2,342	1,582	538	388	33	658	9	151	5,701	2.96
24	Seer fish	1,092	897	286	47	275	1,808	547	578	5,530	2.88
25	Tunnies	177	-	5	-	20	133	265	680	1,280	0.67
26	Sphyraena	92	-	3	3	-	183	124	165	570	0.30
27	Mullets	81	665	450	684	68	64	14	-	2,026	1.05
28	Soles	461	-	25	23	49	-	120	91	769	0.40
29	Penaeid prawns	1,612	1,640	1,116	2,186	24	3,322	1,079	410	11,389	5.92
30	Non penaeid prawns	-	15	325	-	-	-	-	-	340	0.18
31	Other crustaceans Lobsters	310	-	-	19	-	32	123	35	519	0.27
	Crabs	448	738	271	1,181	454	936	134	18	4,180	2.17
32	Cephalopods	939	1	109	12	24	176	-	152	1,413	0.73
33	Miscellaneous	1,331	2,284	3,520	5,418	832	8,630	3,892	9,684	35,591	18.53
	Total	21,254	22,618	13,252	31,052	4,329	42,265	25,823	31,745	192,338	

Appendix 9.1 (contd/...)

Appendix 11.1

Marine, population, craft and landings by district and major centres.

	Marine Population (Nos.)	Catamarans (Nos.)	Country craft (Nos.)	Mechanized boats (Nos.)	Landings (1975) (tonne)
Madras	60,678	5,416	71	556	21,254
Chingleput	35,566	4,584	245	169	22,618
South Arcot	27,647	1,508	342	304	13,252
* Cuddalore	1,892	202	1	130	800
Thanjavur	84,536	5,027	1,709	168	31,052
* Nagapattinam	3,230	260	-	10	1,237
* Kodiakarai	630	16	2	10	2,500
Pudukkottai	12,031	15	618	(included in Thanjavur)	4,329
* Mallipattinam	616	-	25	250	1,167
Ramanathapuram	56,043	228	3,257	229	42,265
* Mandapam	4,375	-	370	150	3,947
* Rameswaram	1,400	-	-	150	6,265
Tirunelveli	33,117	4,240	781	122	25,823
* Tuticorin	5,432	8	301	100	13,330
Kanyakumari	81,225	12,088	688	320	31,745
Total	390,843	33,106	7,711	1,868	192,338

* Major centre in the district, the data of which is included in the district data.

Appendix 11.2

Landing and Berthing Facilities.

Name of place	Type of work	Costs (million Rs.)	Capacity	Year of completion/ Remarks
Cuddalore	A minor fishing harbour with wharf wall of (270 m) boat, basin, approach channel and slipway. Dredged to 1.8 m.	1.07	40 mechanized	I. stage 1963. II. stage 1974.
Nagapattinam	A wharf wall (90 m)	0.57	10 mechanized fishing boats	1969
Mandapam	A shore quay (110 m) on the Palk Bay side	0.45	40 mechanized fishing boats	1972
Rameswaram	A 'T' head Jetty (60 m)	0.95	10 mechanized fishing boats. The bay can accommodate 100 boats to anchor.	1972
Tuticorin	A major fishery harbour with breakwater (813 m) a boat basin (140 x 520 m), wharf wall (400 m) and landing Jetties; A slipway auction and packing hall, out-fitting stores etc. Dredged to 2.7 M.	20.18	400 mechanized fishing boats and 10 trawlers.	1976
Madras	A major fishery harbour. Eastern breakwater (1325 m) northern breakwater (829 m). Wharf wall (420 m)	66.80	400 mechanized boats and 50 trawlers	The harbour is under execution by MPT. It is likely to be completed by the end of 1978.
Kodiakarai	T. head Jetty	1.44	10 mechanized fishing boats	The works are under execution by the State Port Officer, and are likely to be completed in the next two years.
Mallipattinam	T. head Jetty	1.06	10 mechanized fishing boats	

Appendix 12.1

LIST OF PRIVATE PROCESSING/STORAGE FACILITIES IN TAMIL NADU FOR FISHERIES PURPOSES. (Registered with MPEDA)

(Capacity in Tonnes)

Name of the Party	Freezing	Frozen storage	Chilling	Ice Plan (24 hrs.)
Bali Cold Storage Ltd. Saidapet	2.5	190	..	10
Southern Sea Foods Ltd. Palavakkam	2.0	103	..	5
Orient Marine Products, Madhavaram	7.0	120	..	10
New India Maritime Agencies, Madhavaram	10.0	450	..	..
SIR Ice Factory, Egmore	..	5	..	..
Liberty Cold Storage, Egmore	6.0	65	..	..
Continental Sea Foods, Tondiarpet	3.25	40	..	..
Konkan Fisheries, Nedlankadai	3.00	100	..	5
Freezing Products (P) Ltd. Virugembakkam	5.00	375	..	20
Sea Foods International, "	2.5	..	..	..
Eastern Sea Foods, Tiruvettiyur	3.5	100	..	..
South Eastern Products, Walltax Rd.	2.0	20	..	..
Cochin Sea Foods	3.25	120	..	..
The Tata Oil Mills Co. Ltd. Tondiarpet	5.00	50	..	..
Markes Marine & Plastic Pvt. Ltd. Tiruvottiyur	2.5	80	..	10
George Maijo, Palavakkam	..	180	..	..
Star Cold Storage, Royapuram	..	100	..	..
S. David & Son Ice, Freezing and Industries, Kilpauk	3.0	50	..	3
Kay-Am Processors, Royapuram	5.0	100	4	2
Maharaja Sea Foods (India) (P) Ltd., Thiruvanmiyur	5.0	120	6	40
Asian Marine Products (P) Ltd. Injampakkam	2.5	50	..	10
Ocean Blest Foods, Royapuram	2.0	25	..	..
Melayil Sea Foods, Cuddalore	3.0	45	..	..
Kerala Food Packer, Cuddalore	7.0	140	..	..
Cordel Sea Foods (P) Ltd. Cuddalore	2.5	2.5	..	..
George Maijo, Cuddalore	2.0	25	..	..
Madras Pack Marine, Mandapam (4 units)	15.0	150	25	2
George Maijo (New) Mandapam	5.0	100	..	8
	109.50	2885.5	35	125

Appendix 12.2

Details of State Fisheries Departmental Ice Plants and Cold Storages and Capacity etc.

Location of the Plant.	Capacity of ice production 24 hours.	Cold storage.	Freezing capacity.	Frozen storage	Ice and chilled fish storage.
	(Capacity in tonnes)				
1. Metturdam	5	15	..	..	..
2. Tuticorin	5	15	3	50	..
3. Ennore	3	1	5	50	15
4. Nagercoil	..	1	..	..	..
5. Cuddalore	2	2	..	..	..
6. Nagapattinam	2	2	..	..	..
7. Kilakarai	2	2	..	..	..
8. Neelankarai	2	2	..	..	..
9. Pulicat	2	2	..	..	..
10. Madurai	2	2	..	..	..
11. Thanjavur	2	5	..	..	..
12. Kovalam	1	2	..	..	..
13. Punnakayal	2	5	..	..	..
14. Bhavanisagar	..	1	..	..	..
15. Thirumullaivasal	13	..	..	..	..
16. Sathanurdam	..	1	..	..	..
17. Krishnagiri	..	1	..	..	..
18. Adyar	..	1	..	..	..
19. Royapuram	..	1	..	..	..
20. Muttom	5	15	..	..	..
21. Rameswaram	5	5	..	..	..
22. Portonovo	2	5	..	..	..
23. Palayamkottai	..	1	..	..	..
24. Pudupattinam	..	1	..	..	..
25. Trichy	..	1	..	..	..
26. Mandapam	15	60	11½	50	50
27. Amaravathy	..	1	..	..	..
28. Cape Comorin	5	15	..	..	..
29. Sethubavachatram	2	..	..	..	..
30. Kadapakkam	2	..	..	..	..
31. Enayanputhenthurai	2	..	..	..	..
32. Idinthakarai	5	15	..	..	..
33. Muthupet	2	..	..	..	..
34. Thoothur	2	..	..	..	..
35. Adirampattinam	2	..	..	..	..
TOTAL:	82	180	19½	150	65

Appendix 13.1

Flow of fish from producer to consumer (1975/76).

in tonne

	Tamil Nadu excluding Madras			Madras			Other states	Other countries
	Wholesale	Retail	Consumer	Wholesale	Retail	Consumer		
Inland fish 150,000			5,000					
		50,000	50,000					
	95,000	89,000	89,000					
				1,000	1,000	1,000		
							5,000	
Sub-Total	95,000	139,000	144,000	1,000	1,000	1,000	5,000	
Marine fish fresh 150,000	11,000 prawns			4,000				4,000
							7,000	7,000
			15,000					
		35,000	35,000					
	89,000	60,000	60,000					
			5,000					
				22,000	22,000	22,000		
							2,000	
Dried 70,000 conversion rate 1:3 = 23,000	2,000							2,000
	3,000						3,000	
			4,000					
		6,000	6,000					
	8,000			4,000	4,000	4,000		
		4,000	4,000					
Import marine/ inland fresh 4,000				2,000	2,000	2,000		
	2,000	2,000	2,000					
Sub-Total	115,000	107,000	131,000	32,000	28,000	28,000	12,000	13,000
Total 370,000 + 4,000 imports	210,000	246,000	275,000	33,000	29,000	29,000	17,000	13,000

Appendix 13.2

Average producer, wholesale, retail and CFC prices of marine Fish at Madras (1975/76).

		Producer price Rs/kg.	Whole-sale price Rs/kg.	Retail price Rs/kg.	CFC retail price
	SEA FISH.				
1.	Bekte (Lates calearifar)below 2 kg. full	3.50	5.50	7.00	6.00
2.	Seer (Cybium) full	4.50	6.50	8.00	8.00
3.	Jew fish (sciaena) full	2.50	4.00	6.00	
4.	Thread fine (Polynemus) full	2.50	4.00	6.50	
5.	Pomfret white	3.00	4.00	6.00	
	Pomfret black		4.50	6.50	
6.	Perches - above 25 cm. full	3.00	4.50	5.00	
7.	Caranx above 25 cm. full	2.00	3.50	4.50	
	Caranx below 25 cm. full		2.00	3.50	
8.	Pristipoma full	1.75	3.00	4.50	
9.	Flat fish full	1.00	3.00	4.50	
10.	Leather jacket		2.50	4.00	
11.	Mullet above 6"	2.50	4.50	6.00	

Appendix 16.1

House Construction Schemes.

Name of executing Agency	No. of Houses	Remarks
1. Tamil Nadu Slum Clearance Board	3,638	Tenaments at Royapuram, Tondiarpet, Foreshore Estate, etc. (Madras City).
2. Fisheries Department under departmental housing scheme	421	
3. Public Works Department	381	Kalpakkam and Chingleput, Ammapattinam Pudokottai District.
4. Tamil Nadu Harijan Housing and Development Corporation	2,622	2,020 houses have been completed.
	1,185	Government has sanctioned fund for construction of 1,185 houses. But this is not yet approved.
5. Tamil Nadu Housing Board	400	Vanagiri
	500	Poombuhar
6. Fishermen Cooperative Society	72	Erayumanthurai Kanyakumari District.
Total	9,219	

Appendix 17.1

Subsidy Schemes.

(i) Local (India) construction of trawlers.

Central Government: 27.5% of difference between cost of domestic trawlers and imported trawlers.

(ii) Mechanized boats.

State Government: Interest on loans for boats (95%) is subsidized as follows:-

1e year	:	100%
2e year	:	66 2/3%
3e year	:	33 1/3%
Thereafter	:	Nil

(iii) Synthetic twine:

State Government: 20% for traditional craft through cooperatives (not yet approved).

(iv) Landing and berthing facilities.

Central Government: 100% grant.

(v) Integrated development of fishing villages.

Central Government: 75% of costs of landing facilities, shore facilities, marketing, approach roads, electricity, water supply, etc. (not yet approved).

(vi) Half-a-million job scheme.

Central Government: 100% for the training programme (718 persons trained).

(vii) Housing Subsidies.

State Government: 1975/76 100%

Special schemes:

Ammapattinam: 83 1/3% subsidy

Kadapakkam: 33 1/3% subsidy

(viii) Other Schemes.

State Government:

- Rs.1,000 as family grants for deceased fishermen while fishing.
- Subsidies and loans for natural calamities.

Appendix 18.1

Fisheries Fifth Five Year Plan: Financial Allocations.

in million Rs.

	Name of the Scheme	1974-75 Actual Expenditure	1975-76 Actual Expenditure	1976-77 (Budget)	1977-78 (Outlay proposed)
I.	Direction and Administration	-	0.008	0.034	0.094
II.	Research	0.172	0.503	1.494	1.252
III.	Education and Training	0.236	0.225	0.238	0.203
IV.	Inland Fisheries	0.668	0.350	0.667	1.464
V.	Fishing Harbour and Landing Facilities	0.002	-	0.006	0.003
VI.	Deep-Sea Fishing	0.290	0.366	0.848	0.832
VII.	Processing, Preservation and Marketing	0.131	0.142	0.362	0.263
VIII.	Mechanization and Improvement of Fishing Crafts	15.573	9.244	8.889	7.987
IX.	Other Expenditure	0.174	0.091	0.101	0.073
X.	Fisheries Cooperatives	0.540	0.295	0.833	0.103
XI.	Fishermen's Housing Scheme	0.019	6.353	10.068	0.005
XII.	Centrally sponsored scheme	0.891	1.138	0.784	1.000
	Total	18.696	18.715	24.324	13.279

Appendix 18.2

Fisheries Development Schemes in the Fifth Plan.

(Rupees in .000)

Item	Fifth Plan Target		1974/75		1975/76		1976/77	Anticipated achievement	1977/78 Proposed Target
	Fin.	Physical	Target Fin.	Achievement Fin.	Target Fin.	Achievement Fin.	Target Fin.	Fin. (upto Sept. 1976	Fin.
1	2	3	4	5	6	7	8	9	10
1) Assistance for Non-mechanized traditional fishing:									
(a) Preservation of Craft materials treatment Plants	713	3 Units of Timber preservation	-	-	The scheme has not been implemented		-	-	-
(b) Provision of insulated box and brine tube	500	2000 sets	60	Nil	54	Nil	51	Nil	51
(c) Outboard motors on catamarans	2,500	800 outboard motors	100	Nil	100	Nil	85	Nil	Proposal has been dropped
(d) Provision of sails including improved materials	500	2000 sails	-	-	The Scheme has not been implemented		-	-	-
(e) Modern gear and Gear materials	2,500	20% subsidy for 300 tons of Nylon	538	Nil	1 (The scheme has not been implemented during 1974/75 to 1975/76)	Nil	1	Nil	2
(f) Boat Yards for non-mechanized boats	600	2 Yards	-	-	The scheme has not been implemented		-	-	-
(g) Provision of winches for shore seines	500	60 winches	-	-	The scheme has not been implemented		-	-	-
(h) Forest Plantation of trees suitable for catamaran logs	200	200 hectares	-	-	The scheme has not been implemented		-	-	-

Contd/...

1	2	3	4	5	6	7	8	9	10
2) Assistance to small boat mechanization									
(a) Provision of Inboard Motors for indigenous crafts	7,300	300 inboard motors	200	Nil	200	Nil	60	Nil	-
(b1) Construction and supply of Mechanized fishing boats	67,600	1000 boats 50 trawlers	5,844	7,330	1,551	1,070	5,400	752	4,006
	The Departmental Boat Building yards are functioning under the control of Tamil Nadu Fisheries Development Corporation Ltd., with effect from 1/7/1974				-	-	-	-	-
(b2) Financial assistance to private & Co-operative Enterprises	10,720	No target 20% interest free loan	500	Nil	-	The scheme has been discontinued			
(c) Service Centres, Workshops and Boat Building Yards	3,000	Service Centre at Mandapam, Point Calimere, Cape & Valinokkam Expansion of BBY at Nagapattinam	865	98	3	97	439	Nil	186
(d) Modern Gear and Gear materials	12,430	300 tons of nylon to the mechanized boats 200 tons for boats acquired by Cooperatives and private bodies	500	93	2	Nil	2	Nil	-
(e) Rescue vessels	475	1 Rescue vessel	-	-	The scheme has not been taken up			-	1,000
3) Deep-Sea Fishing:									
(i) Assistance to Private and Cooperative Enterprises	4,745	Grant of Interest free loan for acquisition of 50 trawlers	-	-	The scheme has not been taken up		-	-	-
(ii) Conduct of Hydrographic Survey	-	-	-	-	-	-	326	-	836

1	2	3	4	5	6	7	8	9	10
4) Processing, Storages and Marketing:									
(i) Establishment of:	4,000	8 Units							
(a) Cold Storage			675	Nil	Nil	87	471	Nil	Nil
(b) Ice Plants				131	1,147	Nil	Nil	59	364
(c) Ice Plants and insulated transport	2,800	2 Big Ice Plants	-	-	The scheme has not been implemented			-	-
(d) Transport of fish	-	-	-	-	2	55	2	Nil	1
(e) Assistance to Co-operative Marketing Societies	2,000	-	-	540	-	-			
5) Training:	2,250	No target	55	190	227	141	247	243	211
6) Research:									
(a.i) Inshore Survey	9,000	3 IFS	433	-	777	608	1,018	93	673
ii) Experiment with mod. and large vessels	7,667	3 vessels	The scheme has not been taken up						
(b) Research on local problems	2,000	No target	-	83	152	84	128	74	157
			Research Scheme						
(c) State Commitment for Co-ordinated ICAR Project	7,500	-	Staff expenditure						
(d) Strengthening the statistical unit for marine and inland statistics	1,000	-	67	22	62	55	62	29	59
			Scheme for collection and compilation of statistics						
7) Establishment of Extension Unit:	3,000	No target	49	46	11	84	27	08	
			Expansion of Existing Extension Units						
8) Socio-Economics:									
(a) Housing Scheme	5,000	2500 houses	80	26	92	14,591	10,036	3,700	10,008
(b) Approach roads	2,000	No target	37	9	27	-	2	-	2
(c) Water supply	2,000	No target	The scheme has not been implemented						

Contd/...

1	2	3	4	5	6	7	8	9	10
(d) Assistance to Fishermen Co-operative Societies, Term loans, working capital and Participation in shares	2,500	-	576	Loan scheme	105	295	112	-	102
(e) Demonstration Fish Processing Units	1,000	No target	——— The scheme has not been implemented ———						
9) Other schemes:	1,000	No target	300	Nil	139	-	453	-	-
10) Administrative set-up of the Department:	1,000	No target	-	Staff expenditure	2	8	68	21	94
11) Tourist Promotion	2,500	1 Aquarium	Nil	Nil	Nil	Nil	75	Nil	393
12) Fisheries Development	-	-	5,000	8,437	7,002	8,100	6,003	1,502	2,355
Total	188,000	-	17,398	17,762	12,733	25,579	26,281	6,718	22,489
13) Centrally sponsored Scheme:									
Fishing Harbours and landing jetties	46,560	No target	25,000	891	1,647	1,138	975	59	1,603
Total	46,500	-	25,000	891	1,647	1,138	975	59	1,603

Appendix 18.2 (Contd/...)

Assessment of Problems and Needs in Marine Small-Scale Fisheries

TAMIL NADU
India

Prepared by

C. Ratcliffe, Fisheries Adviser
A. Andreasson, Fisheries Adviser (Associate Expert)
H. Copper, Economist (Associate Expert)

in consultation with

Directorate of Fisheries, Tamil Nadu.

Development of Small-Scale Fisheries in Southwest Asia, Colombo, November 1977.

CONTENTS

		Page No.
1	Introduction	1
2	Resources	1
3	Production	2
	3.1 Fishing Craft	2
	3.2 Fishing Gear	4
4	Catch Utilization	5
5	Landing Facilities	6
6	Fishing Communities	7
7	Institutional Support	7
8	Recommendations	8

Appendices

3.1	Types of Catamarans - East Coast of India	9
3.2	Modified Traditional Designs of Catamaran	10
3.3	Beach Landing Craft	11
4.1	Improved Fish Drying	12
4.2	Possible Lay-Out for Improved Low-Cost Fish/Prawn Handling Shed.	13
5.1	Beach "Slipping" System	14
5.2	Prawn Trawlers Hauled up on Beach for repairs at Tuticorin.	15

1 INTRODUCTION

The production of the traditional small-scale fisheries of Tamil Nadu is some 135,000 tonne per year, which is 60% of the total marine production. The balance is made up by the introduced mechanized prawn trawler fleet.

The fishing effort is, due to the occurence of prawn stocks and the limited range of operation of traditional craft, concentrated to shallow waters, mainly within depths of 40 m. In these waters the production of prawns and associated by-catch species appears to be reaching maximum yield. There are prospects for increased production from pelagic species in shallow waters (e.g. mackerel). However, the bulk of a production increase will have to come from areas beyond 40 m of depth.

In order to increase the production there is a need for diversification of fishing effort which could be achieved by technological modifications of existing craft and gear.

The bulk of the landings are marketed fresh without means of preservation (ice). About 30% is dried. Improved handling and processing practices offer savings in the form of reduced waste and higher income to fishermen for better quality products.

Landing and shore facilities, roads, public services and houses have been provided under Government schemes. Some notable achievements have been made but some of these activities need re-appraisal as to contents and implementation with the view to improve the services to the beneficiaries i.e. the fishing communities.

The Fisheries Administration and associated Institutions is well established and capable to cater for support to the industry. Weaknesses have however been identified in the technical/biological development programme, in semi-commercial government activities and in planning and coordination.

2 RESOURCES

The continental shelf of Tamil Nadu extending to 200 m depth covers an area of 41 400 km^2, along a coastline of 960 km. Most of the fishing effort is concentrated in waters of less than 40 m in depth and particularly inshore waters within 20 km of the coast. Production from these waters has increased steadily over the last 3 years from 160 000 tonne in 1974/75 to the present level of 220 000 tonne. The landings comprise about 50% pelagic and 50% demersal species.

From a recent estimate[1] of the potential yield, it follows that the main prawn resources at scattered locations, generally within depths of less than 40 m, as well as the small demersal species normally associated with the prawn catches, are heavily exploited, while the stocks of larger demersal species within these depths are generally underexploited. There are stocks of unexploited demersal species in the deeper waters of the continental shelf, i.e. beyond 40 m, all along the coast.

Little is known of the extent of pelagic resources, but there are indications that they are far from being fully exploited and should allow a doubling of the catch[2], i.e. another 100,000 tonne a year.

Better resource information is needed for proper planning of fisheries development. Improved collection and analysis of data from existing fisheries and systematic surveys and test fishing of the pelagic stocks would meet this need.

---

1) Report of the National Commission on Agriculture, 1976.
2) CMFRI, Bulletin 27, 1976.

3 PRODUCTION

Of the total marine landings of 220,000 tonne in 1975/76 [1], some 60% (135,000 tonne) comes from 42,000 traditional craft (i.e. catamarans, vallams and canoes) and 40% (85,000 tonne) from 2,000 mechanized/motorized 9 - 10.5 m boats. With the exception of a few of the larger motorized traditional open boats (vallams) most of the mechnized boats are decked craft of introduced contemporary design. The traditional craft use various types and sizes of gillnets and boat-seines. Almost all the mechanized boats are trawling for prawns.

The traditional craft land the bulk of the better quality food fish, most of the pelagic catches and considerable quantities of prawns. The mechanized boats mainly land prawns, lesser quality food fish and trash fish.

The development efforts during the last 20 years have resulted in:-

(i) the establishment of an export oriented prawn industry;

(ii) substantial increases in landings of smaller lesser quality food fish and trash fish associated with prawn trawling and prawn gillnet by-catches;

(iii) increased profits and earnings in the traditional sector due to the high export prices of prawns and larger fish catches attributed to the transition from natural to synthetic fibre nets.

Whilst there has been a considerable overall growth in fish production during the past two decades this additional production mainly comprises the small, prawn by-catch, fish species.

There are, as already mentioned, opportunities for further increases in production by greater use of other less exploited fish stocks. Initial efforts to increase production should be aimed at encouraging the fishermen to capitalize fully on the fair weather season. The possibilities of increased fishing effort during bad weather will be more difficult and must be based on the suitability of existing landing facilities or the possibility of establishing new ones, e.g. for partly protected low-surf beaches and unprotected heavy surf beaches.

The following areas are identified for future development activities:-

(i) increasing the size and range of operation of traditional craft;

(ii) diversification of fishing methods on mechanized boats; (e.g. fish trawls, gillnets, ring nets and long lines);

(iii) introduction of new and/or modified craft and fishing gear.

However the introduction and acceptance of such technical changes will be dependent on, the economics of food fish production being favourable and thorough analyses of costs and earnings are necessary. Such information will also assist Government to determine appropriate levels of development inputs required.

3.1 Fishing Craft.

Along the Coromandel Coast, the southern part of the Gulf of Mannar and the West coast of Tamil Nadu, where seasonal heavy surf conditions exist, the dominant craft is the "sailing" catamaran (log raft).

The catamaran is well suited for the heavy beach surf conditions and the prospects of replacing these crafts with normal displacement boats are not encouraging. Repeated attempts in India and other countries to replace traditional beach landing craft with competitively priced contemporary displacement hull surf boats have so far been unsuccessful and no economically feasible solutions have so far emerged. However, whilst the catamaran is common along the east coast of India from Dhamra in Orissa to Cape Comorin, there is considerable variation in local designs. These range from a small (3 m) basic structure, comprising of a number of roughly shaped logs, to the larger (8 m) well shaped modified versions of boat catamaran, fitted with drop keels and sometimes rudder, used in the Gulf of Mannar (Appendix 3.1 and 3.2). Therefore, accepting that the catamaran is an important specilized fishing craft in its own right there are opportunities to effect localized improvements by the introduction of the better larger catamaran and/or boat catamaran types from other areas. Bearing in mind

---

1) Directorate of Fisheries, Division of Information and Statistics.

that this craft is essentially a buoyant, soft wood, raft with sides, the main area for development may be to produce a suitably durable, low-cost, bottom section of alternative materials in view of diminishing supplies of suitable logs for catamaran construction.

Considering the importance of the catamaran it is suggested that efforts be made to determine whether or not this category of craft can be further developed or, at light surf locations at least ultimately replaced. In many such locations in Sri Lanka the catamaran is gradually being replaced by a 5 m fibre glass beach boat (Appendix 3.3). A mould for the construction of this model is available in Madras. It is suggested that a small number of these fibre glass boats be obtained and their performance tested under the various local operation conditions.

The other craft found in these areas with heavy surf conditions is the larger masula boat (stitched boat). The constraint against replacing the "masula" boat, which is only used during a short season for beach seining, will be more a question of economics rather than of a technical nature. This craft is of simple, frameless, double ended, carvel construction and could possibly be replaced by a stronger framed contemporary designed boat without greatly increasing the weight factor. However the provision of a substitute would probably be dependent on additional lucrative fishing operations opportunities (e.g. gillnetting during the off-season for shore seining). Presently mechanized shrimp trawlers operate from many open beach landing centres along the Coromandel coast during the fair weather season. These boats anchor outside the surf line and catches and crew are ferried by catamarans. Therefore it is considered that renewed attempts should be made to develop a low cost multi-purpose sailing and/or motorized beach landing craft of contemporary design.

In the shallower protected waters of Palk Bay and the northern part of the Gulf of Mannar, various types and sizes of well evolved outrigger sailing canoes and sailing vallams (carvel built plank boats) are in vogue (Appendix 3.3). It is not deemed necessary to hasten the replacement of these craft, which are of proven traditional design. Initially the aim should be to effect such modifications as required to, improve present operations performance or cater for introduction of new operations. Such modifications could include:- (i) removable insulated fish holds, (ii) improved sail arrangements, (iii) forepeak accommodation, (iv) full or half decking, (v) fore or aft steering cuddies, (vi) hull structure modifications to facilitate increased carrying capacity and/or motorization.

In order to keep the costs of such modifications as low as possible it is recommended that these be implemented through the traditional boat-builders. The development of suitable modifications along with investigations to determine the feasibility of introducing contemporary designed craft could be carried out in the State Fisheries Development Corporation boatyards. Such a boatyard could also provide short ad hoc internal and field extension training courses for the traditional boat-builders.

