

Marine Small-Scale Fisheries of Bangladesh: A General Description



MARINE SMALL-SCALE
FISHERIES OF BANGLADESH :
A GENERAL DESCRIPTION

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This document attempts a brief and factual presentation of data and baseline information on the main features of the small-scale marine fisheries of Bangladesh.

It could serve as an introduction to the subject, leading to deeper studies of particular aspects; as a source of general information; or as a background document for use in discussions on the planning and programming of development assistance.

The paper has been prepared by the small-scale fisheries project of the Bay of Bengal Programme (B O B P) which began in 1979 from Madras. It covers five countries bordering the Bay of Bengal — Bangladesh, India, Malaysia, Sri Lanka and Thailand. It is funded by the Swedish International Development Authority (SIDA) and executed by the Food and Agriculture Organization of the United Nations (FAO). It is a multi-disciplinary project, active in the areas of craft, gear, extension, information and development support. The project's main aims are to develop, demonstrate and promote appropriate technologies and methodologies to improve the conditions of small-scale fisherfolk and increase the supply of fish from the small-scale sector in member countries.

The paper has been prepared in cooperation with the Directorate of Fisheries, Bangladesh, with the assistance of a consultant, Dr. B. T. Antony Raja.

The document is a working paper and has not been officially cleared by the Government concerned or by the FAO.

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1. INTRODUCTION

Bangladesh is situated at the northern end of the Bay of Bengal between latitudes 20°34' and 26°38' north and longitudes 88°01' and 92°41' east. It is bordered by India (west and north), India and Burma (east) and the Bay of Bengal (south). A map of Bangladesh is on Appendix 1.1. Some country data is provided in Appendix 1.2.

The country is divided into four administrative divisions: Rajshahi (north-west), Dhaka (centre), Khulna (south-west) and Chittagong (east). Each division has districts (**zilla**) and sub-districts (upazilla) as administrative units. There are 68 zillas and 460 *upazillas* with 85,650 villages.

Bangladesh has a coastline of 480 km. The area of the continental shelf is about 66,400 km².

Endowed with an estimated inland water area of about 44,000 km² and a shallow water regime (50 m depth zone) of about 37,000 km² off the coast, Bangladesh is ideally suited for small-scale fisheries activities. The inland waters are characterized by high natural production due to a combination of intensive solar energy and nutrient laden soil; the inshore waters in turn get enriched by the silt deposits carried by the rivers making them very rich areas for tertiary production from organic matter. Thus, with a variety of fish species these water resources are ideally suited to exploitation by artisanal fishermen using small-scale fishing crafts and traditional gear.

The fisheries sector accounts for 3% of the GNP, 8% of export earnings and 6% of total employment, yet it plays an important role in the economy of the country in that about 80% of the country's animal protein supply comes from fish as reported in the Draft Second Five-Year Plan.

As of 1980-81, the number of marine fishermen was about 400,000 out of a total of 1.1 million fishermen in the country. The fishing fleet consists of about 12,000 traditional boats, 2,700 motorized boats and 36 trawlers (5 public, 31 private). The first trials with motorized fishing boats started in 1966-67 with 12 hp outboard engines. The motorization programme gained momentum after the country won freedom in 1971. The only fishing harbour in the country at Chittagong came into operation in 1971 when seven trawlers were introduced.

Facilities for production of ice and cold storage are available near the main landing centres with a capacity of about 1,750 t/day for ice production and about 2,400 t of storage of ice/fish. Freezing plants and frozen storage facilities are to be found mainly in the Chittagong and Khulna districts. There are 39 freezing plants having a total freezing capacity of nearly 200 t per day and a frozen storage capacity of 5,390 t.

There are two fish meal plants with a total capacity of 25.5 t raw fish per day, but the plants are working far below capacity due to shortage of raw material.

There are two net making factories producing about 60,400 kg of nylon twine; two more are planned to be set up with a total capacity of 200,000 kg. Most of the nets used by the small-scale sector are hand braided by the fisher-folk.

About 30% of the landed fish is marketed fresh and about 40% as fresh fish with ice. Some 20% is sun dried and the rest frozen and exported, but for a small quantity of poor quality fish and small shrimps which is converted to fish meal.

As a major food item, fish stands next to rice, but the annual per capita consumption is only 7.4 kg. The fish production meets hardly 25% of the minimum requirement of animal protein. The demand for fish by 1984-85 has been estimated at about one million tonnes on the basis of income elasticity of demand and population projection.

Coastal aquaculture, particularly culture of prawns, has been expanding rapidly in the recent past. Exports of prawns have gone up from Tk. 24.6 million (about US \$ 1 million) in 1976-77 to Tk. 1555.0 million (about US \$ 62.2 million) in 1981-82 and of all fish and fish products from Tk. 27.8 million (about US \$ 1.1 million) to Tk. 1942.8 million (US \$ 77.7 million). The fishery sector ranks second among all exports, next only to jute and jute products.

The Government encourages increase in fish and prawn production and desires the establishment of a better marketing system through which fish can be distributed throughout the country, including supply during the monsoon period.

The fisheries administration vests with the Fisheries Et Livestock Division of the Ministry of Agriculture. The main agencies implementing development activities are the Directorate of Fisheries and the Bangladesh Fisheries Development Corporation (BFDC). Of the total plan outlay of Tk. 7,500 million (US \$300 million) for the period 1980-85, these two organizations together have been allotted Tk. 1,531.5 million (about US \$ 61.3 million). Besides the Planning Commission, the other important ministries/departments concerned with fisheries are the Department of Cooperation and the Ministry of Industries and Commerce.

Fishermen cooperatives have been organized into the traditional three-tier pyramidal structure : primary, intermediary and apex societies. The national apex organization is the Bangladesh Jatiya Matshyji Samabaya Samity (BJMSS). There are 88 intermediary and 4,243 primary societies with a membership of 540,000 as of 1983.

The awareness that Bangladesh is one of the poorest countries in the world with a per capita annual income of US \$120 (as of 1980), places the major thrust of the development on a significant reduction of poverty. The specific objectives of fisheries development focus attention on improving traditional and employment-oriented technologies, organizing and mobilizing the rural labour force, improving the socio-economic conditions of fishermen and fish farmers, increasing fish production, raising the consumption of fish and the level of nutrition, development of selected fishery products, and intensification of research in both marine and inland fisheries.

Foreign aid plays a very important role in the development effort. A number of national and regional projects are being executed by the FAO (Food and Agriculture Organization of the United Nations). Among the bilateral aid programmes, the Danish assistance, most of which is directed through the BFDC, constitutes the largest component in marine fisheries.

2. FISHERY RESOURCES

Generally, the period from September to March is characterized by fine weather and calm seas. In April, the first signs of the south-west monsoon appear and the period April to August is marked by rough seas, caused by strong winds with heavy rain. Usually, the Bangladesh coast is subjected to heavy cyclonic storms, once during May-June and again during October-December.

Ocean currents in the Bay of Bengal are complicated because the Bay is very narrow in the north and flanked by coasts in three directions (east, north and west) and many rivers flow into the Bay. In general, in seas deeper than 40 m, the ocean current flows eastward during the strong south-west wind season and westward during the north-east wind season. In the Bay near the coast, on the other hand, affected by rivers and tides, the current flows northward during high tide and southward during low tide.

The lowest surface temperature of the ocean is 22-24°C during December and January. Thereafter it goes up and reaches 30°C in June and remains more or less unchanged till October. The annual temperature difference is about 5-6°C. However, from the survey of R. V. Dr. Fridtjof Nansen (Saetre 1981) it is seen that the surface temperature was 28-29°C in November-December and in May it was about 1.5°C higher.

In general, the rainfall shows a bimodal pattern, the peaks normally occurring in June and September. The occurrence of the peaks may vary by a month or so from year to year, and are sometimes not clearly demarcated (Dunn, 1982). Although the fishery extends almost throughout the year, fishing activity is considerably reduced during the monsoon months (June to August).

The territorial limit of Bangladesh is 12 nautical miles measured seaward from the coastline. Appendix 2.1 shows the fishing grounds and depth contours in the sea off Bangladesh. The length of the coastline is 480 km and the continental shelf extends over an area of about 66,000 km² of which about 37,000 km² within 50 m depth zone have good fish resources. According to the survey carried out by R.V. Dr. Fridtjof Nansen in 1979-80, the shelf area off Bangladesh from the 10 m line to the edge of the continental shelf is about 42,440 km². The areas of the different depth zones are shown in Table 2.1.

Table 2.1

Shelf area of Bangladesh

(Source : Saetre, 1981)

Depth zones (m)	Area (km ²)
< 10	24,000
10 - 24	8,400
25 - 49	4,800
50-74	5,580
75 - 99	13,410
100-199	10,250
Total	66,440

The survey also indicated that the shelf area up to about 150 m appeared to be very even, and obstacles hazardous to bottom trawling were observed only in the northern part of the Swatch of No Ground and south-west of St. Martin Island at about 20°00' N, 91°40' E. The continental edge is found at depths between 150 and 180 m. The slope is very precipitous and it is perhaps impossible to carry out bottom trawling in waters deeper than 180 m.