A possible future constraint to effecting improvements to traditional craft or introducing a new generation of wooden boats could be shortage of suitable timbers. In order to facilitate future development it is recommended that an analysis is made of the supply and cost trends of timber against those of other alternative construction materials such as fibre glass, ferro-cement, etc. From past experience it is known that the traditional craft can be motorized with outboard or inboard engines without any real technical complications. Trials with boat catamarans powered with petrol outboard motors conducted by the former Indo/Belgium project in Muttom were successful prior to the 1973 oil crisis, after which they became uneconomical. During the 1950's various trials in which canoes and vallams were fitted with imported small inboard diesel engines also showed that motorization was possible. It appears that the main reason for the fishermen not going over to motorization was one of uncertain economics and operational problems. However, there are still a few motorized larger (9 m) vallams gillnetting in Palk Strait.

A major constraint against effecting motorization of existing or future models of small craft is the lack of suitable size outboard motors and light weight low horse power inboard engines of Indian manufacture. This situation will need consideration in conjunction with any future motorization programme. The capacity to produce such units in India is available and engine manufacturers should be closely associated with the above discussed development efforts.

To be economical, motorization generally has to be accompanied by changes in the operational pattern i.e. an increased fishing effort by extended range or by the use of larger quantities of fishing gear. In many instances this is quite feasible and renewed motorization efforts should be undertaken for selected fisheries.

3.2 Fishing Gear.

The most common fishing gear used in the traditional fisheries are gillnets and boat seines; other gears employed include shore seines, hand-lines, trolling lines and fish traps. The most important gear is the gillnet which comes in a variety of different types (e.g. surface drift nets and bottom set nets) and sizes, ranging from light small mesh (25 mm) for sardines to heavier large mesh (175 mm) nets for large demersal and pelagic species. During the last two decades synthetic materials have rapidly replaced natural materials in the fabrication of gillnets. The most significant gear development in the traditional fisheries in this period has been the introduction of the bottom drifting prawn gillnet. The general acceptance and popularity of this gear, which is by far the most widely used type of gillnet, is due to the lucrative seasonal returns from the prawn fisheries.

As mentioned in previous chapters there are indications that increases in fish production can be expected by increased effort and/or further diversification of methods on less exploited stocks. The general acceptance of new innovations (whether it be craft or gear) will depend on the financial returns being supplementary to, or greater than, those derived from prawn fishing.

An example of a recent gear development, which demonstrates the fishermen's reluctance to forfeit his chance of lucrative earnings from prawns, can be seen in Thanjavur District on the South Coromandel Coast. Here the prawn season coincides with the mackerel (Rastrelliger kanagurta) season. In order to obtain the best of both worlds the catamaran fishermen have developed combination gillnets. These comprise a lower section of multi-filament nylon prawn net and an upper section of monofilament nylon mackerel net. Another version of this gear consists of alternate vertical sections of multifilament and monofilament netting. The main reason for using monofilament netting is that it is considerably cheaper than multifilament and has double or treble the catching efficiency.

The use of these prawn/mackerel combination nets appeared to be confined to the coastline between Porto Novo and Kodikkarai. The possibility of introducing this ge r in other areas where seasonal mackerel fisheries exist could be explored. A further possibility is the replacement of existing cotton or multifilament nylon surface gillnets with monofilament nets.

Other areas for diversification and/or increasing the amount of gear used that can be explored by experimental fishing activities from the various craft employed are:-

Catamarans and Small Sailing Craft.

(1) mesh permutations of combination gillnets, e.g. small mesh (prawns) - big mesh (large fish species); or trammel nets with small mesh centre walls (prawns, small and large fish species).

(2) Small-mesh, surface drifting, gillnets for small pelagic species (e.g. sardines and mackerels).

Large Sailing Craft (and mechanized craft).

(1) Big mesh surface drifting gillnets for large pelagic species (e.g. tunas and spanish mackerels).

(2) Small light weight purse seines and/or surround gillnets for mackerels or sardines in Palk Strait or Gulf of Mannar.

(3) Pair trawling with a high lift bottom trawl.

To facilitate improvements in fishing technology it is recommended that the catalogue of traditional craft and gear be updated. Particular attention should be paid to the economics of the various fishing operations. Then each gear and its operational use should be examined individually in order to identify opportunities for effecting improvements.

In order to effect an overall increase and diversification of fishing effort, a continuous ample supply of suitable materials for introduction and replacement of fishing gear is essential. Individual items lacking in supply need to be identified, requirements established and remedial action taken.

4 CATCH UTILIZATION

About 60% of the total marine production of Tamil Nadu is marketed as fresh fish, 30% is cured, and 8% (mostly prawns) is frozen. The balance (about 2% or 4,000 tonne) is used for manufacturing fish meal, oil, manure, etc.

Catches are not normally iced on board. Most of the fresh fish is marketed without addition of ice in coastal areas. The higher priced varieties are to some extent iced and marketed both locally and in coastal and inland urban areas where a latent demand exists. The dried fish is marketed in inland and coastal districts. There is a significant fresh and dried-salted mackerel trade to Kerala during the south-west monsoon period. The dried fish trade will continue to play an important role, not least because there are well established consumer preferences for certain dried fish species.

The fish handling and processing techniques employed in the traditional fisheries are not conducive to producing good quality products. Fish drying is carried out on the ground and the end products are usually heavily contaminated with sand and dirt, and there is considerable insect infestation. There is considerable scope for improving the catch handling and processing at traditional landing centres, but the aim should be to effect gradual, simple, and low cost improvements. Particular attention needs to be paid to the limited buying power of the main consumer groups and the low amounts of capital available to the people to effect improvements. Important target areas for the introduction of better drying practices should be the major landing centres to make better use of substantial prawn trawler fish by-catch and the large landings of small pelagic species normally dried.

The physical components of a programme for improved fish drying should include:

1) At traditional fishing centres:

   i) Low cost drying racks made from local materials both for public and individual (family) use, to enable more efficient and hygienic handling and processing.

   ii) Smooth surfaced concrete brine tanks for the larger fish curing operations and suitably sized hard wood or plastic brine/fish washing tubs for household curing operations.

   iii) Simply constructed and well ventilated fish store rooms and/or "off-the ground" wooden or basket woven household storage bins to increase the storage life of the products.

2) At major prawn landing centres properly laid out public fish curing and drying areas to cater for the prawn trawler fish by-catch surplus over fresh fish requirements and small pelagic species normally dried.

Appendix 4.1 illustrates simple improvements for fish drying; these should, as a matter of priority, be introduced through technical extension in fishing villages where housing schemes have been, or are to be implemented, and gradually in other villages.

Also the handling of fresh fish and prawns need to be improved. A more intensive use of ice and associated handling equipment (boxes) would improve the quality and increase the supply of fresh fish. It is of particular importance to improve the prawn handling in view of its high export value.

The main problem associated with obtaining better pre-processing handling is the lack of control that the processors and Government have on the operations of the select circle of merchants responsible for procuring the prawn at landing centres or neighbouring markets. As a result of the absence of effective quality control measures it is possible for persons involved in these intermediate business activities to obtain substantial financial returns without the necessity to invest much capital in more appropriate facilities. The large number of small traders and merchants involved in the prawn procurement business and the isolated location of the numerous landing centres will make the task of upgrading the present handling techniques both difficult and time consuming.

Specific areas for improvement which could be tackled in the form of demonstration projects at selected sites would include:-

   i) The use of ice on board for storage of prawns and/or prime fish in insulated boxes tailored to the size of the vessel and the magnitude of daily catches, and the increased use of ice in handling and transporting particularly for fish going to distant markets.

ii) Low cost handling sheds for sorting and clearing with insulated storage bins, at landing centres (Appendix 4.2).

The Government has provided ice plants at several landing centres with the aim of (i) stabilizing prices of ice, (ii) ensuring a constant supply of ice and (iii) demonstrating the improvements resulting from the use of ice.

In many places where the Government plants have been constructed, ice is now provided by the private sector and the operation of the Government plants is generally not economically viable. Many of these plants have achieved the initial development aims and, unless they can be made to operate economically, would now appear to be superfluous and could be deleted from the Government programme.

In view of the seasonal fluctuations of the demand for ice at the smaller landing centres, and where future development needs have to be satisfied which might not be covered by private sector ice production, it should be considered whether or not future Government or Corporation sponsored ice plants should have larger capacity and be reduced in numbers. Distribution of ice to the landing centres according to the actual demand is probably in most cases more economical.

As a pre-requisite for better catch handling and processing at all landing sites, the provision of adequate public services (e.g. fresh water, power supply, road facilities, etc.) must have a very high priority in fisheries related rural community development schemes.

5 LANDING FACILITIES

The largest fishing harbour in the State is nearing completion at Madras and a smaller fishing harbour has been built at Tuticorin. Landing jetties with associated shore facilities e.g. ice plants, cold stores, boatyards, engineering workshops, training schools, have been provided at minor ports and other large landing centres (e.g. Cuddalore, Nagapattinam and Rameswaram). Similar schemes for providing finger jetties and shore facilities are well advanced at Kodikkarai and Malapattnam in the Palk Strait. Pre-feasibility studies have identified further sites where possibilities exist for providing small harbours and jetties.

The provision of landing centres todate has been primarily aimed at providing berthing facilities for the prawn trawler fleet but due to the seasonal and localized nature of the prawn stocks the inshore prawn trawler fleet is highly mobile. Many of the centres mentioned serve only as seasonal havens. For long periods of the year the prawn trawlers are absent from their home port having migrated to traditional fishing centres within daily range of the prawn grounds. The facilities provided have therefore, in general, not been utilized to the extent that was anticipated. A further problem yet to be resolved; is the serious siltation at some of the centres.

The economic feasibility of developing and maintaining the centres needs to be critically examined in the light of the results achieved todate. The justification for constructing landing facilities at the various sites identified in the pre-feasibility studies would be considerably strengthened if the provision of landing and shore facilities and public services for the development of the resident traditional fisheries was also included.

It is noted that while some measure of shore based support has been provided for the mechanized boat fleets, there is a distinct lack of appropriate facilities for the traditional fisheries. More than half of the fish production comes from open coast operations by beach landing craft. The provision of fixed structure landing facilities along the open coast where littoral drift and strong wave action conditions prevail will probably, technically and economically, be unfeasible. The opportunities for improvements at open centres are the development of beach landing and/or berthing systems suitable for the conditions of the particular coastline i.e. Coromandel Coast, Palk Bay, Gulf of Mannar, and Lakshadeep Sea. It has been noted that a simple low cost indigenous beaching system has been developed for prawn trawler repairs (Appendix 5.1 and 5.2). It is recommended that this particular item of local technology be transferred to other centres where berthing facilities for prawn trawlers do not exist. It is further recommended that the possibilities of developing similar simple devices be carried out in conjunction with any efforts to develop improved beach landing craft.

6 FISHING COMMUNITIES

The budget of the Fisheries Directorate does not include any financial allocations for access roads to fishing villages and water supplies. These schemes have been taken over by the local administrative agencies. However, the housing schemes for the coastal fishermen are implemented by the Directorate, and substantial financial allocations have been made annually and will continue, as this scheme is a long term one.

It is logical that the Directorate, which is the Government body with the closest contact with the fishermen, promotes the socio-economic development of the fishing communities. There are however, specialized Government agencies for implementation of physical infrastructure and housing development and it is felt that the Fisheries Directorate should only participate as cooperating agency in the planning of these facilities and concentrate its programme on matters directly related with the fisheries as such.

As far as housing is concerned it is suggested that the effort is limited to the development of improved low cost houses of traditional style for demonstration purposes. In addition, suitable housing and village sites could be allocated and planned with the view to facilitate orderly village development.

7 INSTITUTIONAL SUPPORT

There are several specialized institutions, corporations and semi-commercial operations under the control of the Directorate of Fisheries which are engaged in fisheries development work. A general observation is that many of their activities are planned and implemented without consideration as to whether they fit in with and contribute to the objectives of current development programmes; it is also noted that their work is often duplicated by other institutes.

The biological and technical stations, for example, are engaged in various activities of a nature which is unlikely to be of benefit to the small-scale fisheries. These and similar activities are also overlapping with similar activities undertaken by the Central Research Institute to which they would seem to properly belong. A reconsideration of the work plans of these institutions should be considered.

The semi-commercial operations of ice plants and boatyards carried out by the Tamil Nadu Fisheries Development Corporation were justified when they started and, indeed, stimulated similar developments in the private sector. However, they are now functioning as somewhat self-centred institutions, their development work is minimal and their economic resources are negligible. A complete review of their continued operation is merited and should consider whether Government involvement in ice plant construction and boat construction is necessary, or whether it should be left to the private sector.

To ensure planning and coordination of fisheries development programmes it is necessary to strengthen the planning capacity in the Directorate. More emphasis should be given to the collection and analysis of information on cash earnings and benefits of the different industry operations to ensure sounder planning and effective implementation of support programmes for industry development.

The Directorate has been active in collecting the loan repayments from the fishermen groups to whom the mechanized boats were issued by the Government. The Corporation has been active in identifying and obtaining financial facilities for the fishermen in order to implement the mechanization programme for which purpose, four boatbuilding yards are under its control. Generally boats are issued to a group of five fishermen who pay an initial 5% of the total cost of the boat. Eighty percent of the cost is obtained from financial institutions and the interests on this amount are met by the Government as interest subsidies. The remaining 15% are directly provided by the Government as interest free loans. The period of repayment is 7 years. The selection of the fishermen is made on the basis of their seniority on the registration list maintained by the Directorate. This practice requires reconsideration. It is noted that neither the Directorate nor the Corporation have in the past taken sufficiently active steps to give the fishermen the required technical and management support for the successful operation of the mechanized boats issued to them under their sponsorship.

Although many boats have been issued in the past under this scheme the results have been disappointing; repayments are poor and drop sharply after 2 or 3 years (in many cases inspite of good earnings); in

many cases the boat ends up in the hands of one man only who therefore benefits unduly.

As a result, Commercial Banks and other Credit Institutions are very reluctant to continue loan schemes to fishermen. In the case of mechanized trawlers this is probably not any longer a constraint to development since private entrepreneurs are now able to secure credit from Banks or other sources. It is therefore clear that the Government scheme in its present form has outlived its usefulness.

The experience of loan schemes operated to date indicates that the lending functions should be entrusted to the banks and the Directorate should only have an advisory role in the specification of equipment and selection of loanees. The Directorate should play a key role in assisting the Banks to set up special branches dealing with fisheries loans, in order to understand the peculiarities of fishery loan systems and assist in properly servicing fishery loan schemes.

The most critical issue is the selection of loanees for other than Government sponsored loans. The banks normally require security in fixed assets which is not readily available in the target groups of poor fishermen. Other assets such as skill, dedication and ability of running a commercial fishing operation are there but can only be distinguished and valuated if loan officers from the banks and fishery staff collaborate fully in the selection.

8 RECOMMENDATIONS

From the discussions in previous sections the following needs for support are identified for further consideration.

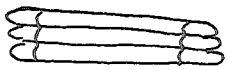
1. Physical Support.
   - 1.1 Low cost landing facilities (utilizing possibilities for beach landing) related to the topographical conditions.
   - 1.2 Sites and shore facilities at landing centres with essential public services (e.g. roads, water and electricity).
   - 1.3 Provision of facilities at major landing centres for improvement of dried fish processing.
   - 1.4 Feeder roads to traditional fishing centres.
   - 1.5 Supply of suitable outboard motors and light weight inboard marine diesel engines.
   - 1.6 Supply of suitable fishing gear materials.

2. Technical Support.
   - 2.1 Survey of coastal pelagic resources through exploratory fishing and stock assessment studies of pelagic and demersal species.
   - 2.2 Experimental and demonstrational fishing with the aim of diversifying fishing methods and operations towards greater utilization of lesser exploited food fish within range of small-scale operations.
   - 2.3 Gear development, including investigation of possible improvements and transfer of combination gillnets and other methods already in use.
   - 2.4 Craft development related to beach conditions in different regions, including improvements in sail arrangements and motorization.
   - 2.5 Improvement of the fresh fish and prawn handling by launching of pilot projects providing facilities and demonstrations.
   - 2.6 Strengthening of planning and coordination functions in the Directorate of Fisheries.
   - 2.7 Modification of credit and subsidy schemes in cooperation with commercial banks.

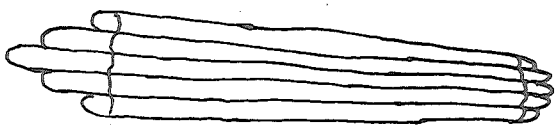
Appendix 3.1

TYPES OF CATAMARANS EAST COAST OF INDIA

① Basic Type.



PLAN.



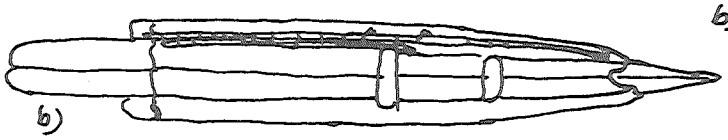
SIDE VIEW.

② Coromandel Coast Catamarans.

a)

PLAN

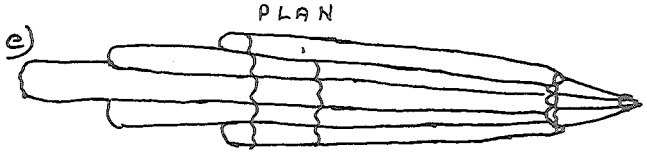
b)



SIDE VIEW.

c)

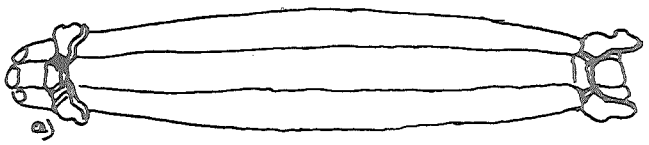
PLAN



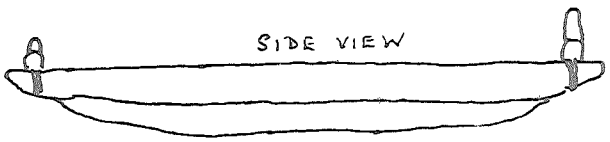
③ Cape Comorin Boat-Catamaran:

PLAN.

a)

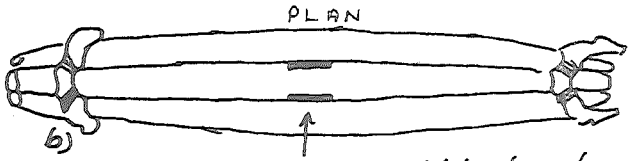


SIDE VIEW

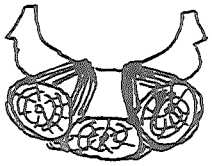


PLAN

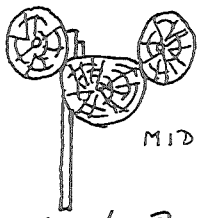
b)



- with drop keel

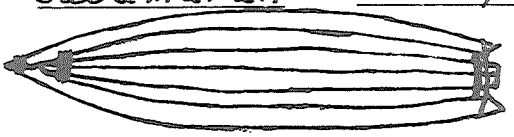


END-SECTION



MID-SECTION

④ Andhra Pradesh Boat-Catamaran - Visakhapetnam



PLAN

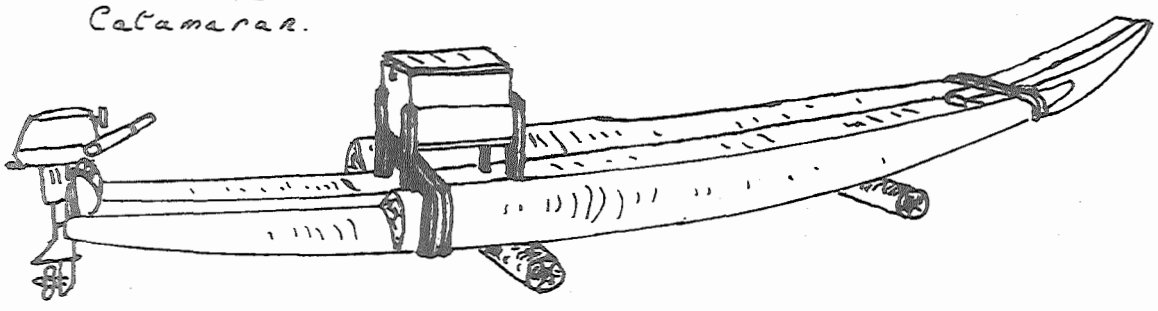
MID-SECTION.

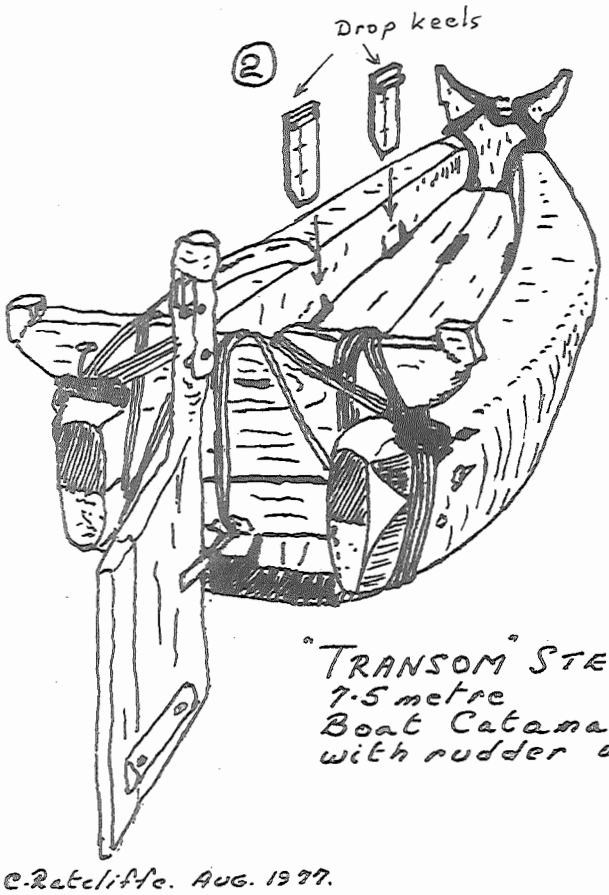
C. Ratcliffe Aug. 1977.

Appendix 3.2

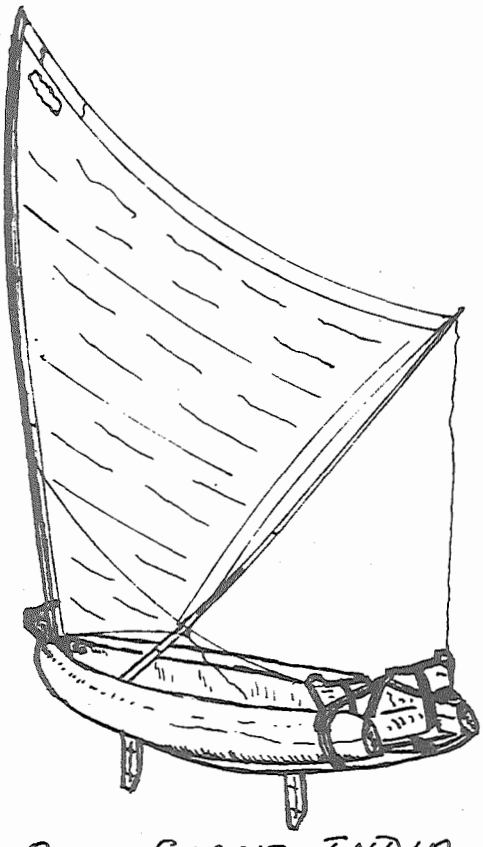
MODIFIED TRADITIONAL DESIGNS OF CATAMARAN

(1) Motorized - EAST COAST OF SRI LANKA.
6.5 metre
Catamaran.





(3)

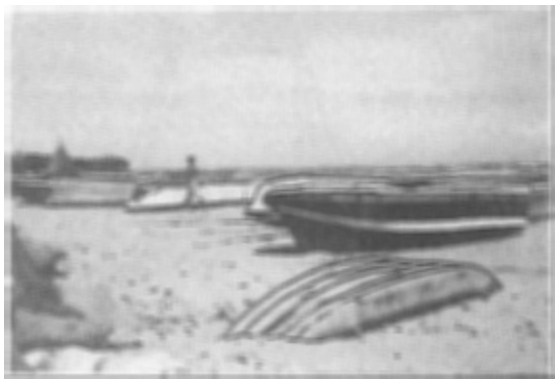


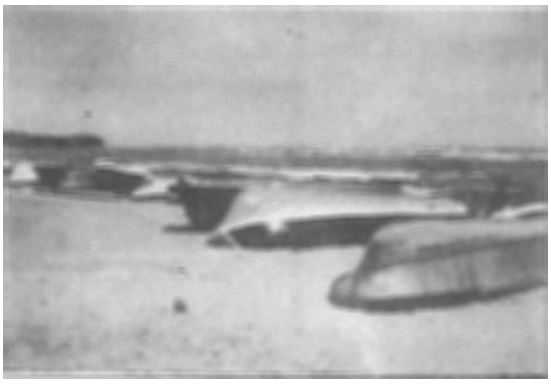
"TRANSOM" STERN. - PALK STRAIT - INDIA.
7.5 metre
Boat Catamarans
with rudder and drop keels.