Analysis of the distribution of salinity and dissolved oxygen seems to indicate that distribution of the marine fish and shrimp population has been limited to a narrow belt by the following factors :

- (a) freshwater inflow from rivers, restricting the inshore distribution of marine species to depths greater than 15 m, and
- (b) low oxygen cold water moving up into the shelf, restricting distribution of marine demersal species to depths up to 80-100 m.

Several surveys have been conducted to estimate the resource potential. The most comprehensive of these (mainly trawling) was the one under the UNSF/PAK-22 project conducted from 1968 till 1971 by the BFDC in collaboration with FAO. It covered an area of 26,000 km² and resulted in the identification and charting of four major commercial fishing grounds. Details are provided in Table 2.2.

Table 2.2
Commercial fishing grounds

(Source : Hussain, 1982)

Name	Location	Major commercial species
1. South Patches	90°10' – 90°50'E 21°10' – 21°40'N	Indian salmon, Hilsa, Pomfret, Ribbon fish, Bombay duck, Eel, Croaker, Catfish, etc.
2. South-west of South Patches	90°30' – 90°40'E 20°45' – 21°1 0'N	Pomfret, Red snapper, Croaker, Carangids, Grunter, Ribbon fish, Shrimp, etc.
3. East of Swatch of No Ground	90°00' – 90°40'E 21°00' – 21°25'N	Snapper, Grouper, Croaker, Shrimp, etc.
4 Swatch of No Ground	89°00' – 89°50'E 21°00' – 21°40'N	Hilsa, Pomfret, Ribbon fish, Bombay duck, Croaker, Shrimp, etc.

Past estimates of the potential yield of the waters of the Bangladesh shelf area have varied widely between 350,000 t and 700,000 t. On the basis of a study of different estimates, Raja (1980) suggested a figure of 350,000-360,000 t as the potential yield of the shelf waters, of which about 175,000 t to 180,000 t might be accessible to small-scale fisheries. A lower estimate of 200,600 t has been made on the basis of the survey carried out by R.V. Dr. Fridtjof Nansen in 1979/80. The latter survey did not cover the shallow area below 10 m and only an assumption was made of the resources in this area. An estimate by Penn (1982) of the potential production on the marine offshore zone (in addition to the existing inshore catch) is of the order of 10,000 – 14,000 t of demersal fish and 2,000 – 4,000 t of marine shrimp. No such estimates are available in regard to the potential yield of the inshore waters, nor for the pelagic fish resources of the shelf.

A valid assessment of the resources exploited by the small-scale fisheries would require the establishment of a proper data collection system and a detailed analysis of the fishery. The ongoing FAO/UNDP Fisheries Resources Survey System Project is engaged in establishing such a system.

3. FISHING FLEET

3.1 Fishing craft

Till the mid '60s, fishing operations in the estuaries and offshore waters were carried out by traditional craft. Although the introduction of motorized fishing craft has gained momentum during the last decade, the bulk of the marine catch is still landed by non-motorized craft. As may be seen from Appendix 3.1, there are about 12,000 indigenous craft, 2,700 motorized boats and 36 trawlers. No breakdown of figures for different types are available with regard to gear.

The details for 1967-68 are given in Appendix 3.1 from a survey carried out at that time which also provided some data of the district-wise, distribution of traditional boats. These are given in Table 3.1.

Table 3.1
Distribution of traditional boats by district (1967-68)

(Source : Anonymous, 1972)

District	Plank-built boats	Dugouts	Total
Chittagong	4055	1871	5926
Noakhali	780	185	965
Barisal	1025	—	1025
Patuakhali	1077	111	1188
Khulna	445	3	448
Jessore	11	—	11
Total	7393	2170	9563

The *plank built boats* are mainly of two types- Dinghi and Chandi. *Dinghi* is a shallow boat with a pointed bow and a stern 5 - 7 m long. The hull is strengthened by ribs and cross beams. The hulls are made of sal, teak, or jarul wood with decking of half split bamboo. It is propelled by long oars and/or sail operated by one or two fishermen. The boat is used to operate small lift net, cast net, or traps.