C. Ratcliffe. AUG. 1977.

Appendix 3.3

BEACH LANDING CRAFT

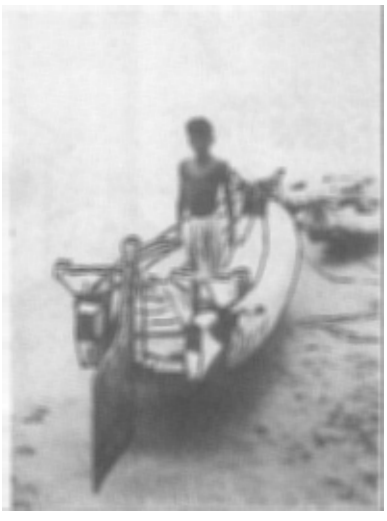




① SRI LANKA 5 metre - Fibre Glass Craft - Rps. 8,000

② TUTICORIN - 7-10 metre, "Vallams" - Rps. 5,000-10,000

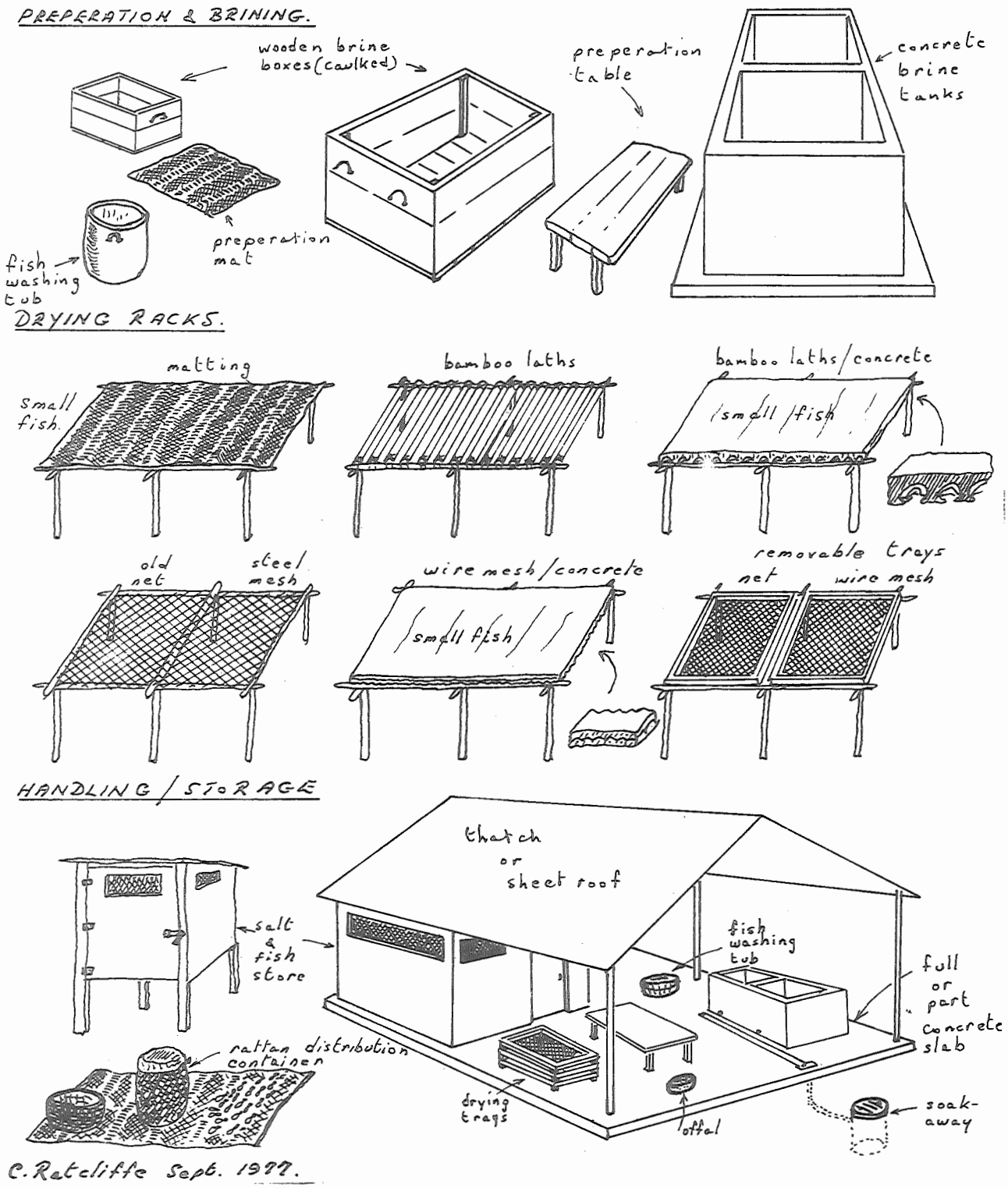
③ PALK STRAIT
7.5 metre
Boat Catamaran
Rps. 5000



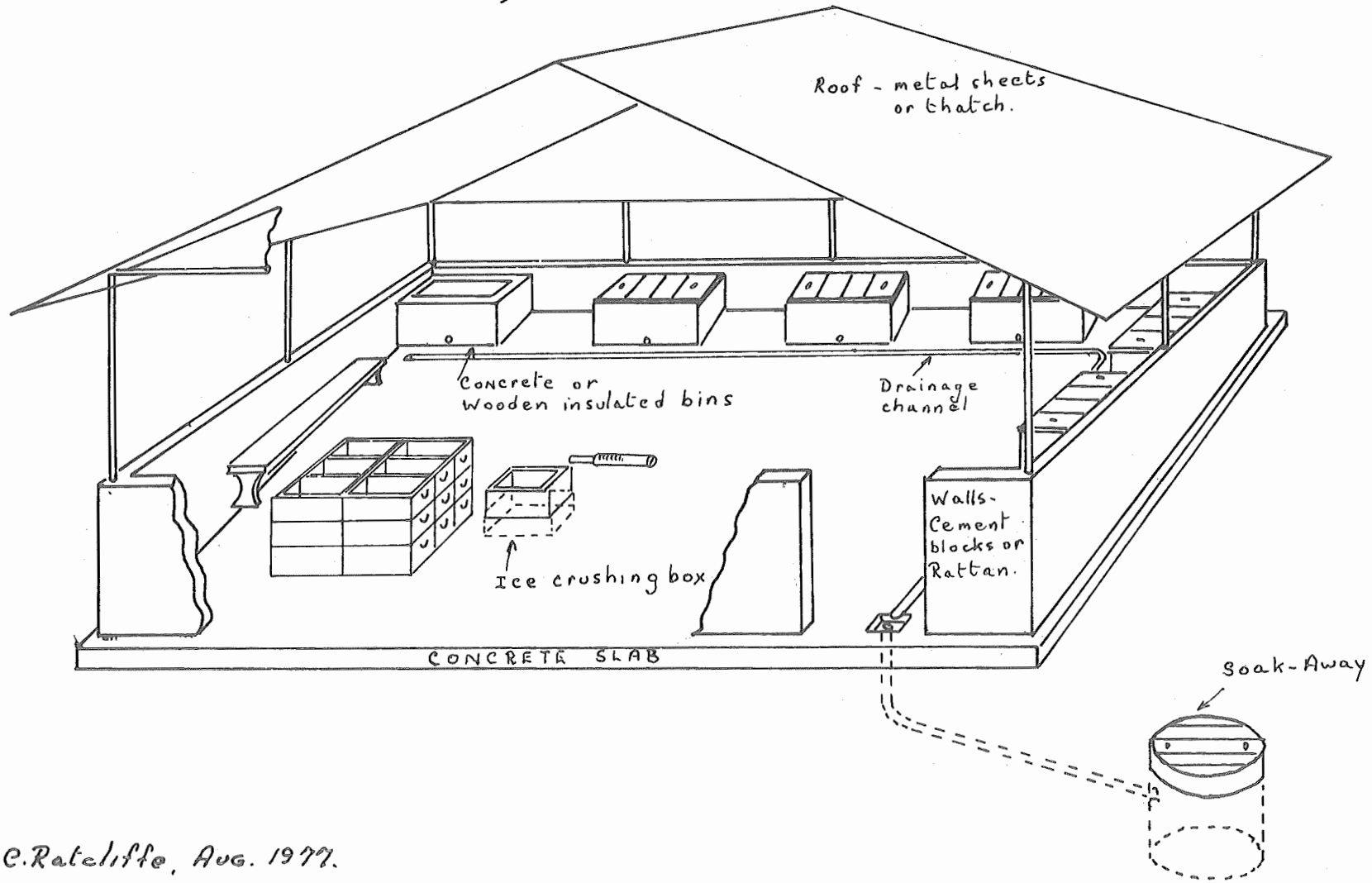
C. Ratcliffe Aug. 1977.

Appendix 4.1

IMPROVED FISH DRYING



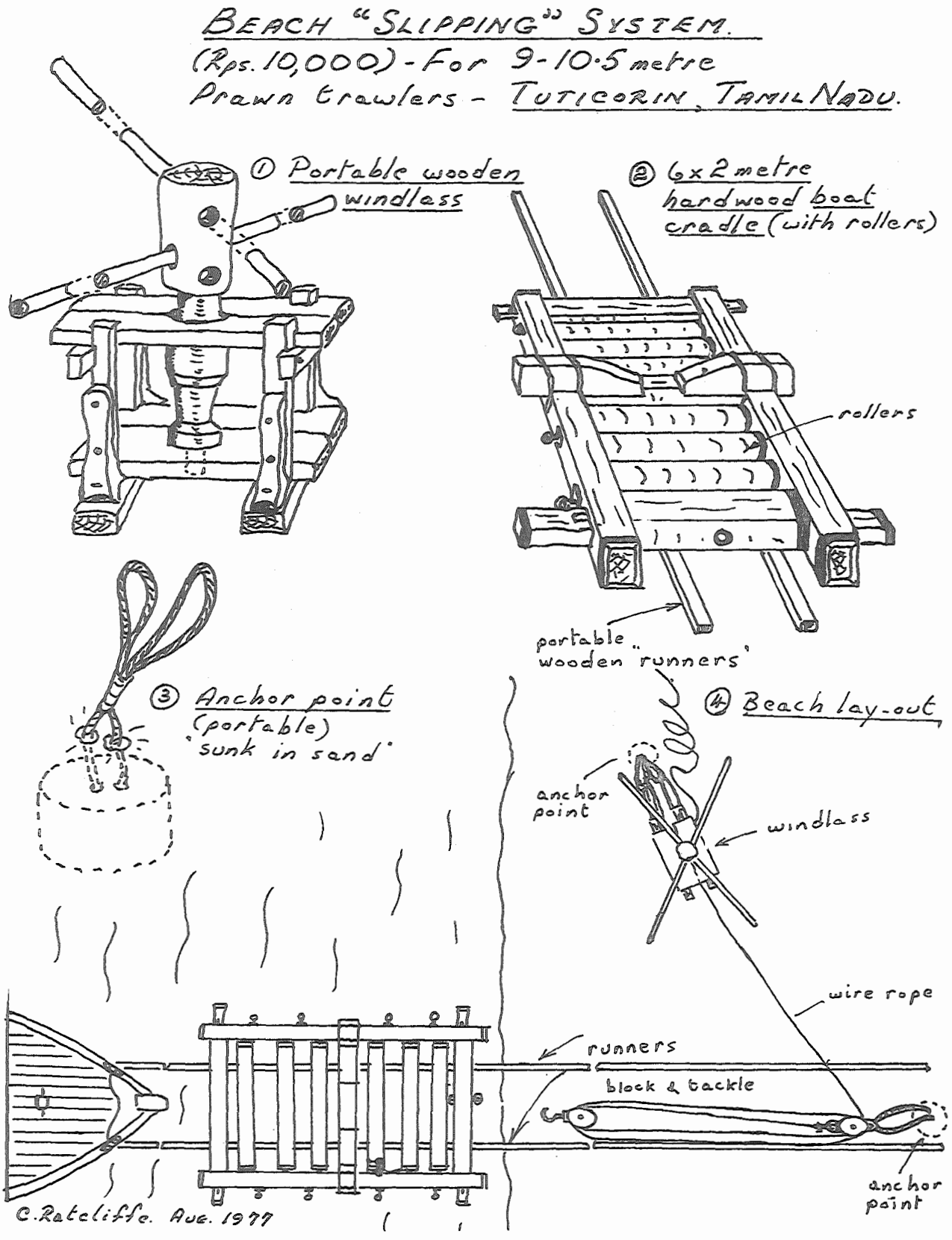
POSSIBLE LAY-OUT FOR IMPROVED LOW COST FISH/PRAWN HANDLING SHED. - "From design in use by private merchant at Rameswaram, Tamil Nadu. (Rs.4,000)"



C. Ratcliffe, Aug. 1977.

Appendix 4.2

Appendix 5.1


BEACH "SLIPPING" SYSTEM.
(Rps. 10,000) - For 9-10·5 metre
Prawn trawlers - TUTICORIN, TAMIL NADU.
① Portable wooden windlass
② 6x2 metre hardwood boat cradle (with rollers)
rollers
portable wooden 'runners'
③ Anchor point (portable) 'sunk in sand'
④ Beach lay-out
anchor point
windlass
wire rope
runners
block & tackle
anchor point
C. Ratcliffe. Aug. 1977

Appendix 5.2

PRAWN TRAWLERS HAULED UP ON BEACH FOR REPAIRS AT TUTICORIN.

C. Ratcliffe Aug. 1977

General Description of Marine Small-Scale Fisheries

SRI LANKA

Prepared in collaboration with

Ministry of Fisheries, Sri Lanka.

Development of Small-Scale Fisheries in Southwest Asia, Colombo, June 1977.

CONTENTS

		Page No.
1	Country Data	1
2	Introduction	3
3	Brief History	3
4	Fisheries Administration	5
5	Specialized Institutions	5
6	Corporations	7
7	Co-operatives	9
8	Fishery Resources	10
9	Production	11
10	Fishing Craft and Gear	12
11	Landing Centres	13
12	Handling and Processing	14
13	Marketing and Distribution	14
14	Import and Export	16
15	Ancillary Industries	16
16	Socio-economics	17
17	Government Policy	17
18	Development Plans	18
19	Bibliography	19

Appendices.

1.1	Map of Sri Lanka	21
3.1	Production of Marine Fisheries by Category of Effort, 1958 - 76	22
3.2	Marine Fish Production by Groups of Species, 1958 - 76	23
3.3	Production, Imports, Exports, 1958 - 76	24
4.1	Organization Chart: Ministry of Fisheries, Sri Lanka	25
9.1	Most common Marine Fish Species and Production by Group (1976)	26
9.2	Monthly Average Landings, 1972 - 76	27
11.1	Number of Villages, Boats, Fishermen and Annual Landings by Landing Areas (DFEO Divisions)	28
12.1	Ice-making and Cold Storage Facilities	29
18.1	Targets for Input and Output of Motorized Craft - Medium Term Development Programme, 1972 - 1977	30
18.2	Government support and concessions	31
18.3	Fisheries Projects in Sri Lanka Receiving External Support	32

1 COUNTRY DATA

1.1 Location

Sri Lanka is situated in the Indian Ocean south-east of India.
Latitudes 6°N - 10°N; Longitudes 80°E - 82°E
(Map in Appendix 1.1)

1.2 Size

Area	65,600 km^2
Coastline	1,200 km
Continental shelf (180 m depth)	30,000 km^2

1.3 Population

Total:	13.7 million
Urban	22.4%
Rural	77.6%
Density	209 per km^2
Growth rate	1.6%
Birth rate	2.44%
Mortality rate	0.84%
Life expectancy	66 years

1.4 Education

Literacy rate:	85%
Primary School Enrolment	89%

1.5 Health (1975)

Population per hospital bed	350
Population per physician	6,500

1.6 Nutrition (1975)

Calorie intake of requirement	97%
Per capita protein intake	45 gm/day

1.7 Employment

Table 1.1 Employment by categories

Category	Nos. in millions	% of labour force
Agriculture	2.24	56
Industries	0.44	11
Services	1.32	33
Total labour force	4	100

Rate of unemployment (1975) 19.8% (source: Economic Review, January 1977).

1.8 GNP (1976)

Total Rs.11,092.5 million (at 1963 constant prices)
Per capita Rs.815.4
Growth of GNP 3.8% (average 1972 - 1975)

1.9 Trade

Table 1.2 Exports (1976)

Item	Value million Rs	%
Tea	2,237	46.5
Rubber	893	18.5
Coconut products	508	10.6
Gems & Jewellery	264	5.4
Others	913	19.0
Total	4,815	100

Table 1.3 Imports (1976)

Item	Value million Rs	%
Food	1,539	32.8
Petroleum	1,196	25.5
Textiles, synthetic fibre and cotton	261	5.6
Fertilizer	78	1.7
Others	1,614	34.4
Total	4,688	100

Table 1.4 Trade balance (1972 - 1976)

(in million Rs)

	1972	1973	1974	1975	1976
Exports	2,009	2,617	3,471	3,933	4,815
Imports	2,064	2,715	4,534	5,318	4,688
Balance	- 55	- 98	-1,083	-1,385	+ 127

1.10 Prices

Table 1.5 General price index and annual change

	1972	1973	1974	1975	1976
General Price Index (1963 = 100)	138.7	152.0	170.8	182.0	184.5
Annual % charge		9.6	12.4	6.7	1.0

1.11 Administration

Sri Lanka is divided into 22 districts, of which 12 are coastal. Each district is headed by a Government Agent, who is a state officer. A Political Authority, who is an elected member of the National State Assembly is associated with the Government Agent for certain aspects of decision making. There is a District Coordinating Committee in each administration district under the chairmanship of the Government Agent, which co-ordinates all Government activities in the district.

2 INTRODUCTION

All fishing in Sri Lanka, with the exception of operations carried out by the Ceylon Fisheries Corporation and one private sector firm, is referred to as small-scale fishing activities.

The total marine landings in 1976 amounted to 121,400 tonne, of which 120,800 tonne were contributed by the small-scale sector. The value of the landings was Rs.502 million. The fishing industry contributes about 1.4% to Sri Lanka's economy.

The principal role of the fishing industry is as a provider of food; fish is the main source of animal protein in the diet. While a large portion of the supply has come from imported fish, the domestic production now amounts to about three-fourths of the total.

The small-scale fishery is also an important source of employment, fulfilling an useful social function in providing work in rural areas.

The 1972 Fishery census identified over 43,000 fishing households, comprising a quarter of a million persons of whom 58,000 were active fishermen (1.45% of the total labour force). In addition, the fishing industry creates employment in trade, distribution and ancillary industries, e.g. boat-building.

Exports of high value fish products like shrimp, lobster and Beche-de-Mer are becoming increasingly important, yielding US$ 10.3 million in 1976.

About 70% of the domestic production is consumed in fresh form. The balance is converted into cured products. Cured fish form the major part of the imports. Canning is negligible and freezing is employed mainly for the exportable varieties.

The coastal waters of Sri Lanka are far from being fully exploited and there are prospects for increased landings.

As a result of reduced imports due to the scarcity of foreign exchange and the inadequate level of local production, there is an unsatisfied demand for fish in the country.

The subject of fisheries comes within the purview of the Ministry of Fisheries, where its Secretariat is responsible for policy making, coordination, financial control, programming, planning and development.

The executing agencies of the Ministry are the Department of Fisheries, the Ceylon Fisheries Corporation and the Ceylon Fishery Harbours Corporation.

The Fisheries Department has a field organization for extension work, data collection and enforcement of the Fisheries Ordinance.

The Fisheries Corporation has several district and regional offices, while the Fisheries Harbours Corporation has outposted personnel at fishery harbours.

3 BRIEF HISTORY

Statistics of fair reliability in respect of the fisheries of Sri Lanka are available from 1952. The total production was then in the order of 25,000 tonne. The bulk of the catch was produced by the beach seine fishery and the indigenous craft fishery in about equal quantities. The other sectors, i.e. deep sea and inland fisheries, contributed only about 3% to the total production. More than half the production was consumed in dried form. The wet fish equivalent of imported dried fish was four times as high as the local production i.e. about 100,000 tonne.

During the following six years, 1952 - 58, the total production increased to about 40,000 tonne, but there was no significant change in the fisheries situation.

The only change worth noting was a somewhat lower portion of dried fish, i.e. less than 40% of the total.

This decrease was on the other hand, compensated by an increased import of dried fish amounting to a wet fish equivalent of 120,000 tonne.

The efforts to motorize the traditional fleet were intensified during this period. Experiments had been undertaken long before, as early as 1937, but it was in the 1950's that motorization was firmly established, with about 100 motorized boats by 1958.

The summary of the development of the fisheries during the period 1958 - 76, given below, is supplemented by the following appendices, giving further details: Appendix 3.1 (Production of Marine Fisheries by Category of Effort, 1959 - 76), Appendix 3.2 (Marine Fish Production by Groups of Species, 1958 - 76) and Appendix 3.3 (Production, Imports, Exports, 1958 - 76).

The second period, 1958 - 65, is characterized by (i) the motorization of small indigenous craft and the introduction of a small motorized fibre glass boat, (ii) the introduction of a 3½ ton plank built boat and (iii) the introduction of nylon netting. In this period, the production more than doubled and was 85,000 tonne in 1965.

About half the catch was produced by the non-motorized traditional craft; the relatively high share for this fishery was probably because of the nylon netting. The other half was equally divided between beach seining, motorized traditional craft, and new 3½ ton boats. (Inland fisheries produced about 8.5% of the total production).

The local production of dried fish was at about the same level as in 1952 and 1958 (4,500 tonne), and the import of dried fish was at the same high level as in 1958, i.e. 120,000 tonne (3 year average) wet fish equivalent. The remarkable production increase was thus absorbed by the fresh fish market.

A slowing down in the rate of motorization and issue of 3½ ton boats marks the end of this period; furthermore, the first 3½ ton boats issued in 1958/59 started to go out of service. Greater interest is shown in the development of deep sea fisheries at this time and the Ceylon Fisheries Corporation (CFC) is established.

The period from 1965 to the present (1976) has been one of much slower development rate and, with reservation for errors in the statistics*, the production increase is about 29,000 tonne.

The reasons are to be found in (i) a net decrease in operational 3½ ton boats because of an inadequate replacement programme (until 1972), (ii) shortage of fishing nets (import restrictions), (iii) shortage of spare parts for engines (import restrictions), (iv) failure of the deep sea fishery development (lack of capital and skills).

One third of the production now comes from the 3½ ton boats and the balance from indigenous craft and other small craft. The deep sea fishery still produces only a small fraction of the total (0.4%).

The production of dried fish remains at the same, now historical level.

The imports have been lower than in the previous period and, since 1972 (85,000 tonne), have been drastically reduced and now (1976) amount to about 15,000 tonne wet fish equivalent.

Development efforts are now being concentrated on replacement of 3½ tonners, continued motorization of traditional and other small craft and on upgrading of the coastal fisheries for more intensive exploitation of the pelagic resources abundant in the off-shore waters beyond 20 km (15 miles).

---

* A new statistical practice was introduced in 1970. The catch statistics of the 3½ ton boats were until 1968/69 based on an average catch, obtained by sampling, and with a correction factor multiplied by the number of boats registered. Due consideration was not given to the boats going out of service and a too high correction factor was applied, thereby inflating the catch figures. The errors were therefore probably building up gradually from 1958 to 1966 and were aggravated in the period 1966 - 1969 during which many of the first 3½ tonners went out of service.

4 FISHERIES ADMINISTRATION

Fisheries matters are dealt with by the Ministry of Fisheries since 1970. An organization chart is given in Appendix 4.1.

4.1 Secretariat:

The Secretariat of the Ministry is being reorganized and will in its new set-up include two new divisions for Programming/Planning and Development. The Fisheries Research Station and the Institute of Fish Technology will also be directly attached to the Ministry.

The Secretariat has a professional staff of 16 members.

The recurrent expenditures are (1976) Rs. .678 million and capital expenditures* are (1976) Rs 23,073 million.

4.2 Department of Fisheries:

The Department was set up in 1941 and performs the functions of administration of the Fisheries Ordinance, research, provision of welfare services, training and extension work, provision of credit facilities and development of inland fisheries. It also currently functions as the executive unit for implementation of development projects. (The training centres and institute and the research station will be dealt with separately below).

The Department, located in Colombo, is divided into sections dealing with legislation and licensing, research, socio-economics, cooperatives, credit, establishments, finance, civil engineering and marine engineering, plus 13 district fisheries extension offices located in each of the 12 coastal districts and in one special area (Negombo).

The staff cadre including the District Fisheries Extension Officers but exclusive of the staff of the research station, training institutes and the training centres, consists presently of 71 professional officers, 157 clerical staff and 457 other staff.

Budget (1976):

Recurrent expenditure (exclusive of research and training	...	Rs 7.844 million.
Capital expenditure (exclusive of research and training)	...	Rs26.142 million.

The major tasks presently executed by the Department are the mororization programme for the coastal fishery which includes provision of credit to the cooperatives for boats and gear, implementation of the Sri Lanka Fisheries Project (ADB) and implementation of a programme for the development of inland fisheries.

5 SPECIALIZED INSTITUTIONS

5.1 Research and Development Institutes

5.1.1 Fisheries Research Station

Until 1941, fisheries research was the responsibility of the Marine Biologist of the Colombo Museum. In 1941, with the establishment of the Fisheries Department, responsibility for research was vested in the Department. Research activities commenced only in the 1950's due to the interruption caused by the 2nd World War. Constructed in 1939, the Fisheries Research Station building is located at Galle Face, Colombo. It has provision for a library, and laboratories. The building was never exclusively used for research work as problems of accommodation made it necessary to use it also for housing the administrative offices of the Ministry and the Department of Fisheries.

---

* Contributions to capital of CFC and CFHC.

The purpose for which the Research Station was set up was to deal with all types of research - both pure and applied; biological studies covering the bionomics and ecology of marine, brackish water, and fresh water fishes and other commercially important products; hydrographical, hydrological and biometrical studies; problems of fish processing and preservation; utilization of marine produce; fishing boats, fishing gear and appliances.

The staff cadre consists of forty two professional officers and sixty seven technicians and other staff. Eighteen posts of professional officers are currently vacant.

Budget (1976)

Recurrent expenditure .... Rs. 1.153 million.

Capital expenditure .... Rs. 3.356 million.

Foreign support currently consists of a FAO/UNDP fishery development project which is carrying out a resources survey of the coastal and off-shore waters.

Current activities consist of population studies of commercially important fish species, annual survey of pearl oyster beds, algae and sea-weed survey, monitoring of the coastal fishery, eradication of Crown of Thorns star fish from the east coast reef, routine analysis of frozen marine products for quality and inspection of processing establishments, chemical analysis of fresh fish and cured fish, quality control tests and checks of fishery by-products.

A continuing programme of comprehensive biological studies relating to the coastal fishery and various items of chemical work has been well established. It is planned to expand the scope of research to include, inter alia, hydrographical and hydrological studies, stock assessment in coastal and off-shore waters and fishing boat and fishing gear technology. The present Fisheries Research Station will form the nucleus of a Central Fisheries Research Institute. The buildings of the new institute, which is expected to be operational in 1977, are under construction at Crow Island, Colombo North.

The main problems of the Fisheries Research Station have been inadequate cadre of professional staff in earlier years and more recently lack of suitably qualified candidates for recruitment as research officers, inadequacy of space for setting up laboratories, museum and a research aquarium and the non-availability of a research vessel for carrying out continuing resources surveys of coastal and off-shore waters.

5.1.2 Institute of Fish Technology

The Institute is in the final phase of being completed. The purpose in general terms is to assist in (i) reducing spoilage of fish, (ii) finding uses for under utilized or non-utilized species, and (iii) furthering knowledge on improved handling, preservation, processing and marketing of fish.

The Institute is located at Crow Island, Colombo North, and consists of modern facilities for experimental processing and analysis of fish and fishery products.

In the initial phase, the staff will be composed of 6 professional officers and about 16 clerks, mechanics and assistants.

The estimated costs are	local (Rs.)	foreign ($)
Establishment	4.5 million	0.55 million
Recurrent expenditures	0.9 million	—

The foreign component of the establishment costs consists of equipment ($300,000), expert services (50 man-months), mainly in fish technology and marketing ($175,000), fellowships ($35,000), and miscellaneous ($45,000). This is provided under a FAO/SIDA (Sweden) project of two years duration.

Work programme for the nearest future has not yet been completed. Discussions have been held between the Government, SIDA and FAO, regarding expansion of the centre and its activities into a regional institute for the Bay of Bengal area or Southwest Asia.

5.2 Training Institutes

5.2.1 Sri Lanka Fisheries Training Institute

The Institute is newly established and started its regular training activities in 1975.

Training is given to fishing skippers and ship's engineers for off-shore and deep sea fishing vessels up to 500 tons and for technical staff of the public and private sectors of the fishing industry. The regular courses have a duration of two years. 40 students were enrolled in 1976.

The Institute is located at Crow Island, Colombo North. The facilities include lecture rooms, demonstration rooms with engines and other machinery, fish finding and navigation equipment, fishing gear, etc., hostel for 65 students, transport vehicles and a 75 GT, 400 hp training vessel for 15 trainees.

The permanent staff of the Institute consists of 16 lecturers.

The estimated costs are	Local (Rs.)	Foreign ($)
Establishment	5.5 million	1.1 million
Recurrent expenditures (1976)	.760 million	—
Capital expenditures (1976)	0.781 million	—

The foreign assistance consists of the training vessel ($500,000), equipment ($550,000), expert advisers and fellowships for training of staff for the Institute.

In drawing up the curriculum, particular emphasis has been given to the skipjack fishery in view of the good prospects for establishment of such a fishery in Sri Lanka. There are plans to gradually increase the number of students from 40 to about 65 by 1981. There are also plans for a one year post-graduate course from 1977.

5.2.2 Fisheries Training Centres

A fisheries training centre was established with Japanese assistance at Negombo in 1962. Two others were started at Tangalle and Jaffna in 1973 and the fourth centre was established at Batticaloa in 1974.

The purpose is to train fishermen and mechanics for the coastal fisheries. The yearly output per centre is 30 fishermen in two 6 months courses and 10 mechanics in a 12 months course. In addition, the centres are conducting field training courses of shorter duration.

The centres are equipped with engines and fishing equipment for demonstration purposes. Twelve training vessels of the 3½ tonne type are attached to the centres.

The staff of the centres consist of 36 instructors and 52 other staff. The estimated establishment costs for a centre (Batticaloa 1974) is Rs. .803 million. The yearly recurrent expenditure (1976) for all four centres is Rs. .849 million and the capital expenditure is Rs. .455 million.

6 CORPORATIONS

6.1 Ceylon Fisheries Corporation (CFC).

CFC was established in 1964 under the State Industrial Corporations Act to assume the commercial activities carried out at that time by the Department of Fisheries and the Ceylon Cooperative Fish Sales Union Limited.

The fundamental tasks of CFC are to catch, purchase and sell fish. The original objectives also imply fish processing, construction and operation of fishery harbours and associated shore facilities, transportation and sale of fishing gear, construction, repair and maintenance of fishing boats and general fisheries promotion. These functions are still carried out except for the harbour function which has

been transferred to the Ceylon Fishery Harbours Corporation.

The operational centre for CFC is the Mutwal fishery harbour where the larger fishing vessels land their catch. The associated shore facilities are a 600 tonne cold storage plant with a freezing capacity of 18 tonne/day, 11 tonne block ice plant, 18 tonne flake ice plant, 45 tonne ice store, two small plants for manufacture of fish meal and extraction of shark liver oil and a repair workshop for the CFC fishing vessels. The fishing fleet of CFC consists of (1976) 5 stern trawlers (236 GT); 2 tuna long liners (317 GT) and 12 other steel vessels (11 tonners).