Chandi is a round bilge carvel planked boat with a high sheer aft, usually built in 'Sundari' wood, but also in 'Jarul' or 'Gurjan'. The shell is built up by stapling individually-shaped planks after which the framing is nailed into place. The boat is decked with split bamboo and a thatched bamboo shelter is located slightly forward of amidships. The boat is narrow and keel-less and is equipped with a large steering oar. The boat is propelled by oar and sail. The square sails usually fitted permit only downwind sailing and the craft is built essentially for rowing. It carries a crew of 7 to 15 people ; it is mainly employed for operating hilsa gillnet.

Balam is a dug-out. The bow and stern are slightly raised. The sides are built by fitting planks to the dug-out portion of the hull. A square sail is carried on a bamboo mast. The large balam is 15-20 m long, the medium is between 10 and 15 m. Crew members for the large. boat are 20-30 and for the medium 10-15. The balam is used for operating gillnet, set bagnet or beach seine.

Motorized traditional boats- These craft were introduced for the first time in 1966/67 by an FAO-SIDA project under the Freedom From Hunger Campaign by motorizing traditional Cox's Bazar type boats with 12 hp petrol outboard engines. Subsequently, these were replaced by inboard marine diesel engines of 15-33 hp. The boats are 12-14 m long. They mainly use gillnets, but also operate behundi and/or funda nets. The number of crew is generally 8-10.

From 1975-76, a modified Cox's Bazar type boat has been built in a boatyard set up at Chittagong under a DANIDA-aided boatbuilding and motorization project. The boat is 12 m long, has a gross register storage of 5 t, is powered by a 22 hp marine inboard diesel engine and has a crew of six. The marine engines and motorized boats distributed by the Government agencies up to 1982 are shown in Appendix 3.2. Details of the traditional and motorized boats are summarized in Appendix 3.3. The economic performance of Chandi and motorized boats are in Appendices 3.4 and 3.5, respectively.

Trawlers — Commercial trawling in the offshore waters commenced in 1972 with the introduction of seven trawlers. Towards the end of 1983, the effective number of trawlers in operation increased to 65, of which 47 were fish trawlers and 18 double rig shrimp trawlers (Shahidullah, 1983) — most of them in the length range of 30-40 m.

3.2 Fishing gear

Four main types of gears are being used, namely, gillnets, behundi (set bagnets), funda (stake nets) and longline.

Gillnets are almost all drift gillnets with generally 100 mm mesh for catching hilsa, pomfret, mackerel, croaker, eel, red snapper, grunter, shark, catfish, etc. Large-mesh gillnets with 180-200 mm mesh are used for catching Indian salmon, sea bass, grouper, etc. The cost varies between Tk. 40,000 and 60,000 per unit (US \$ 1,600-2,400) depending on the length and the weight of the net. Twines used for these nets are made of nylon and tyre cord and have an average life span of about four years.

The driftnet fishery has benefited from improvements in traditional motorized boat construction brought about by the DANIDA/BFDC boat construction project. The BOBP's small-scale fisheries project has organised systematic experiments to improve the traditional floating large-mesh gillnets. The outcome of the experimentation and demonstration programme, which was carried out in 1980-81, is an improved net made of lighter twine than the traditional net, but with the same mesh size. These improvements have been adopted already by fishermen. The specifications of the improved driftnets are as follows :

- (i) for hilsa fishing, the type of net most suitable has the following characteristics: nylon 210 d6, mesh 100 mm in length, stretched 140 m (or 1,400 meshes), depth 120 meshes, hanging ratio 0.5. The floats are usually of bamboo and the float line of synthetic material. The "lead line" is weighted with discs of clay. A 12 m motorized boat with a crew of five to eight men can handle 25 nets of 70 m (mounted), or a total length of 1,750 m (stretched webbing), and can make two sets in a day.
- (ii) for other fish (large-mesh) ; the net would be nylon 210 d30, and the mesh is 180 mm. Each unit mounted would be 90 m long with a hanging ratio of 0.5 and 50 meshes deep. A 12 m boat with a crew of five to eight men can handle a driftnet consisting of 20 units.

Behundi is a fixed bagnet with a rectangular mouth. Wings are often attached on the two sides of the mouth to increase the total fishing area. 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 4-13 mm. 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 sea bottom. The fish comes with the current (tide), enters through the mouth and ends up in the bag. The catch consists mainly of shrimp, Bombay duck, small anchovies and immature hairtails. One main fishing ground is Dubla Char where bagnets are set from October to February; another is off Chittagong. Around Cox's Bazar, bagnets are used at sea from October to March to catch bigger fish of high quality such as pomfrets, large croakers and Spanish mackerel. The typical bagnet unit consists of two country crafts, one fish carrier and six to eight bagnets which are set to fish simultaneously. A behundi net has a life span of about five years, and costs Tk 6,000 — 15,000 (US \$ 240-600) depending on its size.