Shore facilities outside the Mutwal harbour consist of a 125 tonne cold storage plant with 8 tonne/day freezing, 8½ tonne flake ice plant, three 5 tonne block ice plants and four 2 tonne flake ice plants at fish landing centres; two cold storage plants (10 tonne and 5 tonne), 10 tonne block ice plant and ½ tonne flake ice plant sited in three urban consuming centres.

CFC operates 60 fish purchasing centres, two wholesale markets at Colombo and Kandy, eight retail stalls in various parts of Colombo and seven retail sales points in the outstations.

CFC has a fleet of 95 transport vehicles of which 25 vehicles, including 7 refrigerated trucks, are used for transport of fish.

A boatyard situated at Mattakuliya, Colombo North, constructs 3½ ton boats in timber and fibre glass.

A fish cannery with a capacity of 3 tonne/day is operated at Pesalai.

A monopoly for import of fishing gear is held by CFC. Fishing gear is sold to fishermen through sales points operated by CFC and through sub-agencies granted to cooperatives.

CFC has a five member Board of Directors. One of the directors functions as full-time Chairman. The executive staff is headed by a General Manager who is directly responsible to the Board of Directors. The staff is composed of 77 professional officers and 2093 other staff.

Budget (1975)

Recurrent Expenditure	....	Rs. 40.454 million
Revenue	....	Rs. 33.243 million
Deficit	....	Rs. 7.210 million.

52% of the revenue is derived from fish sales and 31% from the import and sales of fishing gear.

The CFC fishing fleet is responsible for less than 1% of the total marine production. About 3.5% of the total marine production is marketed through CFC. It is intensifying its effort to compete with the private fish traders with the objective of reducing margins to the benefit of both fishermen and consumers. Fish collection centres and associated transport facilities are being established at several places along the coast. The imposition of a measure of control over the supply of ice to fish traders is planned.

A too wide variety of activities, the majority of which moreover are not profitable, recurring deficits and inadequacy of working capital, dependence on Government capital contributions, over-staffing in respect of some activities, uneconomic fishing operations, shortage of spare parts for equipment and fishing vessels and an inadequate share of the market for fish are the fundamental problems facing CFC.

6.2 Ceylon Fishery Harbour Corporation (CFHC).

CFHC was established in 1972 under the State Industrial Corporations Act to take over part of the activities of CFC. The tasks assigned to CFHC are the establishment, construction, maintenance, operation and management of fishery harbours, anchorages and shore facilities and the provision of repair and maintenance facilities for fishing craft.

CFHC is responsible for six fishery harbours, viz: Galle, Trincomalee, Beruwala, Tangalle, Mirissa and Myliddy. Of these, Galle and Trincomalee have been completed while the others are in varying stages of construction. An initial capital contribution of Rs.16 million was provided by the Government. This contribution is being supplemented by further annual capital contributions.

CFHC has a five-member Board of Directors. One of the directors functions as full-time Chairman.

The executive staff is headed by a General Manager who is directly responsible to the Board of Directors. The staff is composed of 54 professional officers and 480 other staff.

Budget (1975)

Recurrent Expenditure	....	Rs. 7.6 million
Revenue	....	Rs. 1.7 million
Deficit	....	Rs. 5.9 million

The main activities in which CFHC is currently (1976) engaged are operation of the Galle and Trincomalee Fishery Harbours, construction of maritime structures and shore facilities at five fishery harbours and anchorages, construction of fishing boat repair workshops at six fishing centres and construction of buildings for the ice plant and holding rooms at three of five fish landing centres where these facilities are to be provided.

The main problem of CFHC is the commitment to heavy recurrent maintenance expenditure on the harbours and shore facilities without an adequate return in the form of harbour dues, cold storage charges, workshop revenue etc.

While a heavy investment has been made in the construction of harbours and shore facilities to service and accommodate a fleet of larger fishing vessels, no such vessels have been introduced into the country's fisheries. It has also not been possible to attract foreign fishing vessels to use these facilities. Curtailment of the originally planned scope and size of the harbours not yet completed and greater concentration on the provision of facilities for coastal and off-shore fishing vessels is planned.

7 CO-OPERATIVES

The first fishery cooperatives were organized in 1941 as a result of the recommendation of a commission appointed by the Government in 1938 to inquire into the fishing industry. A decision to channel loans, given to fishermen as part of the fish marketing schems operated by the Department of Fisheries between 1942 - 1948, as far as possible through cooperatives gave an impetus to their formation.

The role of fishery cooperatives was reviewed in 1970 and was re-defined as being the organization of fishermen for improvement of the efficiency of the small-scale sector of the industry in the catching, handling and marketing of fish. Between 1970 and 1973 under a scheme of re-organization, 292 small primary societies were amalgamated into 45 large primaries. There is a regional union - the Northern Province Fishermen's Cooperative Societies Union (NPFCSU) and an apex organization - the Ceylon Cooperative Fish Sales Union (CCFSU).

Each primary society has a nine-member Board of Directors consisting of 6 members nominated by the Commissioner of Cooperative Development and 3 members elected by its branches. The chief executive is a General Manager appointed by and responsible to the Board. The activities of each society are subject to by-laws and working rules adopted by the society. The staff of the cooperatives consist of 45 professional officers and 540 other staff.

3½ ton boats for coastal fishing are issued by the Department of Fisheries on hire purchase exclusively to fishery cooperatives. 983 boats were issued to Fisheries Cooperative Societies during the period 1970 to 1976. They also enjoy a monopoly of the export of chanks and beche-de-mer.

The main source of finance is the Government which channels credit to cooperatives through the Department of Fisheries for purchase of boats, outboard motors, fishing gear, repairs, construction and purchase of indigenous craft and marketing. Credits are also given by the People's Bank for fishing gear and engine spare parts. Interest free marketing advances are available to cooperatives from CFC.

Table 7.1 Loans granted to Fisheries Cooperative Societies 1970 - 1976. (Million Rs)

	Total amount granted	Repayment due	Amount actually paid	Arrears
1. Total value of boats & equipment (including issues prior to 1970)	20.4	10.3	2.0	8.3
2. Total cash loans for additional gear	2.3	1.8	0.3	1.5
3. Two-year repayment loans to meet costs of hulls and gear	7.9	5.7	1.9	3.8
4. Total	30.6	17.8	4.2	13.6

The present (1976) membership of cooperatives is 15,270 or about 25% of the total number of fishermen.

The cooperatives have succeeded in achieving a substantial membership, particularly since 1970, and ownership of about 32% of the 3½ ton boats. The establishment of large primaries, however, appears to have led to a certain loss of identity between the fishermen and their cooperatives and some degree of alienation between the members and the Board of Directors with their majority of nominated members. There is considerable inefficiency in the production activities, in maintenance and utilization of boats and repayment of loans are far below anticipated levels. There is also a marked tendency to employ staff in excess of actual needs. Consequently most of the primary societies are operating at great losses.

Improvement of management, greater concentration on service activities such as marketing, supply of fishing gear, spare parts and fuel, operation of small ice plants and repair workshops and the devolution of ownership of boats to the members in place of collective ownership are planned.

8 FISHERY RESOURCES

Seasonal climatic variations in Sri Lanka are determined by the two monsoons which influence the fisheries. The West coast has stormy winds and high rainfall during the Southwest monsoon from May to September. The East coast has similar conditions during the Northeast monsoon from November to February. There are no other seasonal water movements creating upwelling zones.

The tidal amplitude is low causing a low rate of exchange of water between the rivers/lagoons and the sea. The coastal zone is, therefore, poorly enriched and the bio-mass is generally low.

The continental shelf is narrow being on the average about 25 km. Accessible trawling grounds of significance are located in the northwest (Palk Bay and Gulf of Mannar), and in the northeast (Pedro bank). The total area suitable for trawling within the country's economic zone is about 5000 km^2.

Information about the abundance of pelagic and demersal fish is scanty and no proper assessment of the resources is available. Estimates based on extrapolation of catch statistics and assumptions of equal productions per square mile vary from about 270,000 tonne/year for the 5 mile (8 km) coastal belt to 850,000 tonne/year for the 20 mile (32 km) belt extending a little beyond the continental shelf.

The commercial coastal fishery, surveys and exploratory fishing activities indicate that the "shore" resources i.e. those within two miles (3 km) from the coast are nearly fully exploited by beach seining, drift netting and line fishing from traditional craft. The coastal zone up to 30 km (20 miles) is considered to be moderately exploited by drift-netting mechanized boats. The outer zone beyond 30 km (20 miles) is only lightly exploited.

Development prospects include :-

(i) increased sardine and mackeral fisheries in the inshore waters by gillnetting and purse seining,

(ii) increased fishing for skipjack, tuna, frigate mackeral, seer, etc., by driftnetting and pole and line fishing in the outer zone,

(iii) long lining in the outer zone for shark and tuna,

(iv) bottom long lining and bottom-set gillnetting for groupers, snappers, sharks, skates etc., - particularly along the north and east coasts.

9 PRODUCTION

The fish production in 1976 was as follows :-

Table 9.1

		Tonne	%
Coastal fisheries		120,849	90.4
small craft	76,078		
3½ ton boats	44,771		
Deep sea fisheries		539	0.4
Marine fisheries total		121,388	90.8
Inland fisheries		12,343	9.2
Total		133,731	100

For statistical purposes the catch is broken down into seven groups of species, namely Seer, Paraw, Blood fish, Sharks and Skates, Rock fish, Shore seine and Others. The species contained in these groups are given in appendix 9.1, with their names in English and local languages. The Shore seine varieties yielding 48,785 tonne, i.e. 40% of the total catch. In order of quantity then follows the Blood fish (20%), Sharks and Skates (13%), Rock fish (11%), Others (7%), Paraw (6%) and Seer (4%). The species caught by the trawlers are mainly Rock Fish, Skate and Trevally.

The total monthly landings vary between 7,000 and 9,500 tonne. Along the south and west coasts there is a slight drop in production during the Southwest monsoon. The same period is the peak season on the north and west coasts. (See appendix 9.2).

10 FISHING CRAFT AND GEAR

The following catching units were employed in fishing 1977[1)]

Table 10.1

Type	Motorized	Non-motorized
1. Gear without craft		8075
2. Indigenous craft	2780	14,456
2.1 Planked	1300	
2.2 Outriggers	6688	
2.3 Dugouts	864	
2.4 Log-rafts	4047	
2.5 Beach seine craft ...	1557	
3. 17-18 feet FRP boats	2501	—
4. 3½ ton boats	2408	—
5. 11 ton boats	12	—
6. Long liners (317 GT)	2	—
7. Trawlers (236 GT)	5	—

The most important gear is the gillnet. Second in order of importance is the beach seine of which there are some 1500 units. Cast-nets are used particularly in the lagoons. There are about 5,000 cast-nets used without craft and about 2,000 operated from small craft. Other off gear types are hand-lines (about 2,000), pole and line (about 500 units) and set nets, traps etc. (about 2,500).

The principal types of fishing craft in the small-scale sector are as follows :-

Indigenous craft.

(i) Planked beach-seine craft (Padahu, Pathai, Paru). These are beamy planked flat-bottomed boats with a length overall of up to 12 m. The craft are used for carrying beach-seines out to sea for a distance of half to one mile for setting the net.

(ii) Other planked craft (Vallam). These are narrow V-shaped sailing craft constructed with keel and frames with an overall length upto about 10m. They are used for drift-netting, long-lining and set net fishing.

(iii) Dugout beach-seine craft (Madel oru, Karavalai Vallam). These are similar to the outriggers described below (iv) except that they are propelled by oars and in the case of the Karavalai Vallam may have an overall length of upto 12m.

(iv) Outriggers (Oru, Kulla, Thony). These are dugouts and are driven by oars and/or sail. The craft have narrow dugout hulls raised with side strakes attached to the dugout bases, with sharply raised hull ends and an outrigger consisting of a solid counterpoise float attached to a pair of reinforced curved booms. In some parts of the east coast the raised side strakes are not attached to the hulls. The size ranges from about 3m used for bait fishing, cast-netting or angling close inshore or in lagoons, to the larger 10-11m craft used for prawn fishing with drag net, trolling, hand-lining and drift net fishing upto 20 miles from the coast.

---

1) Source: District Fisheries Implementation Plans, 1977.

(v) Dugout without outrigger or raised side strakes (Vallam). These are propelled by oar or sail and range from 3 to 6m. This type of vallam is generally used close inshore or in lagoons for cast-netting as well as for the operation of small-mesh drift nets.

(vi) Log-raft. These are made of four or five roughly shaped logs pegged and/or tied together. They are mainly used for small-mesh gillnetting. In some areas (west coast) a bag-like drag net is dragged by two log rafts for catching of prawns. In the Kattumaram (4 - 7m) the two middle logs jut out beyond the outer logs fore and aft. A small roughly shaped prow made of two logs is attached to the fore end of the middle logs.

In the Theppam (3 - 5m) all logs are of almost equal size with a slight shaping fore and aft. About 30% of the log rafts have been successfully motorized with outboards.

Introduced craft.

(i) FRP boats (17 - 19 ft.). These are undecked, open boats made of glass fibre reinforced plastic. They are used for gillnetting by small mesh nets. Most of the boats have planing hulls adapted from a speed boat design, while a smaller number have a displacement type hull based on a Norwegian life-boat design. They are propelled by petrol or kerosene outboard engines (6 - 15 hp).

(ii) 3½ ton boats. (E 26) These boats have a length of about 8m and a beam of about 2.5m. Most of them are constructed in wood but an adapted version of the E 26 is now built in GRP in large numbers. They are powered by inboard marine diesel engines of about 30 hp. The boat is mainly used for large mesh gillnetting, but in some areas also for long-lining and pole and line fishing.

The "Jaffna type" is a 32 footer which is an adaption of the planked Vallam.

11 LANDING CENTRES

There are about 900 fishing villages in Sri Lanka, each comprising one or more landing centres. Most of these centres are located at unprotected sand beaches and are not operational during the monsoons and completely lack facilities. About 70% of all marine fish produced is landed on the beaches and the fishing craft are generally beached or kept at anchor outside the landing centres.

Fishery harbours for small craft providing protection and shore facilities are available at Beruwala, Mirissa, Tangalle and Ambalangoda and are being constructed at Wennappuwa and Myliddy. Similar facilities are also available in lagoons, e.g. Negombo and Jaffna.

The shore facilities at Beruwala consist of a 200 tonne cold storage plant with 10 tonne/day freezing, 25 tonne holding room for wet fish on ice, 10 tonne flake ice plant, 50 tonne ice store and a repair workshop and fuel supply for coastal fishing boats.

A 5 tonne holding room for wet fish on ice and a 10 tonne ice store are provided at Mirissa.

The shore facilities available at Tangalle are a 50 tonne holding room for wet fish on ice, 10 tonne block ice plant, 20 tonne ice store and a repair workshop for coastal fishing boats. A 2,000 gallon tank for fuel supply is being installed.

The shore facilities available at Negombo consist of auction sheds and a 5 tonne ice plant. A 5 tonne ice plant is available at Jaffna.

Larger harbours for deep sea fishing vessels are available in Colombo (Mutwal), Galle and Trincomalee.

The major landing areas are Jaffna, Negombo, Puttalam and Mannar. In each of these areas the annual landings exceed 10,000 tonne. In appendix 11.1 the number of villages, number of fishermen, number of boats and annual production are given by marine landing areas (DFEO* Divisions).

12 HANDLING AND PROCESSING

The catch is not iced on board, neither in the traditional nor the introduced craft, both of which make one day fishing trips. Ice is also not used for the fish consumed in the vicinity of the landing centres. Fish meant for transportation over longer distances is packed with ice in wooden boxes.

Ice is made in 30 ice-making plants operated by the private sector and in 14 operated by CFC and CFHC. Except for two plants in Colombo producing 40 tonne/day and 64 tonne/day, the other private sector plants are small (2 - 10 tonne/day). 23 of these plants are located in fish-producing areas and the others in Colombo. Their total capacity is 243.5 tonne/day. Except for the plants at Mutwal and Galle fishery harbours which produce 28 tonne/day and 50 tonne/day respectively, the Corporation plants are also small ($\frac{1}{2}$ - 10 tonne/day). Their total capacity is 130 tonne/day. 10 of these plants are located in fish-producing areas.

Freezing and cold storage facilities are used by exporters (for shrimp, lobster, squid); by CFC to maintain buffer stocks for contractual sales, and for the production of packeted fish; by private traders and CFC at times of glut. These facilities are available at Colombo, Trincomalee, Galle and Batticaloa. In addition, two small cold storages are available at Anuradhapura and Kandy.

Location and capacities of ice-making and cold storage facilities are shown in appendix 12.1.

About 90% of the domestic production of marine fish is consumed in the fresh form. The other 10% is converted into cured products. Processing consist mainly of salt-drying which is carried out without any special facilities (beaches and backyards) under poor hygienic conditions.

The fish used for drying are mainly the small species in the "shore seine" group (70%). Most of the dried fish is produced in the districts of Mannar (34%) and Jaffna (33%) and the rest (33%) in Puttalam and in the east coast districts.

There is one cannery operated by CFC which is located near Mannar. The product consists mainly of Flying fish, Tuna and Sardines. The capacity of the plant is 3 tonne/day. Only a fraction of the theoretical capacity is utilized because of the irregularity of supplies. The 1975 production was about 200,000 cans of 15 oz. and 7 oz.

Small beche-de-mer factories at village industry level have been established in the northern districts. About 120 tonne of processed beche-de-mer was produced in 1975.

Freezing on a commercial scale for export is carried out by private companies (shrimp and lobster) in Colombo, by CFC on-board their tuna long-liners and in their shore plants at Colombo, Trincomalee and Batticaloa, by CFHC at Galle and by the Cey-Nor Development Foundation at Karainagar.

13 MARKETING AND DISTRIBUTION

The total supply of fish, including imports is 157,528 tonne, giving a per capita consumption of 10.86 kg (1976). There has been a considerable decline in per capita consumption since 1972 as shown in table 13.1. The decline is due to import restrictions resulting from the scarcity of foreign exchange.

---

* DFEO - District Fisheries Extension Officer.

Table 13.1 Per capita consumption of fish in Sri Lanka, 1958 - 76.

Year	1958	1965	1972	1973	1974	1975	1976
Kg/year	15.66	14.91	14.51	11.08	10.91	11.76	10.86

An indication of the unsatisfied demand for fish is the sharp price increase for fish in 1976.

Table 13.2 Fish prices 1972 - 76 - (Average price paid to the producers).

Year	1972	1973	1974	1975	1976
Rs/kg	1,97	2,28	3,12	3,39	4,14
Price index	100	116	158	172	210

In Colombo, preference among consumers in the upper income brackets is for Seer, Paraw and Blood fish. Consumers in the lower income brackets buy Rock fish and Shore seine varieties. Consumers in the areas south of Colombo, particularly in the Galle, Matara and Hambantota districts show a marked preference for Blood fish. A consumer demand for Shark is a recent development in the south. Blood fish is not preferred in the areas north of Colombo. In these areas, as well as in the east coast districts, Shore seine varieties and Rock fish are preferred. Consumer preference in the Mannar and Jaffna districts is for Rock fish and Shark.

Marketing at producing centres takes different forms depending on the location of the centre. In sparsely populated areas or migrant fishing centres the producer supplies his fish at pre-arranged prices to a trader who operates a purchasing centre at the beach. The producer is generally committed to a particular trader through a marketing advance and other facilities such as transport, rations and temporary housing provided by the trader. In densely populated areas, the producer is more independent and negotiates a sale each day with one of several competing small-scale traders who congregate at landing points, or, in some instances, passes his fish through an auction conducted on the beach or in a 'lellama' (auction shed). CFC operates about 60 purchasing centres mainly at fishing centres of the former type, where fish is purchased at fixed prices determined from time to time. Fish landed by boats belonging to Cooperatives is sold to traders or to CFC. In a few instances, the fish is consigned by Cooperatives direct to the Colombo market or sold in their own retail stalls.

Most of the fish reaching Colombo is consigned to 'commission agents' at the St. John's wholesale market. The throughput at this market is probably of the order of 35,000 - 50,000 tonne per year. A small quantity (1,041 tonne for 7 months in 1975) is consigned to the other wholesale market operated by CFC since June 1975. In both markets some retail sales are made direct to consumers, but most of the fish passes to retail traders.

Fish reaching places other than Colombo is generally consigned direct to retail points. Some of the fish passes from the retail points to hawkers.

In Colombo and smaller towns, there are retail fish stalls in the public markets controlled by local authorities. Most of these retail stalls are in the hands of private traders. CFC operates 8 retail stalls in Colombo, and 7 in other towns. Retail sales to consumers are also made by hawkers who take fish from house to house in baskets, 'pingos' and cycles. In rural areas and in some towns retail sales are also made from wayside stalls.

The mark-up between producers' prices and retail prices in different parts of the country varies with area and species, but indicative average figures (1975) show a range between 31% and 54%. The range of the indicative average mark-up for different species between producers' prices and St. John's market wholesale prices is between 45% and 67%.

14 IMPORT AND EXPORT

14.1 Fish

Traditionally, Sri Lanka is a large importer of dried fish from Pakistan, the Middle East and the Maldives. The acute shortage of foreign exchange during recent years has prompted the Government to drastically reduce imports. In 1976 imports stood at 7,499 tonne of which the wet fish equivalent is 15,716 tonne. The CIF value was about Rs.29 million.

The export quantities are small (1,909 tonne in 1976) but consist of high value products like shrimps, lobster and Beche-de-mer at a value of US $10.3 million. The export has developed rapidly in recent years.

14.2 Equipment

The largest imports of equipment consist of marine engines - inboards and outboards. Imports in 1975 were 500 inboards (33 hp) and 450 outboards (6 - 8 hp). The CIF value was Rs. 9.8 million. The main source of imports is Japan.

Fishing gear is imported mainly from Japan and Korea. The CIF value of imports in 1975 was Rs. 2.8 million.

Boat building materials - fibreglass mat and resins - are imported for the local construction of FRP boats. The CIF value of imports, mainly from UK, Japan and Federal Republic of Germany, stood at about Rs. 2.3 million in 1975.

Spare parts for marine engines were imported in 1975 from Japan, U.K., U.S., and Denmark. The CIF value of imports was Rs. 1.1 million.

15 ANCILLARY INDUSTRIES

Construction of fishing boats as an industry commenced in 1958 with the establishment of boatyards for construction of plank built 3½ ton boats. Indigenous craft are traditionally constructed on site or in backyards by itinerant carpenters.

There are 32 boatyards registered with the Department of Fisheries. Most of these are located in Negombo (16), Colombo (4) and Moratuwa (3). The other boatyards are scattered in Jaffna, Galle, Matara, Puttalam and Vavuniya districts. Most of the yards construct timber boats. One yard constructs a mix of FRP and ferro-cement boats and another a mix of timber and FRP boats. Two yards construct exclusively in FRP.

Total construction capacity is estimated to be about 370 3½ tonners (250 timber and 120 FRP), and about 350 FRP 17-18 footers, per year. Individual capacities range from 3 to 60 3½ tonners per year. The boats constructed in 1975 consisted of 168 3½ tonners (130 timber and 38 FRP) and 306 FRP 17-18 footers.

Most of the boatyards are small-scale private sector proprietorial concerns operating with very limited capital. Five boatyards are operated by Cooperatives, one by CFC and one by the Cey-Nor Development Foundation.

Nylon nets are made in two small-scale factories. One of these was established (1963) in Colombo by a private sector firm. The factory has 4 net weaving machines mainly for large mesh nets and has an annual production capacity of 270,000 lbs of netting. The other factory was commissioned in 1975 and is operated by the Cey-Nor Development Foundation in Jaffna. It has 7 net weaving machines, mainly for small-mesh nets, with an annual production capacity of about 150,000 lbs of netting.

Engine repair and maintenance is carried out by itinerant mechanics or by motor garages in outstation areas. In Colombo, 6 workshops are operated by the local agents for the various makes of engines; of these, two deal exclusively with outboard motors while the other four attend to marine diesel engine work.

16 SOCIO-ECONOMICS

There are about 43,000 households engaged in the coastal fisheries, according to the census undertaken in 1972. The number of fishermen is about 58,000. The total membership of these households is about 250,000.

The 43,000 households around the coast are grouped into about 1,000 fishing villages of which 50% have an average of 7 households per village, 36% have 45 households and 13% have 200.

As many as 83% of the households depend on fishing as sole source of income.

The average income per income receiver is Rs. 199/- per month. The average number of income receivers per household is 1.7, giving an average monthly income of Rs. 338 per household*.

Many households are in debt: 70% of the owners of motorized boats and 35% of the owners of non-motorized craft. Average debts are Rs. 3,500 and Rs. 900 respectively. The total debt is estimated at Rs. 25 million of which 40% is owed to fish traders.

About 40% of the fishing households do not possess any boats or equipment for fishing and provide labourers only; 20% own non-motorized fishing craft, and about 20% own gear without craft.

About 4,000 fishermen migrate every year from the west coast to the east coast during the southwest monsoon from April to October.

The average age of the fishing population is low and 43% are younger than 15 years.

The educational level of the fishing population is lower than the national average. More than 50% of the fishermen have not completed primary education.

It is estimated that 45 persons per 1000 tonne of fish are engaged in the distribution and retailing of fish. This would add about 7,000 people directly employed in the industry and with families 17,000 additional people dependent upon it.

The employment in ancillary industries like boat building, net making and ice manufacturing and in fish curing adds some 7,400 workers and 18,000 dependents.

The total employment would therefore, be in the order of about 72,000 people and the population dependent on the fisheries as a source of income would be in the order of 300,000 people.

17 GOVERNMENT POLICY

The Government Policy is designed to achieve the maximum development of national resources within a society framework consistent with the country's commitments to a rapid advance towards a socialist society.

The Fisheries policy is influenced by the following factors

(i) It is a general national policy to increase the local production of food which in turn is influenced by the problem of foreign exchange scarcity necessitating the reduction of expenditure on food imports. Imports of cured and processed fish constitute a substantial leak of foreign exchange which could be plugged by increased local production of fish.

(ii) The need to maintain an adequate protein level in the people's diet in the face of a rapidly increasing population and declining fish imports. 70% of the animal protein intake is provided by fish. The importance of fish as a source of protein has increased due to the failure to maintain adequate levels of milk and meat production.

---

* Socio-Economic survey of Sri Lanka 1969/70.

(iii) The fishing industry is considered to have considerable potential for providing employment.

(iv) The fishing industry has a potential as a foreign exchange earner by the export of fish and fishery products.

(v) An articulate and influential segment of the population of 45 coastal electorates is engaged in or connected with the fishing industry.

The Government has declared that its policy is to develop the fishing industry into one of the country's major industries. The achievement of self-sufficiency in fish has been set out as an ultimate objective. Emphasis has been placed on the progressive mechanization of fishing operations, development of inland fisheries and improvement of the socio-economic conditions of the fishermen.

The place of fisheries development in the national priorities was underlined by the creation of a Ministry of Fisheries in 1970. This step has been followed by the grant of increased allocations for fisheries in the national Budget.

As a matter of policy, a great deal of attention is being paid by the Ministry of Fisheries to socio-economic organization of the fishermen, and to welfare and extension activities as a supplement to the action being taken to increase fish production. Socio-economic organization of the fishermen is being attempted through the medium of 45 large primary cooperative fishing societies covering every fishing area round the coast and some inland fishing areas, and more and more production inputs and welfare benefits are being channelled to the fishermen through these societies.

18 DEVELOPMENT PLANS

The development plans for fisheries are embodied in the Medium Term Development Programme for the years 1972 - 76, which has been subsequently extended up to 1977.

The plan for the coastal fisheries sector proposes a 24,000 tonne increase of the annual catch (subsequently revised to 30,000 tonne).

This increase is to be achieved by :-

(i) An increase in the number of 28' - 32' inboard diesel engine powered fishing boats.

(ii) An increase in the number of small fishing craft powered by outboard motors;

(iii) An increase in the catch per unit effort for the 28' - 32' boats by -

- provision of repair workshops
- provision of training facilities for the fishermen in fishing methods and in engine repair and maintenance
- provision of improved extension facilities
- improvement in the supply of fishing gear
- construction of anchorages to enable boats to be operated during the monsoon period
- development and improvement of the fishing craft.

The plan provides for an increase in the number of 28' - 32' boats to 2,630 and in the number of outboard motor craft to 5,970 by 1977.

Further quantification of input and output targets is summarized in appendix 18.1.

The revised plan for the off-shore and deep-sea fisheries sector provides for a 15,570 tonne increase in annual production by 1977. The inputs are ten trawlers, ten 60 ft. vessels and forty 38 ft. vessels.

It is proposed to increase the annual production from inland waters by 18,600 tonne by 1977.

The revised shell fish development programme provides for an output of 1668 tonne of shrimp and lobster by 1977.

The Government supports development in accordance with the plan by providing, hire purchase financing for 3½ ton boats, subsidies on engines, boats and gear, Customs duty concessions and certain income tax concessions (see further details in appendix 18.2).

19 development projects in various fields of fisheries with multi-lateral or bilateral assistance are implemented or under preparation (for further details see appendix 18.3)

Work is underway for the formulation of a development plan for the next five year period.

19 BIBLIOGRAPHY

1. Berg, S.E. 1971 — "Investigations on the bottom conditions and the possibilities for marine and fish trawling on the north and east coast of Ceylon". Bull.Fish.Res.Stn. Ceylon, 22(1 & 2): 3-58.

2. Canagaratnam, P. and Medcof, J.C. 1956 — "Ceylon's beach seine fishery". Bull.Fish.Res.Stn.Ceylon, No.4: - 32pp.

3. ——— 1965 — Draft 10-year plan for the development of the Fishing Industry. 111 pp. Ceylon Fisheries Corporation.

4. ——— 1958 — "Recommendations on development of the fishery industry of Ceylon". Colombo, Govt. Press, 65 pp. Colombo Plan Fisheries Survey Team.

5. De Bruin, G.H.P. 1970 — "Drift-net fishing in Ceylon waters". Bull.Fish.Res.Stn.Ceylon, 21 (I) : 17-32.

6. De Bruin, G.H.P. 1970 — "Spiny lobster resources". Bull.Fish.Res.Stn.Ceylon, 21(I) : 33-34.

7. ——— 1973 — Report of the Socio-Economic Survey of Sri Lanka.(1969/70) Department of Census and Statistics.

8. ——— 1974 — Report on the Census of Fisheries - Sri Lanka 1972. 3 Parts. Department of Census and Statistics.

9. ——— 1940-1974 — "Administration Reports of the Director of Fisheries". Department of Fisheries.

10. De Silva, G.N. 1964 — "Socio-economic survey of fisher families, 1958-59". Bull.Fish.Res.Stn.Ceylon, 17 (I) : 1-44.

11. ——— 1964 — Development of Ceylon's Fisheries (A symposium).

12. ——— 1972 — Districts of Amparai, Batticaloa, Colombo, Galle, Hambantota, Jaffna, Kalutara, Mannar, Matara, Puttalam, Trincomalee, Vavuniya. District Fisheries Development Plans.

13. Medcof, J.C. 1963 "Partial survey and critique of Ceylon's marine Fisheries". Bull.Fish.Res.Stn.Ceylon. 16(2): 29-118.

14. ——— 1971 "Report of the working group on fisheries development". Colombo, Govt. Press, 79 pp. Ministry of Industries and Fisheries.

15. ——— 1972 Sectoral plan for coastal fisheries. Manuscript Report 7 pp. Tables I - VII. Ministry of Fisheries.

16. ——— 1971 The Five Year Plan 1972 - 76. Chapter 3. Ministry of Planning and Employment.

17. ——— 1974 The revised Fisheries Development Programme 1972 - 1977. Manuscript report 47 pp. Ministry of Planning and Economic Affairs.

18. Munro, I.S.R. 1955 The marine and freshwater fishes of Ceylon. Canberra, Department of External Affairs, 351 pp.

19. Sivasubramaniam, K. 1971 "Apparent abundance of yellow fin and bigeye tuna in the inshore, off-shore and near oceanic ranges around Ceylon". Bull.Fish.Res.Stn.Ceylon, 22(1 & 2): 23-28

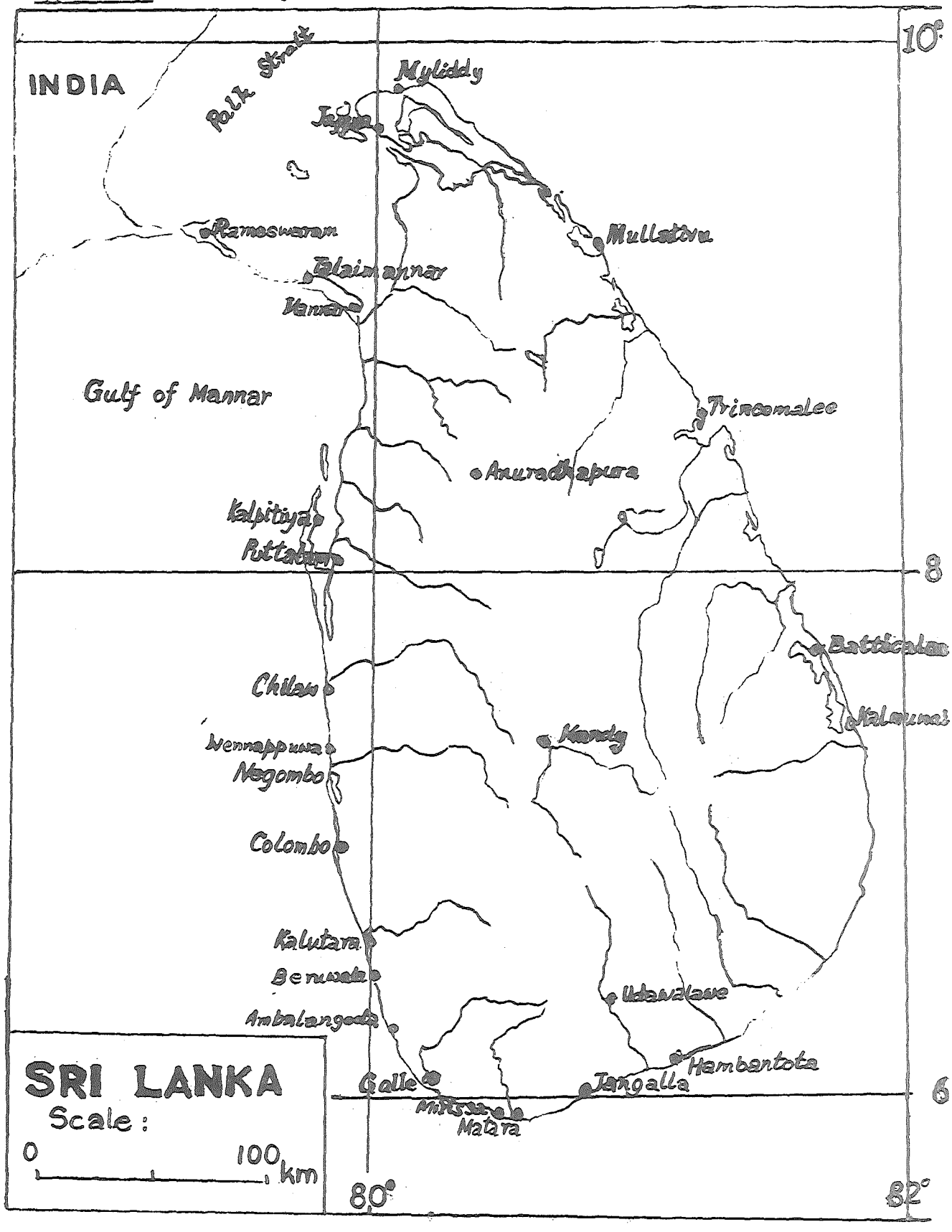
20. Sivasubramaniam, K. 1970 "Surface and sub-furface fisheries for young and immature yellow fin tuna (T.albacares) around Ceylon". Bull.Fish.Res.Stn.Ceylon. 21(2) : 113-122.

21. Sivasubramaniam, K. 1972 "Skipjack tuna (K.pelamis) resources in the seas around Ceylon". Bull.Fish.Res.Stn.Ceylon. 23(1 & 2): 19-27.

22. Wijesekera, M.S. 1972 Fisheries of Sri Lanka - a Bibliography.

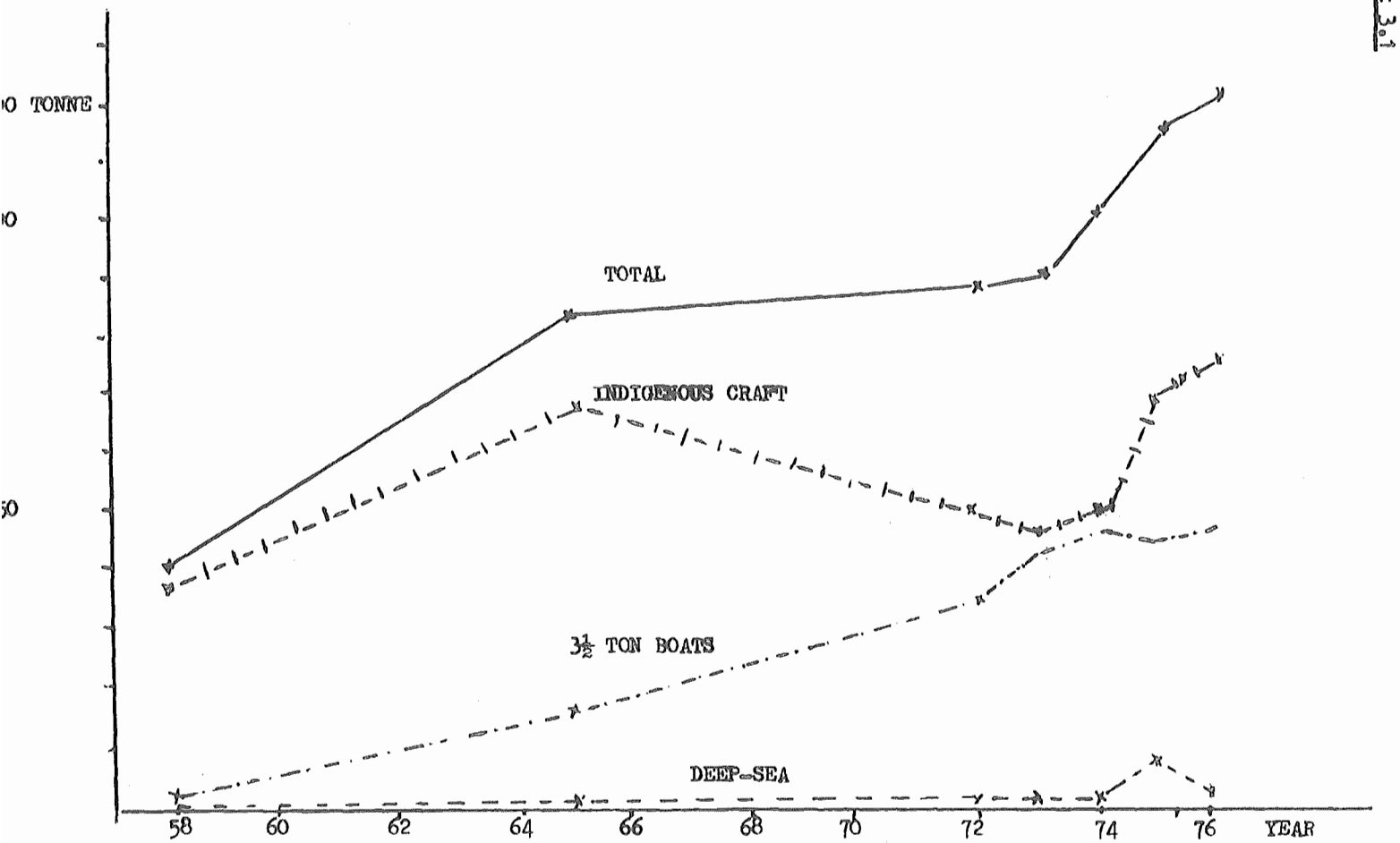
Appendix 1.1

MAP OF SRI LANKA



Appendix 3.1

PRODUCTION OF MARINE FISHERIES BY CATEGORY OF EFFORT, 1958-76

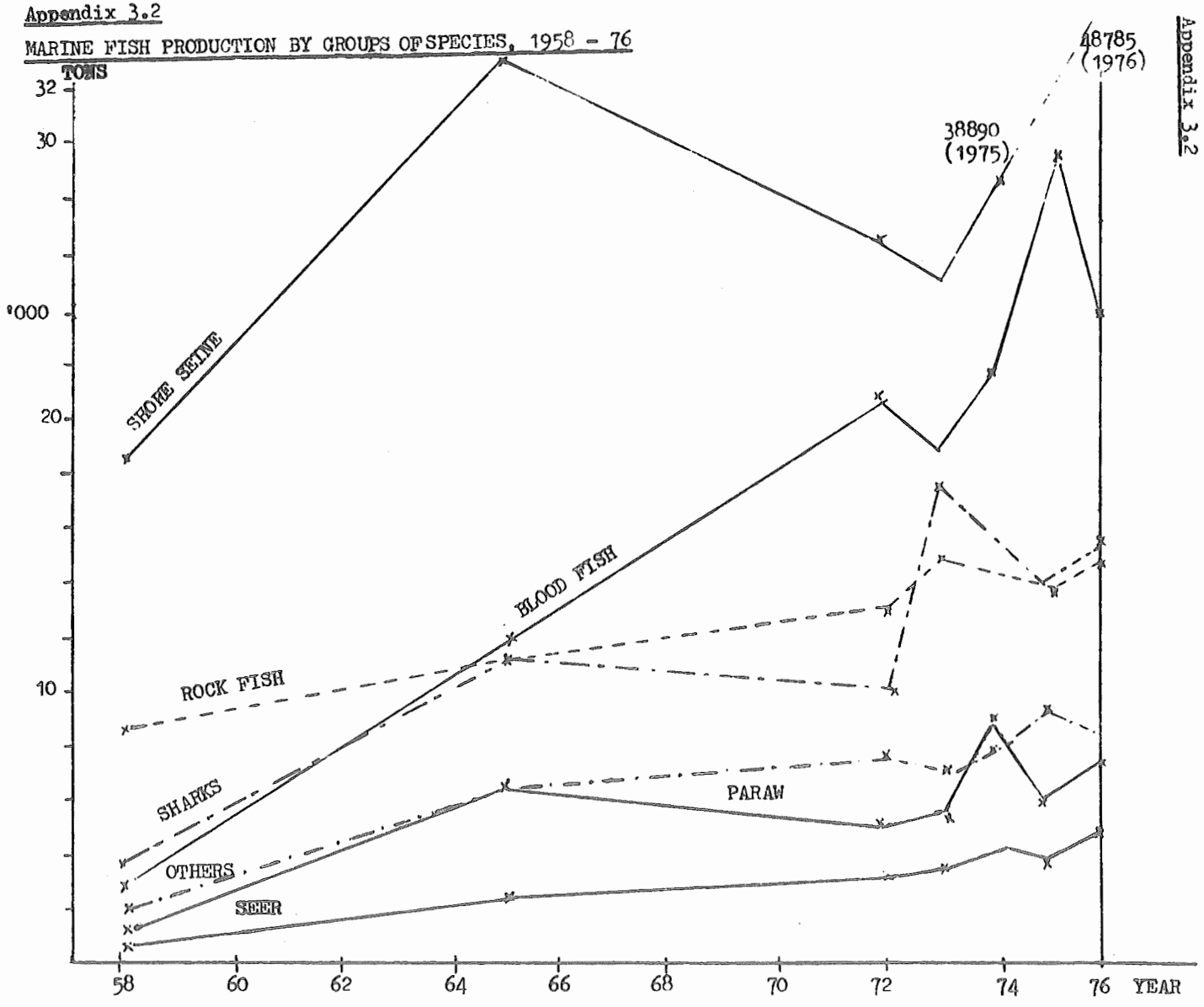


Source: Ministry of Fisheries.

Appendix 3.1

Appendix 3.2

MARINE FISH PRODUCTION BY GROUPS OF SPECIES, 1958 - 76



Source: Ministry of Fisheries.

Appendix 3.2

Appendix 3.3

PRODUCTION, IMPORTS, EXPORTS, 1958 - 76.

Marine fish production	-58	-65	-72*	-74	-75	-76
Quantity[1] (tonne)	39,769	85,346	91,805	101,413	114,009	121,388
Value[2] (million Rs)	..	143.9	184.5	316.1	386.6	502.1
Price (Rs/tonne)			1970	3117	3391	4136
Fish Price Index			100	158	172	210
Inland fish production						
Quantity (tonne)	295	7481	8305	7539	13097	12343
Value (million Rs)	..	3.3	3.7	8.6	19.3	18.8
Fish imports						
Quantity[1] (tonne)	104,635	70,774	85,480	36,629	31,820	15,416
Value[3] (million Rs)	92.3	55.9	92.2	50.0	44.0	29.3
Fish exports						
Quantity (tonne)	..	..	537	1308	988	2713
Value[4] (million Rs)	.4	1.0	11.4	26.8	22.2	75.4
Fish supply						
Quantity[1] (tonne)	144,699	163,801	184,980	143,797	157,528	146,434
Per capita consumption (kg/year)	15.66	14.91	14.51	10.91	11.76	10.7

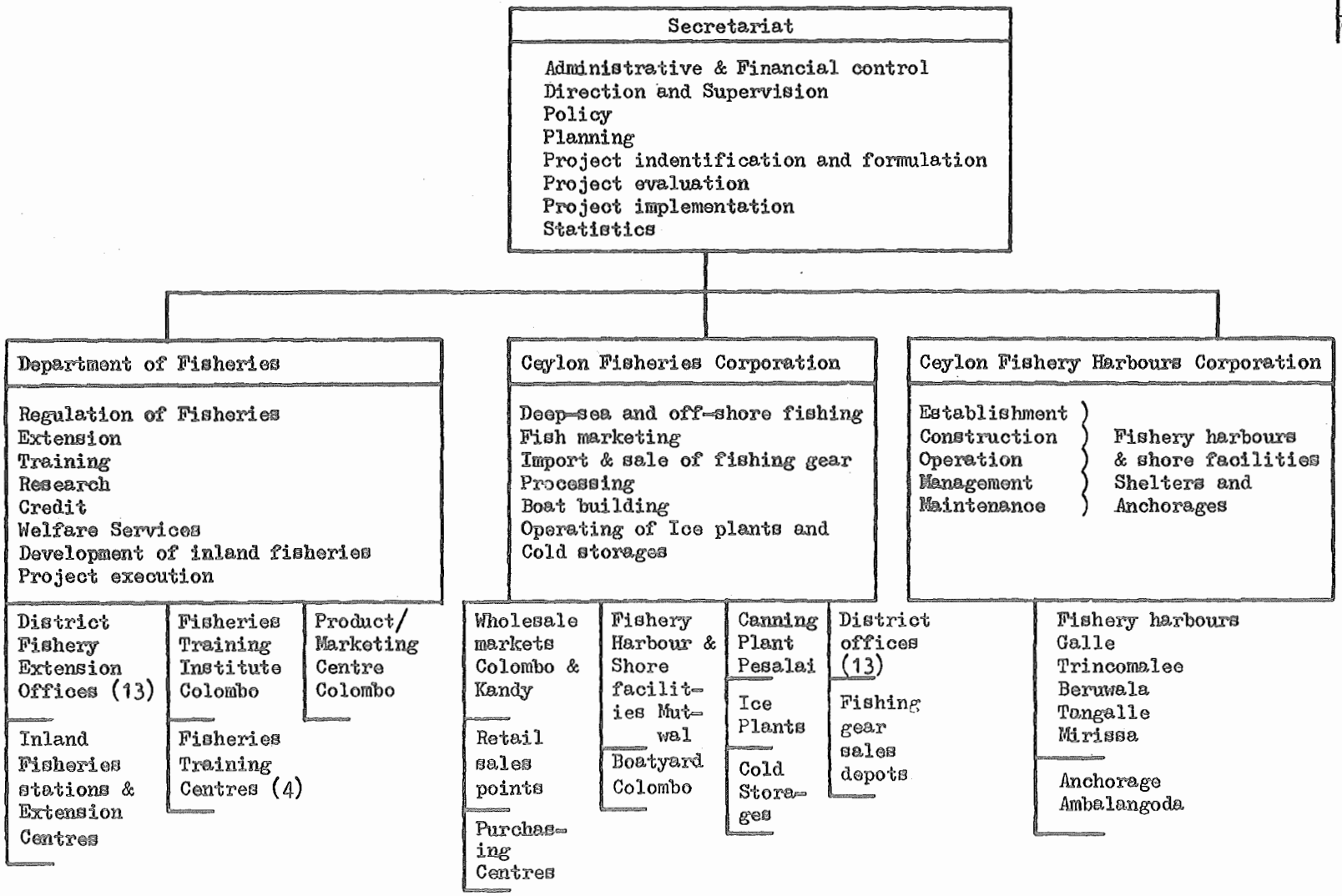
Equipment imports	-72	-73	-74	-75
a) Inboard engines				
Quantity (Nos.)	..	400	..	500
CIF Value (million Rs)	..	4.0	..	9
b) Outboard motors				
Quantity (Nos.)	835	..	800	450
CIF Value (million Rs)	1.2	..	1.7	.9
c) Engine spares				
CIF Value (million Rs)	.5	.8	.8	1.1
d) Boat-building materials				
CIF Value (million Rs)	.5	.8	1.3	2.3
e) Fishing gear				
CIF Value (million Rs)	1.7	2.3	8.4	2.6

1) wet weight equivalent
2) at ex-vessel price
3) CIF values
4) FOB values
* method of estimation of marine catch changed in 1970/71.

Source: Ministry of Fisheries.

Appendix 4.1

ORGANIZATION CHART: MINISTRY OF FISHERIES, SRI LANKA



Source: Ministry of Fisheries.

Appendix 9.1

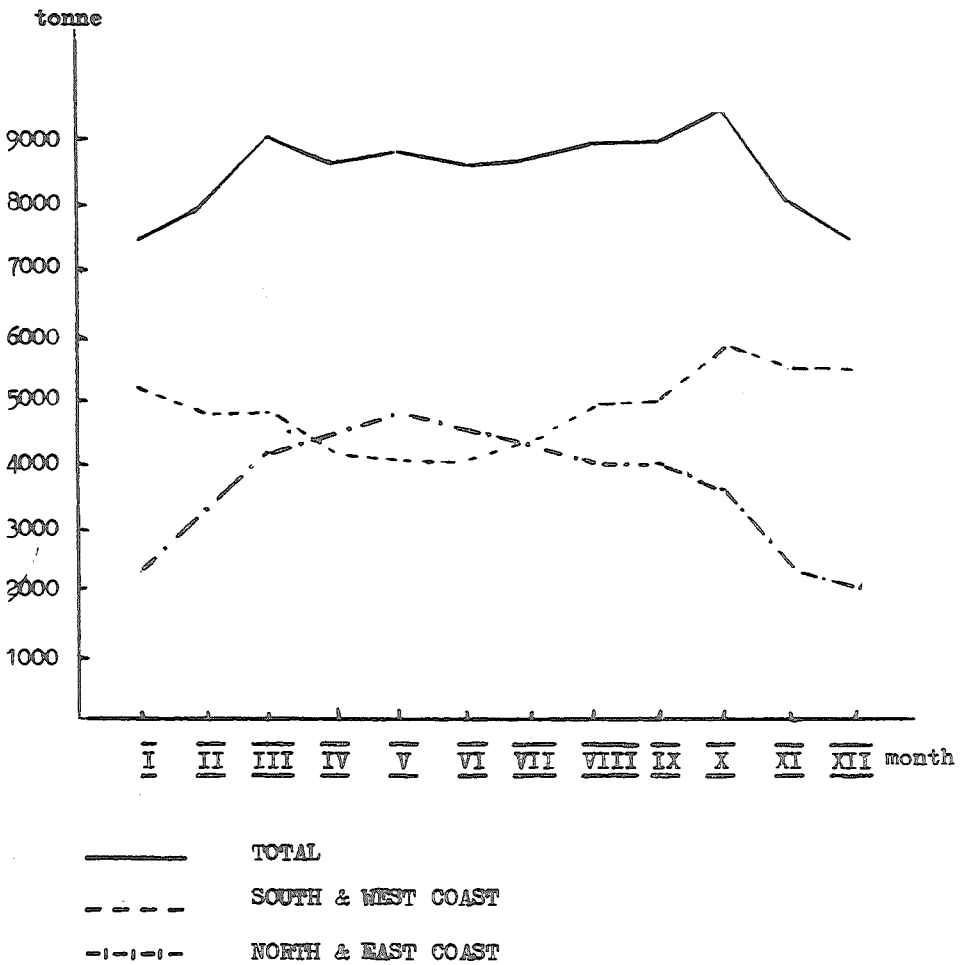
MOST COMMON MARINE FISH SPECIES AND PRODUCTION BY GROUP (1976)

Group	Family	English	Local	Tonne	%
Seer				4597	3.8
	Scomberomoridae	Spanish Mackerel	Thora, Anjila		
Paraw				7483	6.2
	Carangidae	Horse Mackerel	Paraw, Katta		
Blood Fish				23808	19.7
	Thunnidae	Skipjack	Balaya		
		Mackerel Tuna	Attawalla		
		Frigate Mackerel	Alagoduwa		
		Yellow Fin	Kelawalla		
	Istiophoridae	Sail Fish	Thalapath		
		Marlin	Koppara		
	Xiphiidae	Sword fish	Cappara		
Sharks & Skates				15267	12.6
	Carcharinidae and related forms	Shark	Mora		
	Trygenidae and related forms	Rays	Maduwa		
Rock fish				12903	10.7
	Lutianidae	Snappers	Kalameeya		
	Lethrinidae	Breams	Meevatiya		
	Sciaenidae	Croakers	Pannava		
	Serranidae	Groupers	Kossa		
Shore Seine Varieties				48785	40.4
	Clupeidae	Sardines	Salaya		
		Herrings	Hurulla		
	Engranlidae	Sprat	Halmassa		
		Anchovy	Laagga		
	Chirocentridae	Wolf herring	Katuvalla		
	Scombridae	Indian Mackerel	Kumbala		
	Trichiuridae	Ribbon fish	Savalaya		
	Mugilidae	Grey Mullet	Godaya		
	Sillaginidae	Whiting	Kalanda		
	Lactariidae	White fish	Pulunna		
	Carangidae	Horse Mackerel	Parati		
	Ephippidae	Spade fish	Hada		
	Drepanidae	Spotted Bat fish	Handeya		
	Mullidae	Mullet	Nagaraya		
	Stromateidae	Pomfret	Vauvalaya		
Others				8006	6.6
Crustacea	Penacidae	Prawns	Issa		
	Paniluridae	Lobsters	Pokirissa		
	Portimudae	Swimming Crab	Moodhu Kakuluwa		
	Scyllaridae	Lagoon Crab	Kalapukakuluwa		
Cephalopoda	Loliginidae	Squid	Dhalla		
	Sepiidae	Cuttle fish	Pothu Dhalla		
	Octopoda	Octopus	Boovalla		

Source: Ministry of Fisheries.

Appendix 9.2

MONTHLY AVERAGE LANDINGS, 1972 - 1976



Source: Ministry of Fisheries.

Appendix 11.1

NUMBER OF VILLAGES, BOATS, FISHERMEN AND ANNUAL LANDINGS BY LANDING AREAS (DFEO DIVISIONS).