Funda is 55 m long and 3-4 m deep, with a 4 inch mesh. It is a stake net used off Chittagong in the open sea from November to March for sea perch and Indian salmon. The price of a funda net is of the order of Tk 8,000-10,000 (US \$320-400) and it has an average life span of five years.

Longlines are mainly used for catching croaker, threadfin, catfish, eel, snapper, etc. Longlines are about 500 m long and are made of nylon rope and a unit consists of 4-6 sets of lines. Long lines with chain snoods and big shark hooks are also used for catching sharks.

A longline fishery has been developed in Cox's Bazar and exploits waters at depths ranging between 10 and 25 fathoms. There are about 120 country boats, or canoes, with small diesel engines (8-15 hp), engaged in this fishery in Cox's Bazar along with about 500 non-motorized boats. These boats are about 10-12 m long, but only 1.5 m wide and 0.5 m draft, and carry a crew of four to six men.

The longlines bear 1,000 to 1,500 hooks. They are set and recovered twice a day. The average catch is about 150 fish per day. The main species is croaker, but threadfin is also caught and processed; the size is generally 20-25 cm, which is the best size for salt-drying. Each board carries about Tk 300 (US \$ 12) worth of longline. Engines cost between Tk 10,000 and 20,000 (US \$ 400-800). The landing price of the catch is about Tk 12 (US \$ 0.50) per fish (average gross revenue Tk 1,800 (US \$ 72) per fishing day). The boat does not carry ice and the catch is brought back every day to Cox's Bazar.

4. INFRASTRUCTURE AND SERVICE FACILITIES

Fishermen land their catch at numerous landing places scattered all over the coastal districts on beaches or river banks.

The marine delta fishermen, mainly from Chittagong, migrate during the season to the islands Dubla, Rangabali, Sonadia and other areas and land and sun-dry the fish in temporary camps.

In a few places, there are wooden jetties with water, provisions and fuel supply facilities, which are used by both traditional and motorized boats.

Locations of the fish landing terminals that have been established by BFDC are shown in Appendix 4.1.

Ice production and cold storage facilities are available near the main landing centres. There is a total of 130 plants for block ice and nine for flake ice, having a production capacity of 1,246 t/day and 150 t/day respectively. Cold storage facility is available to the extent of 608 t of ice, 305 t of fish, and 1,494 t of ice/fish. The distribution of the plants by district and sector (public, cooperative and private) and their capacities are given in Appendix 4.2. Freezing plants and frozen storage facilities are to be found mainly in the Chittagong and Khulna districts. There are 39 freezing plants in the coastal districts, having a total freezing capacity of nearly 200 t/day, and a frozen storage provision for 5,390 t. The distribution by location is indicated in Table 4.1

Table 4.1

Freezing plants and their capacities

(Source : Marine Fisheries Department, Government of Bangladesh, Chittagong)

Place	No. of plants	Freezing capacity t/day	Frozen fish capacity (t)
Chittagong	22	144.5	3,690
Cox's Bazar	2	11.0	195
Sylhet	1	2.0	150
Khulna	14	39.0	1,355
Total	39	196.5	5,390

The only fishing harbour in the country is located at Chittagong on the left bank of the Karnafuli river, close to the port of Chittagong. It is owned and operated by the BFDC. The harbour was completed in 1971.

The facilities available are :

- harbour basin (2.6 ha) with minimum depth of 4.2 m during low tide, and a wharf of 658.5 m;
- slipway to accommodate vessels upto 33.5 m in length and 250 t in weight;

- ice plant, cold storage, freezing plant, frozen storage, fresh water supply, warehouse, workshop, auction hall ;
- Marine Fisheries Training Centre, boat building yard, and other ancillary facilities.

Constant siltation of the harbour mouth and basin due to erosion of the left bank of the river has made the use of the harbour problematical, requiring regular dredging.

BFDC owns two fish meal plants with a total capacity of 25.5 t raw fish per day. The larger plant of 24 t capacity is at Chittagong and the smaller one at Cox's Bazar. The plants, however, are working far below capacity due to shortage of raw material. In 1976-77, these plants together processed only about 100 t (Jabbar and Karim, 1979).