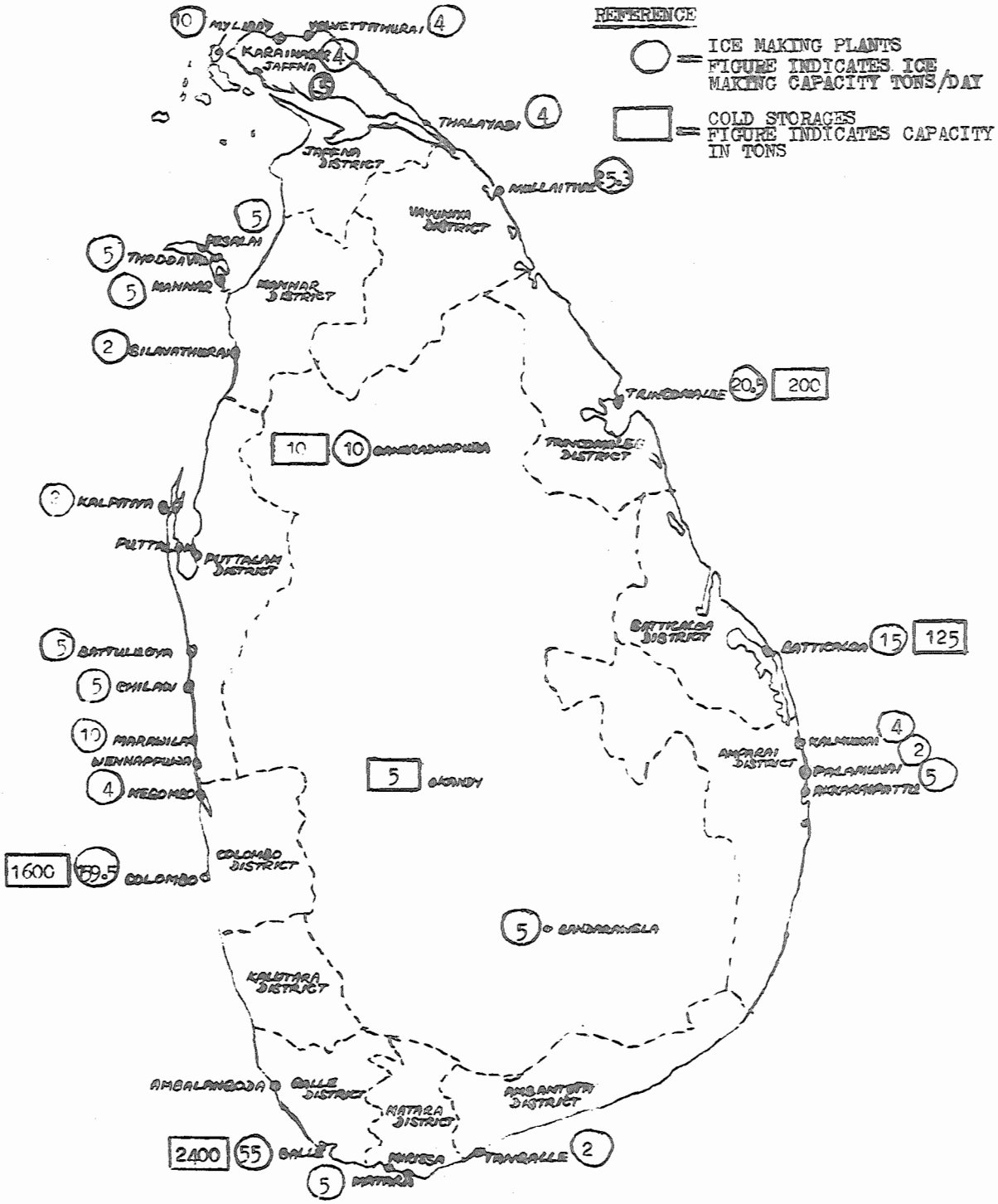
Landing area (DFEO Divisions)	Villages Nos.	Boats Introduced Nos.	Boats Indigenous Nos.	Fishermen Nos.	Landings (tonne/year)
Colombo	25	78	383	2,602	1,640
Negombo	23	666	1,546	5,027	20,372
Puttalam	132	572	3,032	10,703	14,417
Mannar	32	128	696	2,835	12,236
Jaffna	107	384	4,551	11,187	22,409
Mullativu	20	40	392	1,379	7,220
Trincomalee	61	111	978	2,822	9,390
Batticaloa	91	76	2,232	5,564	5,540
Kalmunai	45	1	719	5,616	5,114
Tangalle	91	164	423	1,799	5,159
Matara	53	337	589	3,378	8,059
Galle	231	92	791	3,529	4,581
Kalutara	58	84	499	2,160	3,712
Total	969	2,733	16,831	58,601	120,849

Source: Census of Marine Fisheries 1972, Sri Lanka Preliminary Report, June 1973.

* Landing figures for 1976. (Source: Ministry of Fisheries)

APPENDIX 12.1

ICE MAKING AND COLD STORAGE FACILITIES



Appendix 18.1

TARGETS FOR INPUT AND OUTPUT OF MOTORIZED CRAFT, MEDIUM TERM DEVELOPMENT PROGRAMME 1972 - 1977

Appendix 18.1

		1971 Base year	1972	1973	1974[2]	1975	1976	1977
3½ ton boats								
Average production/boat/year	(Tonne)[1]	16	16.5	17	17.5	18	18.5	18.5
Old boats at beginning of year	(Nos.)	1700	1445	1190	1798	1619	1440	1261
Old boats remaining in service at end of year	(Nos.)	1445	1190	935	1619	1440	1261	1080
New boats introduced during the year	(Nos.)	200	300	400	200	400	450	500
New boats (cumulative)	(Nos.)	200	500	900	200	600	1050	1550
Total estimated production	(Tonne)	27740	26474	28878	30865	33925	39417	44450
Outboard Motor Craft								
Average production/craft/year	(Tonne)[1]	7	7	7	7	7	7	7
Old Motors at beginning of year	(Nos.)	2600	2080	1560	3073	2613	2153	1693
Old motors remaining in service at end of year	(Nos.)	2080	1560	1040	2613	2153	1693	1233
New motors introduced during the year	(Nos.)	300	1000	1000	538	1400	1400	1400
New motors (cumulative)	(Nos.)	300	1300	2300	538	1938	3338	4738
Total estimated production	(Tonne)	16250	17430	20790	20979	24542	31122	37702

1) 25% of average production from old boats/motors going out of service in any year
50% of average production from new boats/motors introduced during any year.

2) Figures of existing boats/motors adjusted on the basis of Census of Fisheries 1972 and targets revised from 1974.

Source: Ministry of Fisheries.

Appendix 18.2

GOVERNMENT SUPPORT AND CONCESSIONS.

Hire purchase financing for 3½ ton boats (currently about Rs.90,000 per boat) is provided by the government through the Department of Fisheries. Such financing is now confined to Fishery Cooperatives but was earlier extended to individual fishermen as well. The total amount of financing provided upto end 1975 was Rs. 68.8 million.

Unsecured loans to fishery cooperatives and secured loans to individual fishermen are given by the Department mainly for the purchase, construction and repair of fishing craft and gear. The total amount of such loans given up to end 1975 was Rs. 11 million.

The following subsidies are granted by the government :-

(i) 50% of the amount of hire purchase financing on a 28' - 32' boat which is given in the form of a waiver of 50% of the total hire (consisting of the full cost of the boat, engine, fishing gear and interest of 9¼% on the cost) when payment of 50% has been completed. This subsidy is granted on all boats issued since the inception of the hire purchase scheme in 1958/59.

(ii) To persons who invest their own funds in the purchase of fishing boats :

- 35% of the cost of hull, engine and fishing gear of 28' - 32' boats.
- 35% of the cost of hull and engine of 32' - 40' boats.
- 25% of the cost of hull and engine of boats of over 40'.

(iii) The cost of FEECs (Foreign Exchange Entitlement Certificates amounting to 65% on CIF cost) on imported fishing gear is borne by the government.

(iv) The cost of FEECs on outboard motors purchased by fishermen for mechanization of indigenous craft or for installation in small FRP boats, as well as on in-board diesel engines purchased by fishermen for installation in boats constructed at their own expense or for replacement of engines, is borne by the government.

Investors in fishing vessels are also eligible for the following income tax rebates :

a Development rebate of 20 - 40% of the capital cost and
a Lump-sum depreciation allowance of 66⅔% of the capital cost.

Source: Ministry of Fisheries.

Appendix 18.3

FISHERIES PROJECTS IN SRI LANKA RECEIVING EXTERNAL SUPPORT.

A. Technical assistance

1.	FAO/UNDP (Regional)	Development of small-scale fisheries in Southwest Asia, RAS/74/031. - Assist the participating countries in formulating policy guidelines and development concepts. - Assist in identifying and formulating specific projects. - Conduct a seminar on small-scale fisheries development planning for Government planners and fisheries personnel. - Identify constraints limiting the development of small-scale fisheries.	Started: October 1975 Duration: 27 months Budget UNDP:$ 160,000 Government: $ 25,000 Location: Colombo
2.	FAO/UNDP	Sri Lanka Fisheries Development Project, SRL/72/051. - To assist in establishing a modern Skipjack Fishery with live bait, to establish a supporting live bait fishery, establish canning and fish meal plants. - To complete investigation of the resources of fish suitable for live bait. - To complete investigations on the availability of fish resources for direct consumption. - To provide on-the-job training for national fishermen and instructors. - Determine feasibility for a purse seine fishery, pole and line and gill-net fishery.	Started: January 1973 Duration: 60 months Budget UNDP:$ 1,568,460 Government: $ 824,154 (6 months extension proposal) Location: Colombo.
3.	FAO/UNDP	Central Institute of Aquaculture Development and Training, SRL/74/085. - To assist development of inland aquaculture by imparting theoretical and practical training to students, teachers, extension workers and prospective fish culturists in the techniques of inland fish breeding and culture.	Pipeline Budget: $ 1,652,250 Government budget: Rs. 10,220,700
4.	FAO/SIDA (Regional)	Centre for the development of traditional fishing communities, RAS/40(SWE). - Establish a system for collection of data relevant to small-scale fisheries. - Assist in the formulation of plans and projects. - Implement projects of experimental and demonstrational nature. - Train staff of fishery administrations and develop extension services.	Started: August 1976 Duration: up to 6 years (Preparatory phase 1 year) Budget: SIDA US$180,600 for phase I. Government's budget: to be discussed. Location: Colombo for prep-phase.

5.	FAO/SIDA	Institute of Fish Technology SRL/28/SWE. - Reduce spoilage of fish products. - Find uses for presently under-utilized species. - Further knowledge on improved handling, preservation, processing and marketing.	Started: July 1976 Duration: 5 years, with preparatory phase of one year. Budget: SIDA $547,000 Budget Government: Rs. 5,900,000 Location: Colombo.
6.	Japan Bilateral Aid:	Sri Lanka Fisheries Training Institute. - To provide practical and theoretical training to persons who will work as skippers and engineers of larger fishing vessels; - to conduct research and experiments for the improvement and development of off-shore and deep-sea fishing techniques.	Started: April 1975 Duration: 4 years Budget: Yen 295 million. Government budget: Rs. 3,556,000 Location: Colombo
7.	DANIDA	Technical assistance (refrigeration) to the Ceylon Fisheries Corporation. - One refrigeration expert.	Started: November 1975 Duration: 2 years Location: Colombo
8.	Norges Godtemplar Ungdomsforbund (Norway)	Cey-Nor Development Foundation - To assist in the development of fisheries in Sri Lanka and to create employment opportunities for the people directly or indirectly by carrying out the following activities - construction of f.r.p. and ferro-cement boats; - processing and export of sea food; - production of ice; - manufacture of fishing nets; - commercial fishing operations.	Started: 1967 Duration: 10 years Budget: Rs. 7.85 M up to 1976. Government budget: Nil Location: Jaffna
9.	CIDA	Small boat Repair Workshop project - To establish repair workshops in selected fishing centres for operation by Fishery Cooperatives with a view to ensuring proper utilization of the existing coastal mechanized craft and to ensure optimum performance by the coastal mechanized craft that will be introduced in the future under the on-going mechanization programme.	Under preparation.
10. B.	CIDA Investment Projects	Assistance in planning, fisheries research and resources assessment.	Under preparation.

11.	World Bank	Tuna Fishery Development Project, 11/76/CEY/8. - To undertake economic exploitation of Tuna resources using small boats, viz: six 70' long liner boats and six 45' pole and line boats based at the Galle Fisheries Harbour.	Under preparation
12.	"Pipeline"	East Coast Fishery Development Project - To increase the production of fish from the coastal and off-shore fishery off the East Coast of Sri Lanka by providing: - fifty 10 metre mechanized fishing vessels, a fishery harbour at Valachchenai, to serve as a base for the operation of the vessels; - shore facilities (vessel repair, ice, cold storage, fuel, etc.)	Prepared
13.	Misereor (Germany)	Establishment of ice and holding room facilities at large fish landing centres. - To provide ice and insulated holding rooms at five fishing centres for short term storage of wet fish on ice primarily with a view to protecting the producer from heavy fluctuations in prices caused by the lack of these facilities.	Started: May 1975 Budget: D.M. 400,000 Government budget: Rs. 450,000
14.	"Pipeline"	South East Coast Fishery Development Project. - To increase the production of fish from the coastal fishery off the South East Coast of Sri Lanka by the introduction of 175 small surf landing fishing boats.	Identified
15.	Norwegian Financial Assistance	Trawler Project - To provide seven fishing vessels (trawlers) to exploit demersal resources on Pedro Bank.	Starting: 1977 Location: Trincomalee
16.	Abu Dhabi Fund for Arab Economic Development.	Small boat trawling project for Palk Bay and Gulf of Mannar. - To introduce 150 nos. 32' f.r.p. trawlers for exploiting the prawn and demersal fish resources in the coastal waters of the Gulf of Mannar and Palk Bay. - To introduce 20 nos. 38' and 2 nos. 60' multi purpose vessels to other areas.	Under preparation.
17.	Asian Development Bank	Sri Lanka Fisheries Project - To augment the mechanization programme for the coastal fishery by the introduction of 200 locally built 28' FRP boats off the South and South West coasts.	Started: March 1973 Budget: $3,100,000 Government budget Rs. 16,000,000 Location: Galle

		- To introduce thirty 38' FRP fishing vessels to exploit the off-shore pelagic resources off the South and South West coasts. - To provide supplementary supporting inputs in the form of equipment for vessel maintenance and fish marketing, e.g. vehicles, repair workshops and fish storage cabinets. - To provide expert consulting services in the form of a Fishing Boat Expert, a Project Adviser and two Master Fishermen.	
18.	Chinese Bilateral Aid	Experimental Fish Breeding Station. - Experimental breeding of larger species of Chinese Fresh Water Fish such as Chinese Grass Carp and the production of fry for use in a programme of aquaculture development with special emphasis on intensive pond fish culture.	Started: June 1976 Budget: Yuan 520,000 Plus Rs. 5,255,000 Government budget: Rs. 1,650,000
19.	"Pipeline"	Fishing Gear Factory Project (Joint venture) - To establish a factory for the local manufacture of synthetic twine, nets and ropes.	Under preparation

Source: Ministry of Fisheries.

Assessment of Problems and Needs in Marine Small-Scale Fisheries

SRI LANKA

Prepared by

L.O. Engvall, Project Manager
C. Ratcliffe, Fisheries Adviser
T.J. Scheepens, Sociologist (Associate Expert)

in consultation with

Ministry of Fisheries, Sri Lanka.

Development of Small-Scale Fisheries in Southwest Asia, Colombo, June 1977.

CONTENTS

		Page No.
1.	INTRODUCTION	1
2.	FISHING GEAR	1
	2.1 Present Situation	1
	2.2 Implications	2
	2.3 Needs	2
3.	ENGINE SPARES, MAINTENANCE AND REPAIR	3
	3.1 Present Situation	3
	3.2 Implications	4
	3.3 Needs	4
4.	FISHERY COOPERATIVE SOCIETIES	5
	4.1 Brief History	5
	4.2 Present Situation	5
	4.3 Implications	5
	4.4 Needs	6
5.	PHYSICAL PLANNING	6
	5.1 Present Situation	6
	5.2 Implications	7
	5.3 Needs	8
6.	INSTITUTIONAL SUPPORT	8
	6.1 Present Situation	8
	6.2 Implications	9
	6.3 Needs	9

Appendices

2.1	Boats using gillnets by type, capacity & catches (1975)	10
2.2	Import prices (CIF) and CFC sales prices of fishing gear	11
2.3	Demand, supply and shortage of fishing gear	12
3.1	Imports, issues, prices and spare part requirements of marine diesels and outboard engines.	13
4.1	Production records of incidentally chosen primary societies.	14
4.2	Loans and arrears under cooperative schemes.	15
4.3	Government subsidy in connection with the issue of $3\frac{1}{2}$ tonners to cooperatives and private individuals.	16
5.1	Fish production per km coastline by district (1975).	17
5.2	Official number of $3\frac{1}{2}$ tonners issued per km coastline by district.	18
5.3	Average fish production per $3\frac{1}{2}$ tonner by district (1975)	19
5.4	Number of operating outboard engines per km coastline by district (1975).	20
5.5	Average fish production per outboard motorized craft by district (1975)	21
5.6	Number of non-motorized craft (excluding Beach seine craft) per km coastline by district (1975)	22
5.7	Average fish production per non-motorized craft by district (1972).	23

1 INTRODUCTION

Fish is a popular ingredient in the diet of the people of Sri Lanka, and an important source of animal protein (70%). The country's own production is not sufficient to satisfy the demand and large quantities of dried fish have been imported in the past. The import has been drastically reduced since 1972, in order to save scarce sources of foreign exchange. As a consequence, the per capita consumption has dropped from 14.5 kg/year in 1972 to 10.7 kg/year in 1976, and the prices increased to levels which are beyond the reach of large groups of the population.

The Government gives a high priority to fisheries development with the ultimate objective of self-sufficiency in fish. To achieve this the Government is supporting the industry by subsidies, grants and favourable loans. Assistance is also received from several international and bilateral financing agencies in connection with specific fisheries development projects.

In spite of the strong effort, the results have, so far, been disappointing and appear not to be in correspondence with the input.

This report draws the attention to some specific constraints which include inadequate supply of fishing gear and spare parts for engines. These shortcomings are directly related to physical needs and could easily be overcome by increased imports and better distribution of those items. The deficiencies in the operation of cooperatives is another serious constraint which require changes in the policy to be overcome.

Finally, the planning of and institutional support to the fisheries are weak and need to be strengthened and re-oriented in order to direct and accelerate the development. However, solutions to this must be seen in a long term perspective.

2 FISHING GEAR

About 60% of the yearly landings of marine fish, which is equivalent to 65,000 tonne, is caught by gillnets. Small motorized and non-motorized craft are employing small mesh nets close to the coasts and catch Sardine, Mackerel and other small pelagic species. The larger motorized boats ($3\frac{1}{2}$ tonners) and some large traditional boats employ drift nets of a larger mesh and catch Seer fish, Tuna and similar pelagic species in deeper water but still relatively close to the coast.

2.1 Present Situation.

There is an acute shortage of fishing nets in the country and it is estimated that the fishing fleet is operating with only 50% of the desirable complement of nets. A breakdown of craft by type, capacity and catches is given in appendix 2.1.

Since the change in Government fishing boat loan policy in 1970, when loans to individual fishermen for the purchase of $3\frac{1}{2}$ tonners was discontinued, the Fisheries Department has allocated about 700 of these craft on a loan and grant basis to Fishermen's Cooperative Societies (FCS). The majority of these craft operate with only about 30% of the required amount of nets. In the case of 1,200 private $3\frac{1}{2}$ tonners the corresponding figure is about 70%.

For private fishermen with small mechanized craft comprising some 3,075 introduced and traditional units only 50% of the requirements are fulfilled.

Similarly the owners of the 7,550 traditional non-mechanized boats using gillnets, who are in the lower income group of the fishery, are very poorly equipped and not able to take full advantage of the fine weather fishing season. Again, only 50% of the required amount of nets is employed.

Furthermore a large portion of nets used are of poor quality because of wear and tear during long periods and need replacement.

The Ceylon Fisheries Corporation (CFC)[1] is the major supplier of fishing gear and has had monopoly on import of fishing nets since 1965. Despite duty free and FEEC concessions coupled with substantial sales marks up, the Corporation is able to utilize only about two-thirds of the foreign exchange quota granted annually by government for this purpose. In the period 1973 - 1976 Rs.31 million worth of foreign exchange were allocated while about Rs.19 million were utilized (according to Customs returns).

The precarious financial situation of the CFC which has lasted for several years is an inducement to obtain as great a profit as possible from the sales of fishing gear which provides about one third of the total revenue.

The mark up is therefore considerable and appears to be between 100% and 200%. The differences between the CIF price and the sales price for various items are given in appendix 2.3.2 Sales of gear during 1975 were Rs.10.5 million, while the cost of purchases were Rs.4.5 million (130%). A lower figure was obtained from the inventory of the CFC stock. It had on 30/11/76 a CIF price of Rs.3.2 million, while the price tags give a local sales value of Rs.8.1 million i.e. a mark-up of 120%.

The net situation is further aggravated by the present system of distributing nets through CFC district stores and primary Fishermen's Cooperative Societies. As repeatedly stated by the fishermen and some officials, the best use is not made of the limited supply as nets are not readily available to the majority of experienced bonafide fishermen. Preference is given instead: (1) to accommodating private fish traders who are willing to sell a portion of their catch to CFC: (2) to fishermen who have been allocated small motorized craft on a government loan basis through the FCS: (3) to FCS boats which performances are very low; and (4) to fishermen, not necessarily the most successful, who pay a minimum FCS membership fee solely for the purpose of obtaining nets.

As a result of the shortage, nets are obtained on the black market at exorbitant prices.

Theft of nets at fishing grounds is a major problem in many areas and has become an accepted method of acquiring nets.

2.2 Implications.

The production in 1975 from craft using gillnets was estimated to be 65,000 tonne.

Since it can be assumed that the catch is proportionate to the amount of nets employed, the loss of production because of the net shortage (50%) is 54,000 tonne/year (see Appendix 2.1, column 9).

(i) This is equivalent to 18,000 tonne of imported dried fish costing some Rs.50 million in foreign exchange, which is more than the actual import of dried fish in 1975 (15,000 tonne), while the yearly CIF cost of additional nets is less than Rs.10 million.

(ii) It represents Rs.180 million lost gross revenue, which, after deduction of Rs.20 million to cover the local cost of additional fishing nets (including 100% mark up) and lost revenue due to an anticipated 40% drop in fish price because of increased supply, is a net revenue loss of say Rs.100 million to cooperatives and boatowners and crew members.

(iii) The average fisherman is earning about 1,500 Rs/year less than he would if working on a fully equipped boat.

(iv) The costs of present operations are 20% higher because of the high mark up and high black market prices.

2.3 Needs.

The shortage of fishing nets is the most serious constraint to an increased production of the marine small-scale fisheries in Sri Lanka.

The Government is currently negotiating a joint venture with a foreign company for the establishment of a net factory in Sri Lanka. The target is to make the country self-sufficient in fishing gear and also manufacture for export.

---

1) The Ceylon Fisheries Corporation is a government owned institution and its main responsibilities are related to commercial fishing operations by the public sector, fish processing and fish marketing.

The factory is not likely to start production before 1979/80 and will need 4 - 5 years to reach full production. It may therefore be 8 - 10 years before self-sufficiency can be achieved. In the meantime, the gap will have to be filled by imports or local manufacture by small plants and cottage industries (see appendix 2.3).

It is estimated that the replacement value (CIF) of nets for the gillnetting fleet is in the order of Rs.36 million (1977 prices). Assuming an average life time of 3 years the yearly requirements are about Rs.12 million:

(i) an immediate supply of nets worth about Rs.20 million (US $ 3 million) is required to make up for the accumulated deficit during recent years.

(ii) The requirements for annual replacements are about Rs.12 million which will gradually decrease when the net factory becomes operational.

(iii) The imports of nets need to be entrusted to an institution capable of fully utilizing the amounts allocated.

(iv) The import and sale of fishing nets should be a separate activity in the institution concerned and commission and charges should only cover the costs of the activity to reduce the mark-up for the benefit of the fishermen and consumers.

(v) The distribution and retail sale of the nets should be through authorised establishments to all bonafide fishermen and boatowners at controlled prices.

(vi) For an initial net rehabilitation scheme short term credits should be made available to boatowners and fishermen through local banks.

(vii) The manufacture of hand braided nets at village level should be encouraged through increased import of twine.

3 ENGINE SPARES, MAINTENANCE AND REPAIR

3.1 Present Situation.

The motorized fleet consists of :-

(i) 2130 nos of 3½ tonners using inboard marine diesels (Perkins 33 hp, Bukh & Cey Bukh 31 hp, Yanmar 30 hp, and others such as Lister and Petter).

(ii) 4882 nos of craft using outboard motors (Yamaha 15 hp and 8 hp, Johnson/ Evenrude 6 hp, Suzuki 7 hp, and others such as Penta). Most of the engines are petrol driven.

The total CIF value, in 1976 prices, of the engines is :

inboard diesels	Rs. 38.3 million
outboard engines	Rs. 10.3 million
	Rs. 48.6 million

A detailed breakdown of imports, issues and prices is given in Appendix 3.1. The regular maintenance and repair of engines is a serious problem, and particularly so for the cooperatives, for the following reasons :-

(i) The imports of spare parts are inadequate. The yearly requirement of spares is equivalent to about 10% of the present CIF value of engines. This amounts to nearly Rs.5 million (see appendix 3.1). In 1976 the total import was only worth about Rs.1.6 million, which corresponds to only one third of the requirements.

The situation has become worse in recent years; in 1973, about half of the needs were satisfied through imports.

(ii) The costs of spares are high. The customer has to pay the CIF price and duty (25-300%) + FEEC (65%) + agent mark-up (40-100%). Furthermore the shortage has created a black market which pushes the prices to even higher levels.

(iii) Properly equipped and staffed facilities for maintenance and repair of engines are scarce in many areas resulting in long delays and lost fishing time and poor work causing unnecessary breakdowns and damages to the engines.

3.2 Implications.

The problem is particularly grave in the cooperative sector. An anlysis of some records indicates that most of the inoperative time, which is about 130% of the present fishing time, is attributed to the lack of proper engine care. The loss of production is in the order of 5,500 tonne/year.

In the private sector, the situation is less critical. It is estimated that the engine problems here cause a loss in fishing time of about 10% which corresponds to a production loss of 5,000 tonne/year.

The total yearly loss of production is therefore about 10,500 tonne valued at Rs.34 million.

(i) Cooperatives, boatowners and fishermen are losing a net revenue of about Rs.20 million (after deduction of running costs).

(ii) The costs of present operations are unnecessarily high because of the expensive spares as a consequence of import charges and black market rates. Cooperative records indicate that these costs are substantial.

3.3 Needs.

In the short term there is an urgent need to increase the supply of spare parts by imports. There is an accumulated deficit of spares and the initial requirement to rehabilitate the fleet is probably more than twice the yearly requirement i.e. Rs.10 million.

Early attention should also be paid to the possibilities of reducing import charges and the establishment of price control system in cooperation with the agents.

In the long term there is a need to :

(i) establish a network of properly equipped and staffed workshops in the immediate vicinity of fishing centres,

(ii) train engine drivers and fishermen in the maintenance and care of engines;

(iii) promote and facilitate the local manufacturing of spare parts,

(iv) issue loans through banks to private entrepreneurs for the establishment of workshops,

(v) better utilization of the existing teaching centres, for training of mechanics.

4 FISHERY COOPERATIVE SOCIETIES

4.1 Brief History.

The first fishery cooperatives were organized in 1941 as a result of the recommendation of a Commission appointed by the Government in 1938. During the following years fishery cooperatives grew in number and in 1970 there were 292 small primary societies, each with a membership of 20 - 30, three secondary societies in the form of regional unions, each with a membership of about 30 active primary societies and an apex organization - the Ceylon Cooperative Fish Sales Union (CCFSU), which had been formed in 1952, as a federation of primary societies and their unions for the purpose of fish marketing.

Between 1970 and 1973, the small primary societies were amalgamated into 45 large primaries. Of the 3 regional unions only the Northern union (NPFCSU) still continues to function. The CCFSU, whose fish marketing and fishing gear import and supply business was taken over by the CFC in 1964, still exists as a skeleton organization bereft of commercial activities (except one ice plant) but owning considerable liquid assets.

4.2 Present Situation.

In 1976, the membership of the 45 primaries was 15,270 or about 25% of the total number of fishermen. The membership of individual primaries ranges from 100 to 1,450. The fishermen are organized in branches (mostly the former small primary societies), which is a practical working arrangement but without legal status.

Between 1971 and 1976, about 760 3½ tonners have been issued to the cooperatives, of which about 700 are believed to be in operation. The corresponding issues to private individuals is about 320.

The present hire purchase system grants the cooperatives a 50% subsidy on the total price of boat and gear. The loan is to be repaid over a period of 5 years. Private individuals receive a subsidy of 35% but no credit.

The 3½ tonners allocated to FCS on government loan basis for gillnet fishing (and trolling, longlining and hand-lining) are badly maintained and operate inefficiently and uneconomically. The majority of society boats are catching 85% less fish than those of the private sector which average 25 - 30 metric tonne/year (see appendix 4.1). This is mainly due to bad selection of crews coupled with a lack of ownership incentive (boats continue to be owned by the FCS even if the loans are fully paid for) and an absence of operations supervision and business management.