There is a net making factory at Chittagong owned by BJMSS which produces 27,000 kg of nylon nets per year. The other factory at Comilla which belongs to BFDC, produced 33,400 kg of nylon twine in 1981-82 (as against the installed capacity of 41,000 kg). Two new net factories, each with a production capacity of 100,000 kg per year, are under construction by BFDC at Chittagong and Khulna.

Most of the nets used by small-scale fishermen, however, are hand braided by the fisherfolk.

The construction of traditional fishing boats is carried out at many places along the coast. The only established boatbuilding yards are one owned by the BFDC at the Chittagong fishing harbour, and one owned by the BJMSS, which is located at Chittagong. The BFDC boatyard has a production capacity of 120 wooden boats per year, while the BJMSS boatyard builds two ferro-cement boats a month.

For repairing engines, there are eight workshops located in the same places where fish landing terminals have been built. Of these, six belong to BFDC and one each to the Christian Council for the Development of Bangladesh, Cox's Bazar (CCDB) and BJMSS, Chittagong. The locations of the workshops, boatbuilding yards and net making plants are shown in Appendix 4.3.

5. PRODUCTION

Fishing activities are extremely scattered and an adequate system for recording catches is lacking. Yearwise production of marine and fresh-water fish since 1964-65 is listed in Appendix 5.1 according to which the present level of total fish production is of the order of 686,000 t; 556,000 t from the inland sector and 130,000 t from the marine sector. The marine catch was around 80,000 t during the late 1960s, and fluctuated between 90,000 t and 100,000 t up to mid-1970s. Thereafter, there seems to have been a rapid increase as indicated in Table 5.1.

Table 5.1

Estimated total production of marine fish and shrimp 1982-83

(Source : Shahidullah, 1983)

Sector	Fish(t)	Shrimp(t)
Trawl fishery	17,164	2,324
Gillnet and seine net fishery	80,000	—
Set bagnet fishery	37,429	—
Longline fishery	3,000	—
Other fishery	20,000	—
Coastal aquaculture	—	2,500
Total	157,593	4,824

Small-scale fisheries in the marine sector are playing a vital role, contributing about 95% of the total catch, in which the set bagnet is the most important fishing gear, landing about 45% of the total catch ; gillnets catch 35% (Mohiuddin et al., 1980).

The main fishing season is from mid-September to mid-April, with a peak season during October- February.

Table 5.2 shows marine fish production from different sectors during 1979-80 and the targets for 1984-85.

Table 5.2
Marine fish production from different sectors
(Source : Anonymous, 1980a)

Source of production	Fishing landings 1979/80 No. of craft	Catch (t)	Target 1984/85 No. of craft	Catch (t)
<i>A. Public sector (BFDC)</i>				
Trawlers	9	3,500	8	4,000
Motorized boats	700	14,000	3,000	60,000
<i>B. Private sector</i>				
Trawlers	3	1,500	66	33,000
Motorized boats	700	14,000	1,000	20,000
Sail boats	12,000	89,000	9,000	63,000
Total		122,000		180,000

Data concerning the amount of each species landed is not available. The important species which compose the catch are listed in Appendix 5.2.

Of these, *Hilsa* spp., (mainly *Hilsa ilisha*), catfishes, Indian salmon, croaker, sea perch, hair-tails, Bombay duck, carangids, snapper, Spanish mackerel, pomfret, Indian mackerel, shark, rays and prawns are important varieties.

6. HANDLING AND PROCESSING

Traditional craft engaged in day fishing do not carry ice on board for preservation of the catch. However, about 70% of the motorized boats which make 4-6 day fishing trips, carry ice in insulated fish-holds.

After landing, fish is transported to the market by headload baskets, hand carts, etc.

About 20% of the catch is sun dried, salted and cured, and the rest is consumed in the fresh form. Generally species such as Bombay duck, small shrimp, pomfret, hairtails, anchovy are sun dried.

Air bladders of Indian salmon, pike-conger, croaker and shark fins are sun dried for export. Since about 1977, croakers are being processed by salting and dehydration for export.

Wet fish is iced, packed in bamboo/palm leaf baskets and wooden boxes, and transported by truck, bus and rail to the markets. Fish carrier boats are used to transport fish packed in ice to

the main marketing centres such as Dhaka, Chittagong, Khulna, etc. The BFDC uses insulated and refrigerated fish vans for the transport of fish.

Almost all good quality shrimp is frozen for export. Besides shrimp, a small quantity of pomfret pike-conger and Indian salmon is also processed and frozen for export.

A very small quantity of poor quality fish and small shrimps is converted into fish meal at the fish meal plants in Chittagong and Cox's Bazar.

7. DISTRIBUTION AND MARKETING

Almost 30% of the landed fish is marketed fresh ; about 40% is transported as fresh fish with ice and marketed; 20% is sun-dried on bamboo or other racks. When the catch is good, sun-drying becomes important, particularly for small fish. Sometimes dry/wet salting is also done for preservation of the product until it is taken to the market. Of the fresh and iced fish product, some white fish is also processed by freezing for internal as well as external marketing.

Traditionally, most fish is sold whole, but larger fish is cut into pieces before sale in fresh/iced condition. Part of the fish is also sold in frozen condition packed in polyethylene. Generally consumers prefer fresh and whole fish.

As a major food item, fish stands next to rice in Bangladesh. The population growth and the decline in production of fish in the country has caused undernourishment and protein deficiency. For the present population not less than about 3 million tonnes of fish are required annually to meet 80% of the minimum requirement of animal protein, whereas the present fish production is about 0.69 million tonnes, far below the present requirement of the nation. The demand for fish by 1984/85 has been estimated at about one million tonne on the basis of income elasticity of demand and population projection. (Karim, 1979 ; Anonymous, 1980a).

In the estuarine and coastal regions, fish is landed and distributed through municipal and private markets situated at Chittagong (Reazuddin Bazar), Cox's Bazar, Khulna, Noakhali, Barisal and Patuakhali, and wholesale fish market and fish landing terminals of BFDC situated at Chittagong (fish harbour), Cox's Bazar and Khulna. To improve marketing of the catches from the estuarine and coastal areas, BFDC has recently established wholesale fish markets and fish landing terminals, one each at Khepupara and Patherghata. Major arrivals are in Chittagong, Cox's Bazar, Khulna and Barisal markets. Yearwise wholesale rates of major commercial species of sea fish at Chittagong and Cox's Bazar during the years 1979-80 to 1983-84 are presented in Appendix 7.1. The most highly priced fish is silver pomfret followed by bhekti, hilsa and the Indian threadfin. Next in the category of valued fishes are the black pomfret, croakers and catfish. In the estuarine and coastal regions fishermen sell their catch to the fish traders ('mohajon') through agents ('dalals'). These 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 weight.

The fish traders either auction the fish at the beach or send the fish direct to the interior wholesale markets. They use owned 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 three per cent of the sale value. Forming a powerful group, the fish traders control the trade through all stages.

Generally, marketing is through open auctioning of unweighed consignments. Occasionally the lots are weighed. Only hilsa is sold by count in 'pon' (80 nos).

Marketing charges in BFDC wholesale fish market are six per cent of the sale proceeds. In private, municipal and cooperative wholesale fish markets, arathdars/mohajons conduct the auction on a commission basis ranging from three to six per cent of the proceeds.

8. EXPORT AND IMPORT

The traditional export of fresh and dried fish has ceased and the bulk of the export now consists of frozen shrimp. Foreign exchange earnings from export of shrimp, fish and fish products during 1983-84 amounted to Tk 1,943 million which is roughly equivalent to US \$ 78 million. This amount was realised from the export of perhaps about 13,000 t. The quantity and value of shrimp, fish and fish products exported during 1975-76 to 1983-84 are shown in Appendix 8.1. The value of exports has increased over ten times from 1975-76 to 1983-84. The export is mainly oriented towards frozen shrimp which contributes 75% of the exports by weight and 82% by value. The next important items are frog legs and frozen fish, the latter purely out of joint ventures. Export of fresh fish which was on the decline since 1976-77 has ceased from 1981-82.

The major imports of equipment since 1972 consist of trawlers (from USSR, UK, Japan, South Korea, Denmark), marine engines (from USSR, Denmark, Japan, Sweden, Germany), synthetic twine and ropes (from South Korea, Denmark, Japan, Norway), boatbuilding timber (from India, Burma), refrigeration equipment (from USSR, Japan, Denmark), ice plants (from Denmark, Japan, India, Norway, Rumania), plants for making fishmeal and shark liver oil (from Denmark), two fully equipped fishing research vessels (from Japan, Denmark), refrigerated and insulated lorries (from Rumania, Japan, Korea) and training equipment for trawling (from USSR).

The quantity of fishing twine and fish products imported during 1977-78 to 1981-82 are shown in Table 8.1.