Boats lie idle for long periods and many are permanently out of commission because of unnecessary engine breakdowns caused by bad handling on the part of inexperienced and un-supervised personnel who lack ownership interest to effect rapid repairs. In most cases boats are inadequately equipped with nets (see appendix 4.1). Crews are undisciplined and uncontrollable and frequently illegally sell fishing equipment and part of the catch to private fish merchants. Only in the case of the northern societies, mainly involved in the very lucrative business of exporting beche-de-mer and conch shells, do the fishermen legally gain financially by being members of societies.

In general, the fish production and marketing activities of the societies are not profitable and they operate on commission obtained from sales of fishing gear (distributed by CFC) and spare parts (distributed by importers) and loans, or with money intended for loan repayments or repairs. There is an over-staffing which results in an expenditure on staff 100% more than the income of commissions; the total staff, regularly paid, in primary societies is said to be around 600 or 13.3 officers per primary.

The majority of the members are fishermen, who pay a minimum membership fee, in order to obtain fishing gear and engine spare parts, be eligible to work in society owned 3½ tonners and be able to apply for government loans for small boats and outboard motors.

The repayment record which shows 80% arrears is a good illustration of the consequences of the points mentioned above. (see sppendix 4.2). Despite the very favourable loan terms only 33 boats (out of more than 900) have been fully paid for.

4.3 Implications.

(i) The total yearly government subsidy to the fleet of 3½ tonners is about Rs.10 million of which Rs.9 million is absorbed by the cooperatives and the remaining Rs.1 million by the private sector.

4.3 Implications.

(ii) Because of the low efficiency of the cooperative boats the entire income of their fishermen is subsidy (10% in private sector).

(iii) Nearly half (45%) of the fish landed by Cooperatives is subsidized (3% in private sector).

(For details see Appendix 4.3).

Furthermore, it is estimated that the poor cooperative management and operational practices are responsible for a total loss of production of some 7,500 tonne/year valued at Rs.23 million. This amounts to 10 tonne per boat and is in addition to the losses due to shortage of gear (7.5 tonne) and engine failures (7 tonne).

4.4 Needs.

The poor performance of the fishermen's cooperative societies is a crucial issue in the small-scale fisheries sector and the regularization of this situation is of greatest importance for the future development. In the short term an increased supply of nets and spares and repair and overhaul of defunct boats may brighten the picture. A sustained improvement however, can only be achieved by a complete programme of rehabilitation including revisions of functions, status, organization and management of the cooperatives.

The most important considerations in such a programme are suggested to be :

(i) The main functions of the Primary Societies should be services and fish marketing and not production.

(ii) The production function should be the responsibility of individual members who would become owners of craft and gear after full repayments of loans.

(iii) The resources for credits should rest with the banks and not with the Fisheries Department.

(iv) The branches of the primary societies should be "up-graded" and given more autonomy as to develop them to sound cooperative enterprises.

(v) Sole control of cooperatives to be exercised by the Fisheries Department, by secondment from the Cooperative Department.

(vi) Better representation and influence of bonafide fishermen in the operation of the cooperatives has to be ensured.

(vii) The government extension services have to be made more effective in all aspects of the operation of the cooperatives (see also chapter 6).

5 PHYSICAL PLANNING

5.1 Present Situation.

The traditional small-scale fishing centres are located in sheltered lagoons and partly protected bays and along the open coast. Very few of these centres have landing facilities and catches are landed on the beaches. It is estimated that 25% of all marine fish production is landed at centres in sheltered lagoons and 70% at centres situated on the beaches of the bays and the open coast. Most of the latter centres are non-operational during the period when the prevailing trade wind is blowing.

The shore facilities at the traditional fishing centres have generally been provided by the private sector and mainly comprise simply constructed ice storage and fish handling sheds and dried fish

preparation compounds. At some of the larger centres there are also small private or state owned ice plants and state or church owned auction halls.

The direct Government support to traditional centres in the last five years consists of: Rs.1.4 million for feeder roads and Rs.1.15 million for small housing schemes.

A masterplan for building harbours was designed by CFC in 1965 which assumed a decline in small-scale coastal fishing ($3\frac{1}{2}$ tonners and small craft) and an input of a large number of off-shore vessels (11 tonners and larger vessels). There was considerable doubt about the reality of the assumptions and viability of the schemes but the bulk of Government development efforts in subsequent years have centred on the construction of new fishery harbours with supporting shore facilities i.e. ice plants (120 tonne/day), cold stores (3,340 tonne), freezing plants (56 tonne/day), repair workshops and fuel supplies to cater for deep sea fishing.

Two, of three, completed small harbours have serious siltation problems and this situation may also occur in the other three harbours under construction, due to problems of littoral drift.

Although these harbours are not intended primarily for the small-scale fishery the majority of boats using them are the $3\frac{1}{2}$ tonners who simply utilize the anchorage facilities after disposing of catches to private traders outside the precinct of the newly established shore facilities.

The large harbours and shore facilities at Colombo, Galle and Trincomalee are adequate to meet future requirements of deep-sea fisheries and offer landing facilities to the larger boats in the coastal fishery.

The distribution of the motorized craft (inboards and outboards) has been concentrated along the north, west and south (west) coasts and very little development has taken place on the east and south (east) coast; the majority of motorized craft operating in the area south of Trincomalee are seasonal migrants from other regions. The reasons for the unequal distribution are probably to be found in the known abundance of skipjack and tuna off the south west coast and the proximity of fish landing sites to population centres like Colombo, Galle and Jaffna. There are considerable variations in the regional production which are probably more related to the degree of fishing effort and availability of landing facilities rather than to the availability of fish and fishermen. The differences in effort and production are illustrated in appendices 5.1 - 5.7.

The types of fishing craft used in the coastal fishery are only suitable for daily or nightly operations. Past efforts to introduce larger craft capable of staying at sea for longer periods were unsuccessful and these craft were ultimately used in the traditional manner. The major portion of marine fish production still results from daily or nightly fishing operations conducted from perennial or seasonal landing sites.

5.2 Implications.

The costly effort to provide landing facilities along a coastline subject to extensive littoral drift has produced harbours that will require continuous expensive dredging maintenance to keep them operational. The new harbours are not attracting a large permanent community but tending to become seasonal havens for migrant fishing craft.

As a result of over emphasis on this kind of development little effort has been made to improve the traditional fishing centres, develop suitable craft, landing systems and fishing centres for open beach operations and to identify other suitable locations for new landing centres.

Consequently many of the larger permanent centres are devoid of any forward development planning programme and have become congested, unhygienic conglomerations of boats, fish stores, shops and dwellings.

As the traditional daily or nightly pattern of operations is dependant on the availability of landing centres within easy reach of fishing grounds, the shortage of such facilities has caused a concentration of fishing effort in limited areas. As a result there is considerable under-development and hence loss of fish production in other areas. The low development effort exercised in such areas, particularly the east coast, results in under-utilization of fishery resources which could be exploited by techniques and capabilities already available in the country.

5.3 Needs

The small-scale fisheries sector will continue to be the backbone of the industry for the foreseeable future. The general strategy for the development of landing facilities should be geared to cater for the actual needs of the industry with due consideration given to the physical possibilities and economic feasibility. The geographical distribution of development effort should also be determined by the potentials, as far as fishery resources are concerned, and the needs of the fishing communities.

A proper masterplan for physical development needs to be established and the process would include the following items :-

(i) an analysis of long term development potentials as to resources and fishing technology and the needs of fishing craft and landing facilities;

(ii) a review of how present fishing effort and its geographical distribution and of how existing landing facilities meet the needs;

(iii) determine how the traditional landing sites can be best developed to meet the present and future requirements of the fishery;

(iv) identify other suitable natural locations for possible future construction of perennial landing facilities;

(v) investigate ways and means of introducing better designed craft and beach landing systems and providing suitable shore facilities for operations on unprotected beaches, particularly along the East Coast.

6 INSTITUTIONAL SUPPORT

6.1 Present Situation.

The small-scale fisheries element of the national development programme is implemented through district offices which are under the control of District Fisheries Extension Officers (DFEO).

The main functions of these offices are the collection of production data from selected fishing centres and provision of technical support to the Primary Fishermen's Cooperative Societies.

Other activities include collection of hire purchase instalments in respect of 3½ tonners, collection of fishing craft registration fees, planning of beacons, access roads to fishing centres and fishermen's housing schemes, processing of applications for engines and loans, inquiries into and settlement of petty disputes.

The offices are adequately staffed but the personnel lack proper direction and supervision, professional and technical training, experience and sustained job interest. As a result, the main work, i.e. extension, is neglected.

Most of the activities implemented through the District Fisheries Extension Offices are incidental to the duties normally performed by professional or technical fisheries personnel. Many officers are completely disenchanted with this situation as they are denied any real career opportunity.

In some cases the academic qualifications and general background of the District Fisheries Extension Officers are unrelated to the duties of the post. Many of the younger Fisheries Inspectors are academically over-qualified and therefore find little interest in the duties allotted them. Others, more experienced technically minded inspectors, are mindful of their academic shortcomings and see little prospect of future advancement.

Fisheries Inspectors responsible for the collection of production statistics do not make regular visits to fishing centres for this purpose. On the odd occasion when these officers visit the centres it is for the purpose of collecting fishing craft registration fees and for loan recoveries.

Therefore inspectors are regarded by fishermen purely as Government revenue collectors.

In general, Fisheries Department district staff have little or no development contact at beach level with the fishermen, and are not knowledgeable enough to converse with, or assist, them on technical matters. Little or no meaningful technical support is being given to the Fishermen's Cooperative Societies or the private sector.

A feed-back from the field is also desirable so as to aid the direction of the work in the institutes into meaningful activities of value and support to the fishery. Such an exchange of information or liaison is lacking and the specialized institutes are not equipped to play the focal role in their respective disciplines.

The only field in which there is some liaison is in training through the four training centres; the new product development/marketing centre (not completed) has not as yet established links with the extension service; the scientific work of the research station is not connected at all with the beach problems; a craft and fishing development unit, which is probably the most important unit for technical extension work, does not exist; cooperative development, organization and management, has no effective institutional back-stopping as the officers are not adequately trained and supervised.

6.2 Implications.

(i) District Fisheries Extension Offices are not providing meaningful development and extension support to the benefit of the fishermen.

(ii) Accurate production statistics are not available to the planners responsible for the formulation of the National Development Programme.

(iii) District Development Committees and Political Authorities are not properly advised by the DFEO's on development requirements.

(iv) Services of good quality officers such as DFEO's cannot be retained since there are limited advancement opportunities in their chosen career.

6.3 Needs.

The following measures are suggested to improve the extension service which is of vital importance for development of the industry :

(i) Within the organizational structure the functions of the district offices need clarification and administrative legislative functions should be clearly separated from the extension functions and statistical functions.

(ii) The extension need to split up in different disciplines, fishing, engineering, cooperatives, etc., and posts established according to the actual needs in the different districts.

(iii) Extension officers require much more training and guidance to perform their duties properly.

(iv) The extension service should be linked up with the existing specialized institutes.

(v) Special institutional competence in craft and fishing development and socio-economics (cooperative functions) need to be built-up for applied research and development to back-stop the extension service.

(vi) Extension officers should be regarded as out-posted staff of the specialized institutes or departments and through an exchange with the respective Headquarters get career opportunities in their particular fields of competence.

Appendix 2.1

Boats using gillnets by type, capacity and catches (1975).

Motorized	1 number of boats "operating" (1)	2 operating capacity of nets (pcs/boat)	3 mesh size	4 nets actually used (pcs/boat)	5 average catch per boat (tonne)	6 Total catch per type (tonne)	7 possible catch with full complement of nets (pcs/boat)	8 possible catch per type of boat (tonne)	9 loss of production (tonne)
3½ tonners (cooperatives)	700	30 - 40	4½" - 6"	10 or less	5.5	3,850	13	9,100	5,250
3½ tonners (private)	1,200	30 - 40	4½" - 6"	20	20	24,000	30	36,000	12,000
17 ft. Fibre Glass Boats	900	20 - 25	1" - 3½"	10	7.5	6,750	15	13,500	6,750
Oru and Vallam	275	15 - 20	4" - 6"	7.5	6	2,250	12	4,500	2,250
Teppan & Kattumaran	1,900	15 - 20	1" - 3½"	7.5	6	11,400	12	22,800	11,400
Non-motorized									
Large Oru & Vallam	850	8(2)	4" - 6"	2 - 4(2)	3	2,550	6	5,100	2,550
Small traditional craft	6,700	6(2)	1" - 3½"	2 - 4(2)	2	13,400	4	26,800	13,400
Total	11,760					64,200		117,800	53,600

Notes:

(1) "Operating" means registered; many of the cooperative boats and non-motorized traditional boats are not operating.

(2) These figures are probably too low.

Appendix 2.2

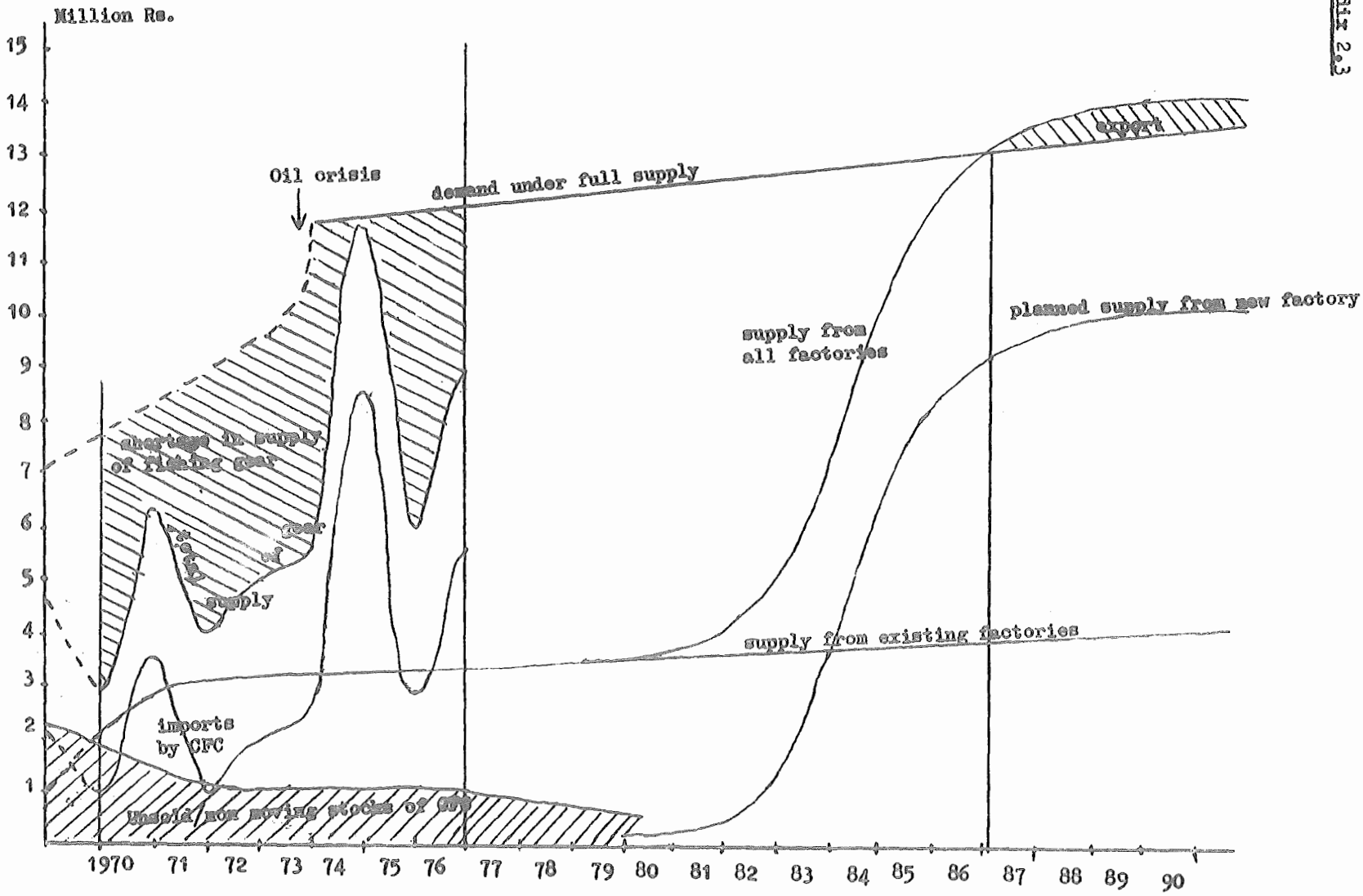
Import prices (CIF) and CFC sales prices of fishing gear.
(Rs.6.88 = US $ 1.00)

		CIF (Oct. 1975)	Sale Price (1976)	Mark up %
Nylon Nets				
2/½"	100 m x 100 yds.	67.42	140.00	108
2/½"	100 m x 100 yds.	32.74	120.00	263
2/1 1/8"	330 x 1500	66.32	160.00	142
2/1 3/4"	125 x 1500	28.41	100.00	257
3/½"	100 m x 100 yds.	97.42	110.00	13
3/1 1/8"	330 1500	83.59	230.00	173
4/2 1/4"	125 x 1500	66.18	150.00	127
4/3"	75 x 1500	25.73	111.00	326
6/2½"	75 x 1500	75.81	100.00	31
6/3"	75 x 1500	67.08	150.00	123
9/3½"	75 x 1500	61.85	300.00	383
15/3 3/4"	55 x 1500	53.80	100.00	85
21/4"	60 x 500	130.23	260.00	100
27/4 3¼"	75 x 500	135.81	450.00	230
			Average*	168.6%
Twine				
Nylon		8.39	30.00	275
Kuralon		10.38	32.00	220
			Average*	247.5%
Ropes per 100 yds.				
2 mm.		5.36	20.00	300
3 mm.		12.04	40.00	233
4 mm.		24.90	70.00	180
5 mm.		31.64	100.00	212
6 mm.		46.57	150.00	219
8 mm.		78.91	250.00	216
9 mm.		98.79	215.00	117
10 mm.		122.87	350.00	184
12 mm.		176.40	525.00	198
			Average*	206.6%

* Not weighted average.

Appendix 2.3

Demand, supply and shortage of fishing gear.



Appendix 3.1

Imports, issues, prices and spare part requirements of marine diesels and outboard engines

	1 Imports of In-board diesels	2 CIF value of one engine	3 Issues: out-right purcha-se	4 Issues: hire purchase	5 Total No. of boats	6 Value of spare part require-ments: 10% of CIF value of engines	7 Imports of out-board engines	8 Average CIF value of one engine	9 Issues	10 Total No. of boats	11 Value of spare part requirements 10% of CIF value of engines	12 Total value of spare parts required column 6+11
	Nos/hp.	(Rs)	(Nos)	(Nos)	(Nos)	(mill Rs)	(Nos)	(Rs.)	(Nos)	(Nos)	(mill Rs)	(mill Rs)
1970	250/33	6,000	49	156					614			
1971	300/31	7,100	103	162			1,000	1,500	134			
1972	-	-	48	182	1,872[1]		835	1,500	1032	3250[1]	0.44	
1973	400/33	10,100	23	104		1.56	-		300			2.00
1974	-	-	51	37			800	2,200	538			
1975	500/33	18,000	61	117			450	2,000	756			
1976 (10 months)	-	-	36	156	2,130[2]	3.83	1,500	2,100	320	4882[2]	1.03	4.86
Total	1450	-	371	914			4,785		3704			
			1285									

Note: 1) 1972 census figure.

2) Official figures which are slightly higher than the actual.

Appendix 4.1

Production records of incidentally chosen primary societies

Name of the FCS	Period of records	No. of boats operating	No. of operating days	Average No. of pieces of nets per boat	Average yearly catch in tonne per boat	Boats not operating	Catch in % of Kayts' catch *
	1	2	3	4	5	6	7
Negombo North	4/75 - 3/76	12	120	14	6.92	0	33%
Trincomalee	1/76 - 7/76	27	71	9	2.63	7	12%
	1/75 - 12/75	27	?	?	2.36	3	11%
Ambalangoda	1/75 - 12/75	15	93	3	3.32	2 - 3	16%
*Kayts	3/75 - 2/76	1	219	30	21.10	0	100%
Chilaw	12 months	20	109	?	4.49	?	21%
Wennappuwa	1/75 - 1/76	16	68	7	1.46	9 - 10	7%
Tangalle	12 months	48	54	7	4.20	?	20%

Appendix 4.2

Loans and arrears under cooperative schemes. (in million Rs)

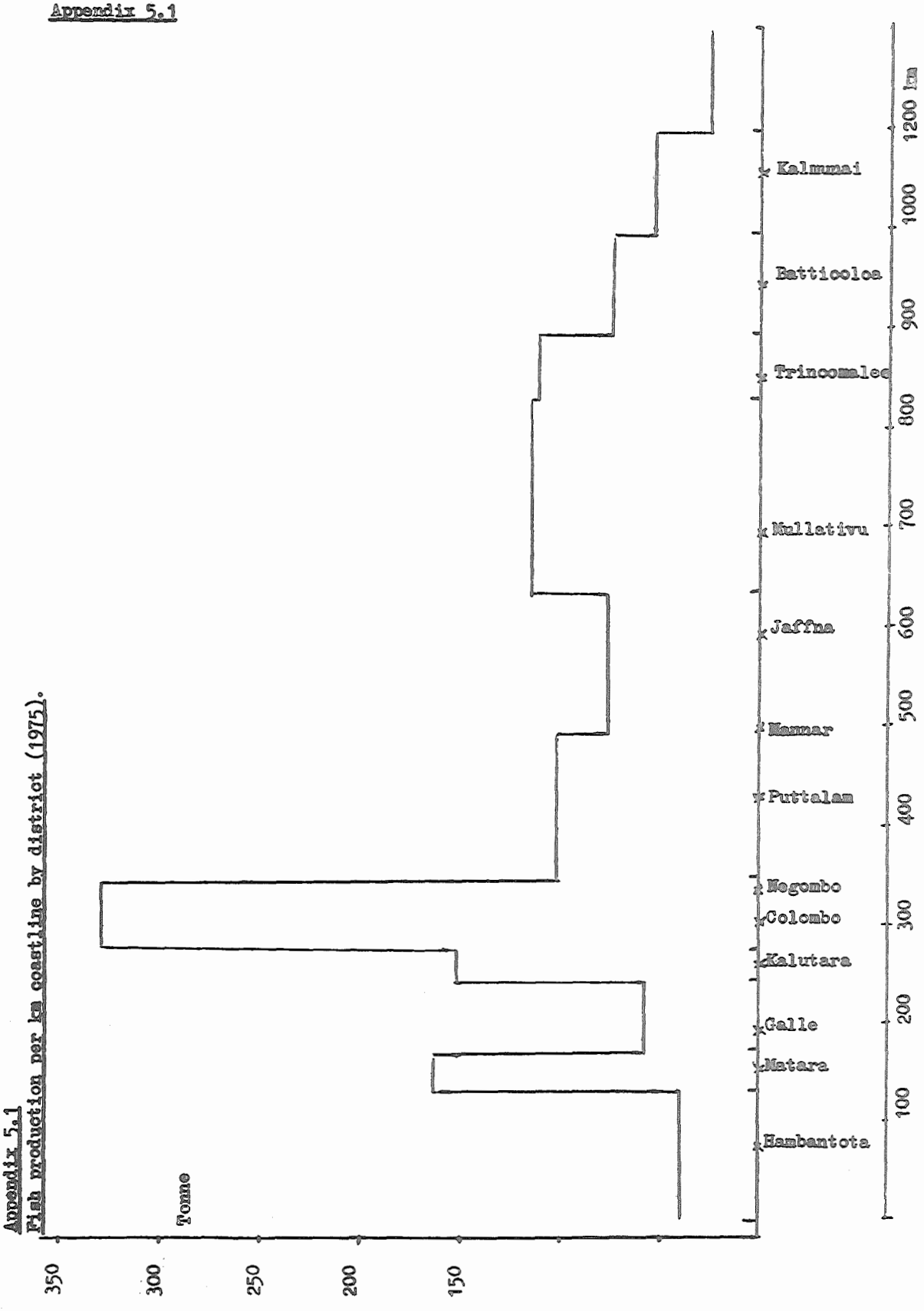
	1973	1974	1975	
Total loans for $3\frac{1}{2}$ tonners (50%)	14.9	15.1	20.4	
Repayments due	5.2	8.2	10.3	
Amount actually paid	2.0	2.6	2.0	
Arrears	3.2	5.6	8.3	(81%)
Total cash loans for additional gear	1.7	1.8	2.3	
Repayments due	1.1	1.6	1.8	
Amount actually paid	0.2	0.4	0.3	
Arrears	0.9	1.2	1.5	(83%)
Total loans for meeting additional costs of engine and hull	5	6	7.9	
Repayments due	4.3	4.8	5.7	
Amount actually paid	1.4	1.5	1.9	
Arrears	2.9	3.3	3.8	(67%)

Appendix 4.3

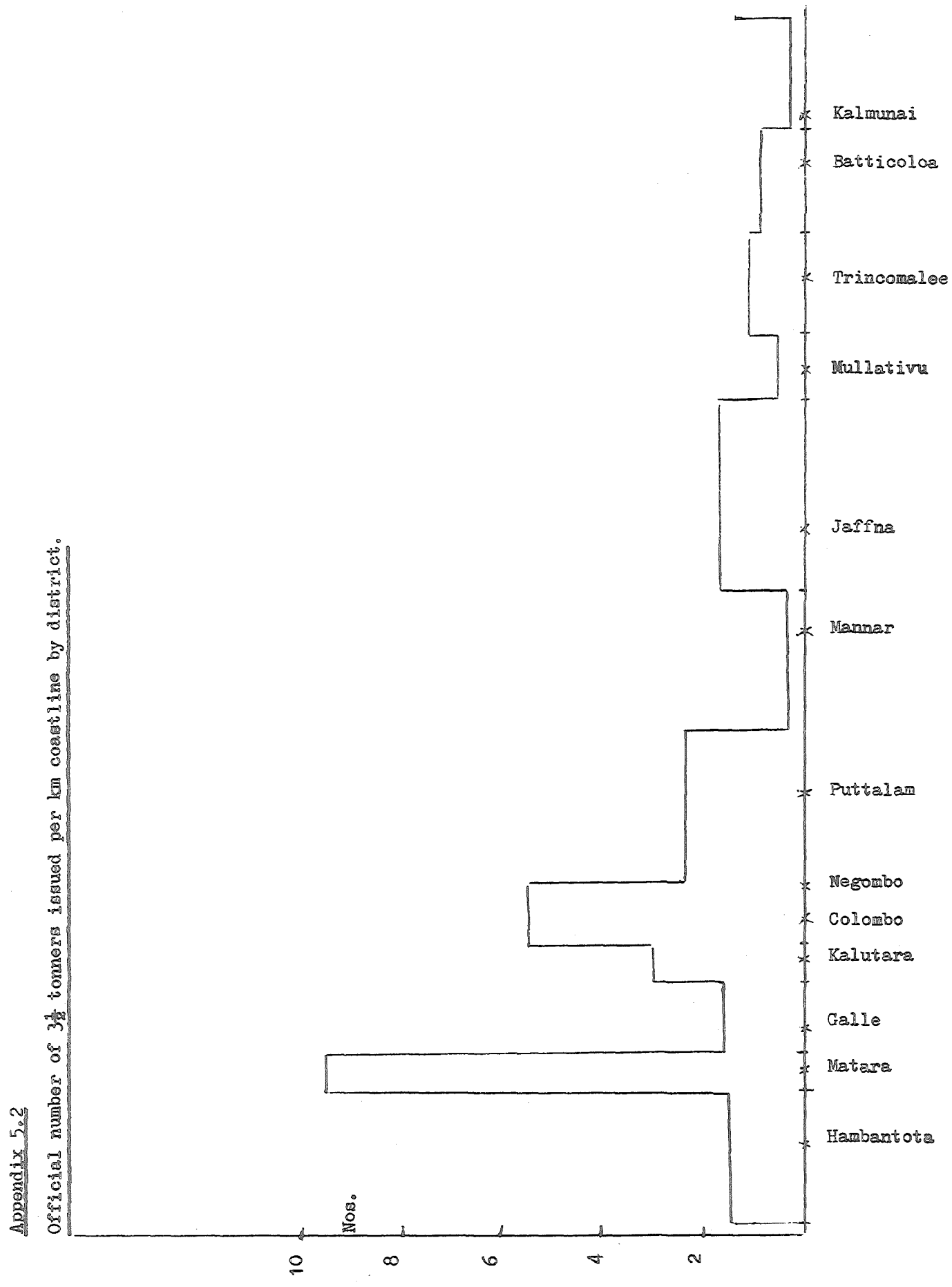
Government subsidy in connection with the issue of 3½ tonners to cooperatives and private individuals. (in Rs)

	Cooperative	Private
Cost of hull, engine and gear including FEECS	75,000	75,000
Subsidy (resp. 50% and 35%)	37,500	26,250
to be paid	37,500	48,750
Actually paid (80% arrears in cooperative repayments)	7,500	48,750
Actual subsidy	67,500	26,250
Subsidy per fisherman (crew of 4)	16,875	6,562.50
Subsidy per year (lifetime = 10 years)	6,750	2,625
Catch per year	5 tons	25 tons
Subsidy per kg. fish landed	1.35	0.10
Average price of kg. fish landed	3.20	3.20
% subsidy per kg. fish landed	42%	3%
Subsidy per year per fisherman	1,687.50	656.25
Income per fisherman per year	1,800	6,300
Subsidy of income per fisherman per year	94%	10%
Average issue of boats per year	126 nos	54 nos
Total government subsidy per year	8,505,000	1,417,500

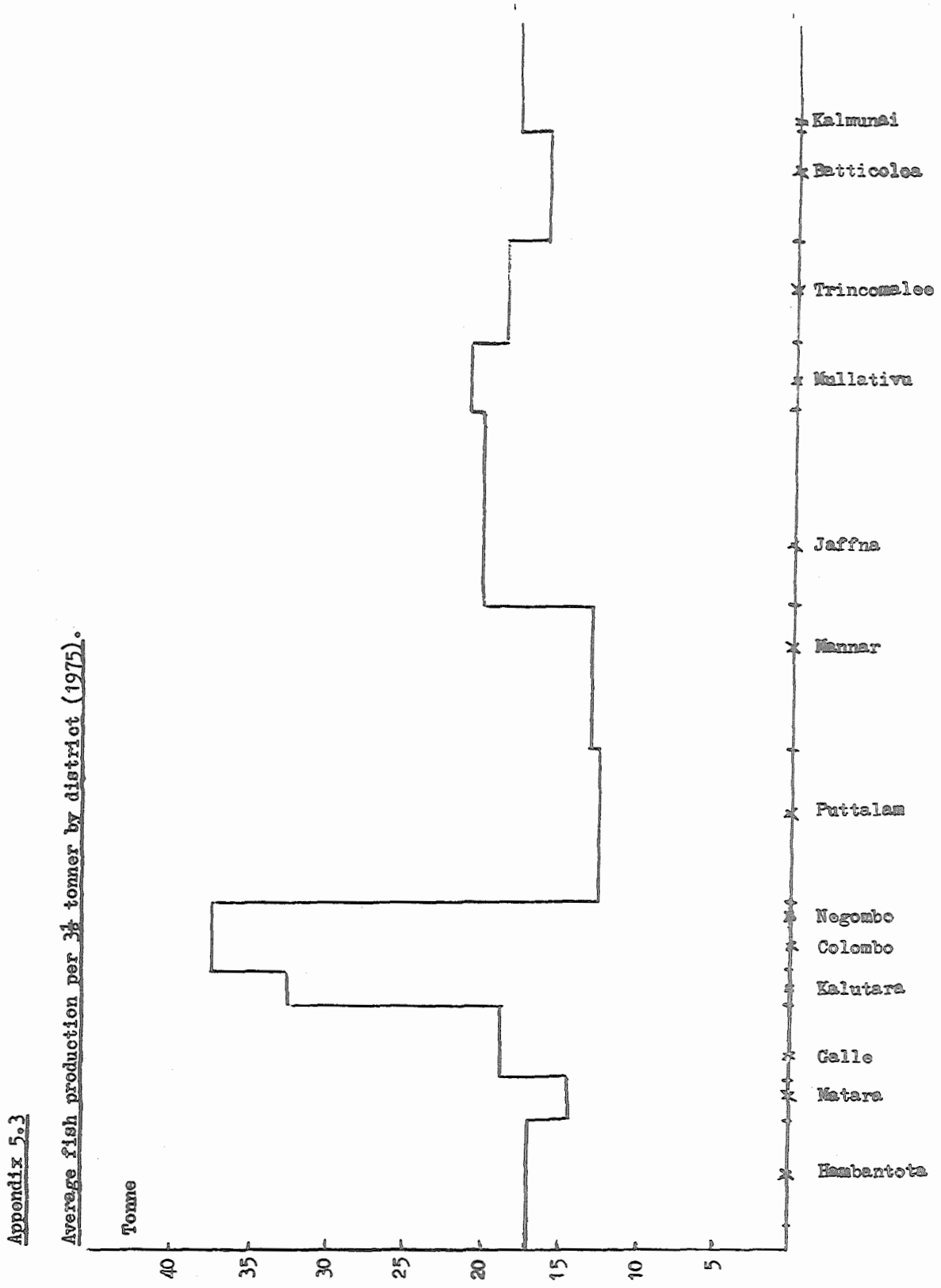
Appendix 5.1


Appendix 5.1
Fish production per km coastline by district (1975).
Tonne
350
300
250
200
150
100
200
300
400
500
600
700
800
900
1000
1200 km
Kalmunai
Batticoloa
Trincomalee
Mullativu
Jaffna
Mannar
Puttalam
Negombo
Colombo
Kalutara
Galle
Matara
Hambantota

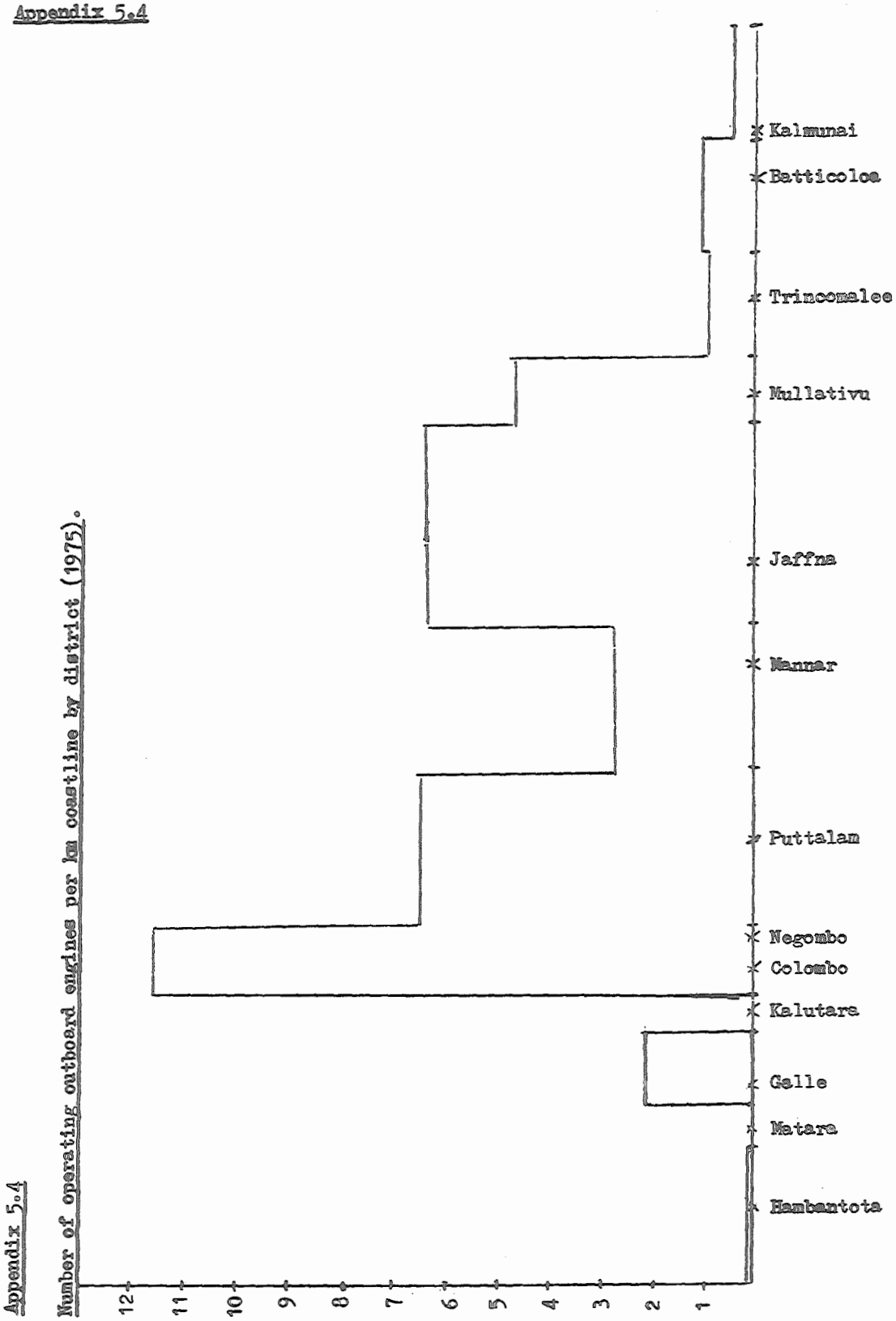
Appendix 5.2


Appendix 5.2
Official number of 3½ tonners issued per km coastline by district.
Nos.
10
8
6
4
2
Kalmunai
Batticoloa
Trincomalee
Mullativu
Jaffna
Mannar
Puttalam
Negombo
Colombo
Kalutara
Galle
Matara
Hambantota

Appendix 5.3


Appendix 5.3
Average fish production per 3½ tonner by district (1975).
Tonne
40
35
30
25
20
15
10
5
Kalmunai
Batticolea
Trincomalee
Mullativu
Jaffna
Mannar
Puttalam
Negombo
Colombo
Kalutara
Galle
Matara
Hambantota

Appendix 5.4



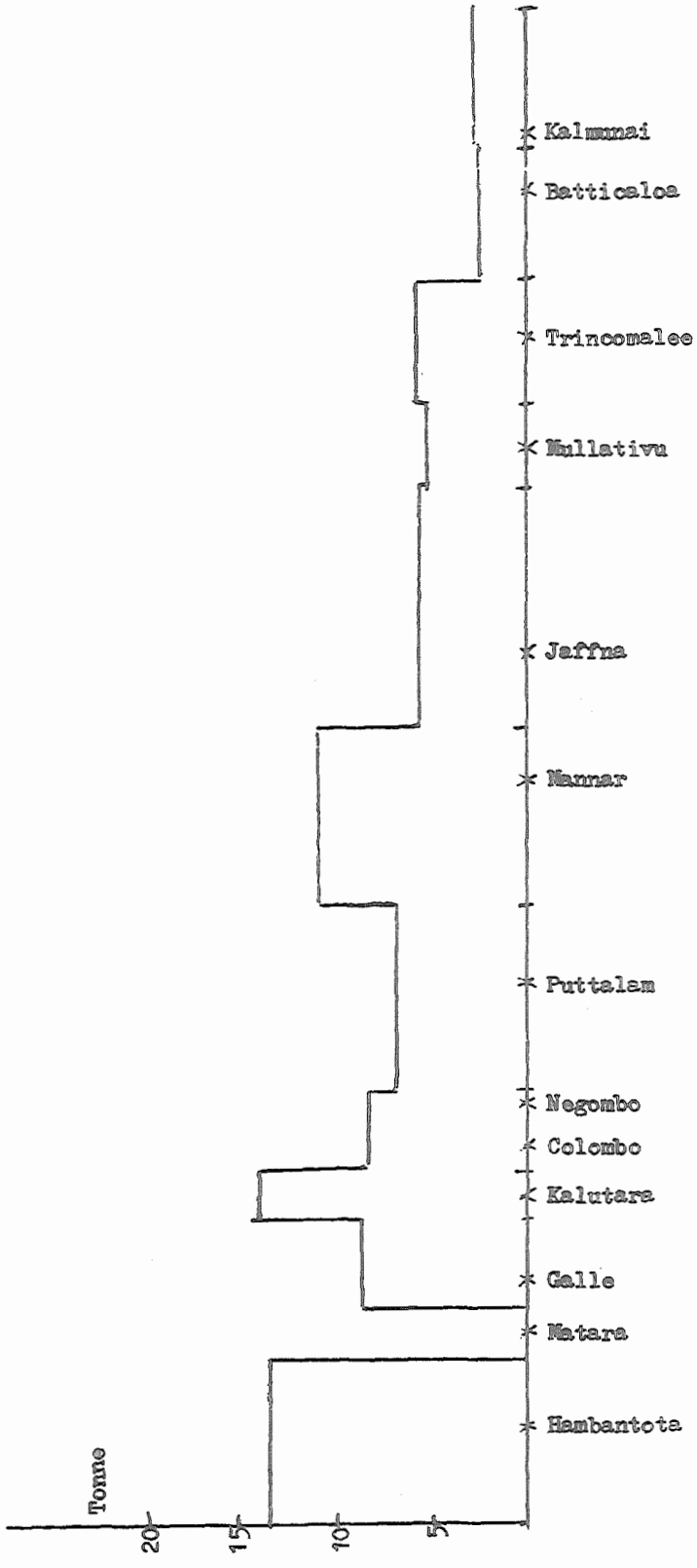
Appendix 5.4

Number of operating outboard engines per km coastline by district (1975).

Appendix 5.5

Appendix 5.5

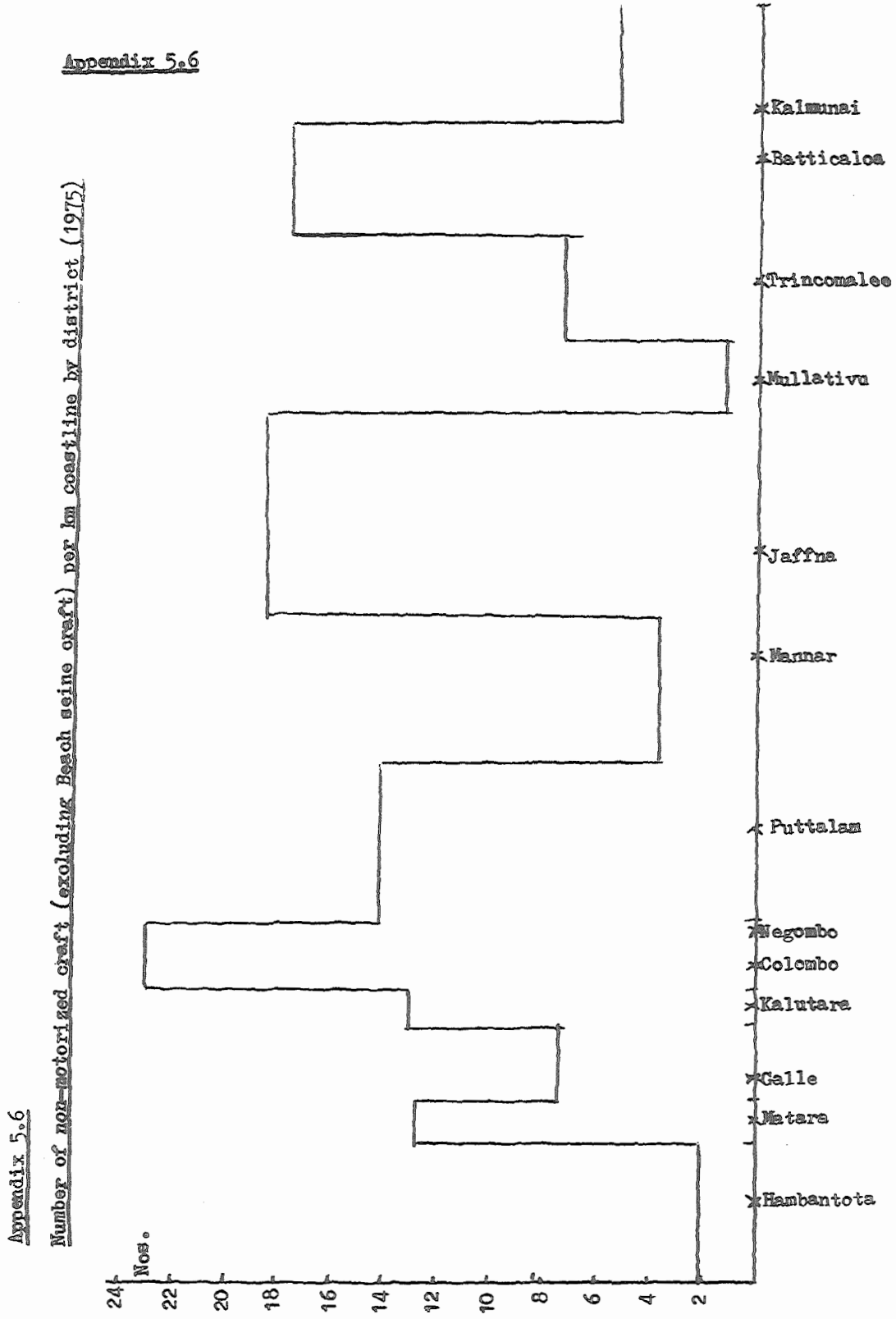
Average fish production per outboard motorized craft by district (1975)



Appendix 5.6

Appendix 5.6

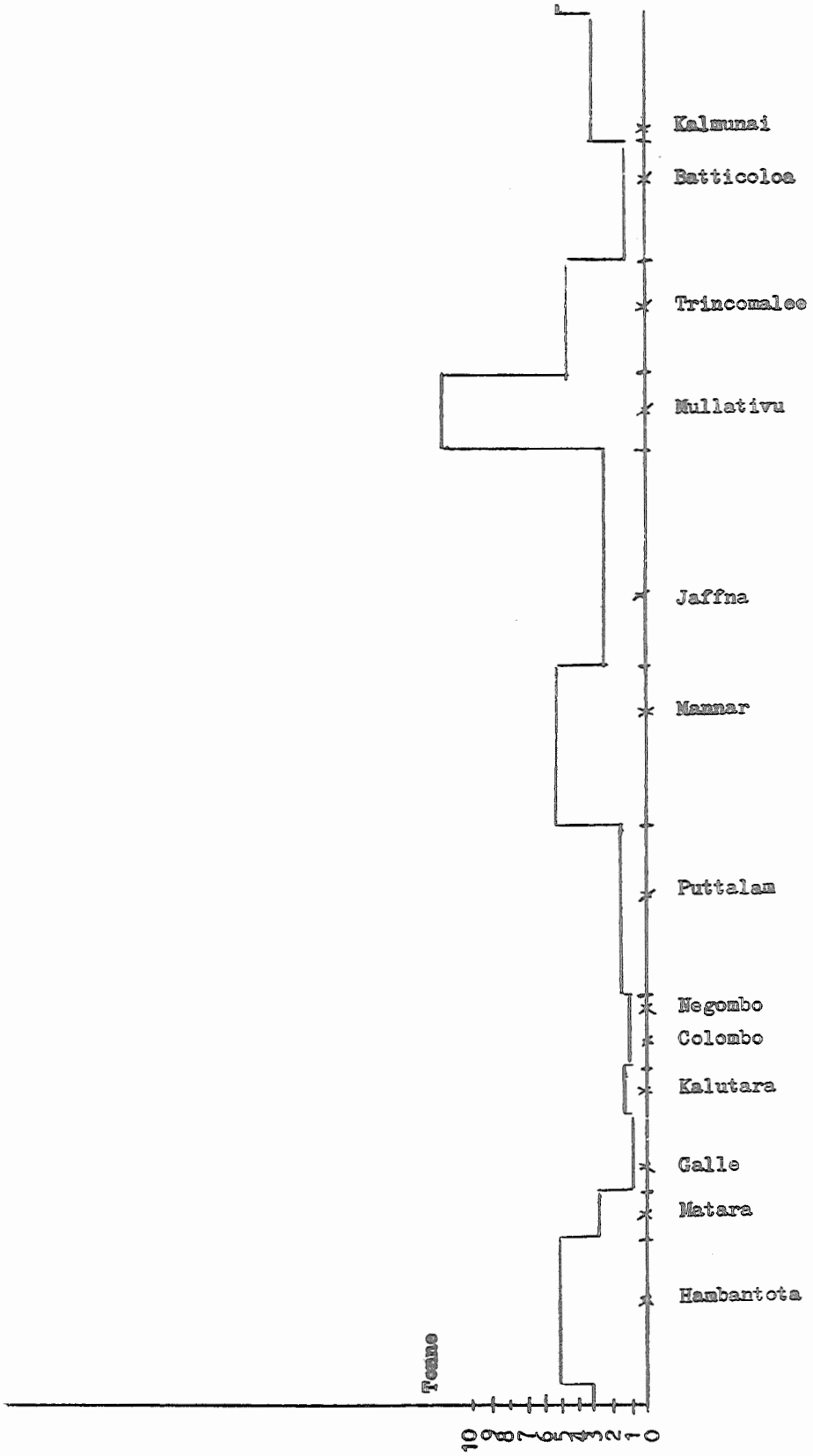
Number of non-motorized craft (excluding Beach seine craft) per km coastline by district (1975)



Appendix 5.7

Appendix 5.7

Average fish production per non-motorized craft by district (1972).



PUBLICATIONS OF THE INDIAN OCEAN PROGRAMME

1. A plan for fishery development in the Indian Ocean. Marr, John C., D.K. Ghosh, Giulio Pontecorvo, Brian J. Rothschild and Arlon R. Tussing. IOFC/DEV/71/1, 78 p. FAO, Rome.

2. Survey of resources in the Indian Ocean and Indonesian area. Cushing, D.H. IOFC/DEV/71/2, 123 p. FAO, Rome.

3. Stock Assessment. Hayasi, S. IOFC/DEV/71/3, 34 p. FAO, Rome.

4. Management. Gulland, J.A. IOFC/DEV/71/4, 8 p. FAO, Rome.

5. Fishery statistics. Banerji, S.K. IOFC/DEV/71/5, 15 p. FAO, Rome.

6. Field surveys and the survey and charting of resources. Alverson, Dayton L. IOFC/DEV/71/6, 22 p. FAO, Rome.

7. Harvesting: Experimental fishing and introduction of alternative techniques. Hiebert, Robin Ann and Dayton L. Alverson. IOFC/DEV/71/7, 30 p. FAO, Rome.

8. Existing fishing vessels and future development possibilities. Guckian, W.J., N.W. van den Hazel, N.F. Fujinami and L.O. Engvall. IOFC/DEV/71/8, 20 p. FAO, Rome.

9. Reconnaissance survey of fishery harbours and landing places. Guckian, W.J. and N.W. van den Hazel. IOFC/DEV/71/9, 35 p. FAO, Rome.

10. Reconnaissance survey of fishing vessel construction and repair facilities. Guckian, W.J., N.W. van den Hazel, N.F. Fujinami and L.O. Engvall. IOFC/DEV/71/10, 31 p. FAO, Rome.

11. Storage, processing and distribution of fish. Moal, R.A. IOFC/DEV/71/11, 137 p. FAO, Rome.

12. Economic development of the Indian Ocean countries: problems, policies, prospects. Clement, M.O. IOFC/DEV/71/12, 20 p. FAO, Rome.

13. Fishery economics. Tussing, Arlon R. IOFC/DEV/71/13, 41 p. FAO, Rome.

14. International trade - tuna. Broadhead, Gordon C. IOFC/DEV/71/14, 27 p. FAO, Rome.

15. International trade - shrimp. Peckham, Charles J. IOFC/DEV/71/15, 19 p. FAO, Rome.

16. International trade - crab. Alverson, Franklin G. IOFC/DEV/71/16, 20 p. FAO, Rome.

17. International trade - fishmeal. Alverson, Franklin G. and Gordon C. Broadhead. IOFC/DEV/71/17, 42 p. FAO, Rome.

18. International trade - groundfish. Lanier, Barry V. IOFC/DEV/71/18, 32 p. FAO, Rome.

19. Economic planning for fishery development. Tussing, Arlon R. IOFC/DEV/71/19, 26 p. FAO, Rome.

20. Assessment of stocks of demersal fish off the west coast of Thailand and Malaysia. Isarankura, Andhi P. IOFC/DEV/71/20, 20 p. FAO, Rome.

21. Crustacean fisheries of the west coast of India. Joseph, K.M. IOFC/DEV/71/21, 23 p. FAO, Rome.

22. UNDP/FAO fishery projects in the Indian Ocean region. Silva, L.I.J. IOFC/DEV/72/22, 41 p. FAO, Rome.

23. An economic feasibility study of a trawl fishery in the Gulf lying between Iran and the Arabian Peninsula. Bromiley, Peter S. IOFC/DEV/72/23, 64 p. FAO, Rome.

24. Some introductory guidelines to management of shrimp fisheries. Gulland, J.A. IOFC/DEV/72/24, 12 p. FAO, Rome.

25. Plan for pelagic fish assessment survey, North Arabian Sea. Midttun, L., O. Nakken, G. Saetersdal and O.J. Østvedt. IOFC/DEV/72/25, 23 p. FAO, Rome.

26. Marketing of Red Sea demersal fish. Bromiley, Peter S. IOFC/DEV/72/26, 23 p. FAO, Rome.

27. A review of the Indonesian Shrimp Fishery and its present development. Unar, M. IOFC/DEV/72/27, 20 p. FAO, Rome.

28. Fishery resources of the Upper Bay of Bengal. West, W.Q.B. IOFC/DEV/73/28, 44 p. FAO, Rome.

29. Economic feasibility of small boat tuna longlining in the Indian Ocean. Sivasubramaniam, K. IOFC/DEV/75/29, ...p. FAO, Rome. (In preparation)

30. A study of the feasibility of the canning of fish and shellfish in the Republic of Indonesia. Bromiley, Peter S., Jan Engstrom and Stewart Thomson. IOFC/DEV/73/30, 32 p. FAO, Rome.

31. Some notes on the assessment and management of Indonesian Fisheries. Gulland, J.A. IOFC/DEV/73/31, 21 p. FAO, Rome.

32. Currency valuation, import control, and fishing industry in Indian Ocean countries. Soon Chough. IOFC/DEV/74/32, 18 p. FAO, Rome.

33. A programme to develop the Marine Fisheries Potential of Kenya and Tanzania. Alverson, D.L. IOFC/DEV/74/33, 28 p. FAO, Rome.

34. Mangrove forests and fisheries. MacNae, W. IOFC/DEV/74/34, 35 p. FAO, Rome.

35. Fishery management issues in the Indian Ocean. Tussing, Arlon R. IOFC/DEV/74/35, 39 p. FAO, Rome.

36. Guidelines for fishery management. Gulland, J.A. IOFC/DEV/74/36, 84 p. FAO, Rome.

37. Joint Ventures in Fisheries. Crutchfield, James A., Robert Hamlish, Gerald Moore and Cynthia Walker. IOFC/DEV/75/37, 83 p. FAO, Rome.

38. An economic study on the various uses of mangrove swamps .... IOFC/DEV/75/38, ...p. FAO, Rome. (In preparation)

39. Frame surveys and associated sample survey designs for the assessment of marine fish landings. Banerji, S.K. IOFC/DEV/74/39, 15 p. FAO, Rome.

40. International trade - tuna, shrimp, crab, fish meal, groundfish. Broadhead, Gordon C. Barry V. Lanier, Franklin G. Alverson, Paul H. Patterson and Charles J. Peckham. IOFC/DEV/74/40, 199 p. FAO, Rome.

41. Improvement of national fishery statistics. Banerji, S.K. IOFC/DEV/75/41, 15 p. FAO, Rome.

42. Round Table Discoussions on Regional Approach to Fishery Development Svanøybukt, Norway. IOFC/DEV/77/42, 18 p. FAO, Rome.

43. Report of the FAO/Norway Workshop on the Fishery Resources of the North Arabian Sea, Karachi, Pakistan, 16-28 January 1978, IOFC/DEV/78/43 Volumes 1 and 2. Volume 1, 57 p. Volume 2, 204 p., FAO, Rome.

44. Report on the Preparatory Phase of the Project for Development of Small-Scale Fisheries in the Bay of Bengal, IOFC/DEV/78/44 Volumes 1 and 2. Volume 1, ... p. Volume 2, 292 p.

L6177/E/9.78