Table 8.1
Quantity and value of fishing twine and products Imported

(Source : Anonymous, 1983b)

Year	Fishing twine		Fish products	
	Quantity (t)	Value (million Tk)	Quantity (t)	Value (million Tk)
1977-78	2655.3	114.1	N.A.	0.5
1978-79	2476.9	107.1	N.A.	1.5
1979-80	1443.1	75.0	N.A.	0.3
1980-81	2005.2	124.2	Nil	Nil
1981-82	972.0	74.6	Nil	Nil

9. COASTAL AQUACULTURE

The increased interest of consumers from major developed countries like Japan, USA and those of Western Europe for shrimps provides an opportunity for Bangladesh to boost foreign exchange earnings through the development of coastal aquaculture.

This activity also has a great potential in enhancing the internal supply of animal protein, providing more employment opportunities, raising incomes and improving the domestic economy through related economic activities.

Indeed, the large stretches of water available-1.6 million ha of perennial inland waters and 2.8 million ha of inundated paddy fields: other lands flooded for four to six months in a year as a consequence of the monsoon -offer wide scope for the development of inland as well as brackishwater aquaculture. Activities related to this field however are still in their initial stages. According to an FAO bulletin released in 1983, the production rate in culture operation is only 177 kg per ha. The total area of 110,000 ha under aquaculture in 1979-80 stands out against a potential of 240,000 ha for the near future. The recent estimate of shrimp production through culture practices is 2,500 t (Shahidullah, 1983), with the potential placed at 4,600 t (Liaquat Ali, Ms).

Table 9.1 presents the areas of water under fish and shrimp cultivation in 1979-80.

Table 9.1
Areas of water bodies that were utilized for aquaculture in 1979-80
(Source : Anonymous, 1980a)

	Public sector (ha)	Private sector (ha)
Pond	10,080	75,448
Baor	1,046	14,954
Coastal waters	240	8,000
Total area	11,366	98,402
	109,768	

Table 9.2 shows the areas which can be brought under culture in the near future.

Table 9.2
Areas of water bodies that might be utilized in the near future for aquaculture
(Source : Anonymous, 1980a)

	Public sector (ha)	Private sector (ha)
Pond	2,800	105,600
Baor	1,046	14,954
Large unmanageable water bodies (cage, pen culture)	200	4,394
Dyked baor	400	—
Irrigation canal, coastal water	2,276	—
Coastal tidal flats, WDB polders, mangrove, creeks, salt beds, etc.	2,200	80,000
Irrigation canals	—	3,724
Paddy fields, flood lands	—	20,000
Total area	8,922	228,672
	237,594	

The main species in brackishwater aquaculture is the tiger shrimp (*Penaeus monodon*). The white shrimp (*P. indicus*) performs well in ponds and rice fields. In Khulna district, the giant fresh water prawn (*Macrobrachium rosenbergii*) is cultured in brackishwater. Additional species of prawns with future culture value also enter ponds or rice fields with the tides, during the stocking period. These are *Penaeus japonicus*, *P. semisulcatus*, *P. merguensis*, *Metapenaeus monoceros*, *Macrobrachium brevicornis* and *Parapenaeopsis stylifera*. Finfish with culture value are *fates caicarifer* (sea perch), *Polynemus indicus*, *Pampus chinensis*, *Harpondon nehereus*, *Congresox talabonoides*, *Hilsa ilisha*. *Mugil* sp, *Arius thalassinus* and some species of croakers.

Chittagong, Cox's Bazar, Khulna, Bagerhat and Satkhira districts form the main centres of brackishwater culture, mainly shrimps. About 8,000 ha are estimated to be under penaeid shrimp culture in each district. This area is expanding very fast. As a consequence, the brackish-water area has altered, mainly by creating polders for flood protection, which in turn influence the tidal currents.

In the region of Cox's Bazar and Chakaria Sunderban, simple dykes with several gates are constructed around large areas of mangrove forest or other types of otherwise unproductive land. During April, May and June water with small shrimps is repeatedly flown into the enclosure to obtain maximum stocking. Nowadays, however, more and more farmers purchase the small shrimp from gatherers. Between July and October, the shrimp has been harvested by use of traps. After all the shrimp has been harvested the ponds are drained for fish harvest. A privately owned farm in Chakaria is reported to have reached an average production of about 300 kg/ha of shrimp and 400 kg/ha of fish.

Recently the government leased 2,000 ha of mangrove in the Chakaria Sunderban area to private parties for shrimp culture. This area is subdivided into 39 farms of 40-60 ha each.

The main problems in this area concern the inadequate construction of dykes and gates. During storm tides and heavy rainfall the constructions may be subject to flooding and the gates are insufficient for draining out excess rain water. Also, insufficient attention is paid to watershed drainage.

Shrimp culture in Khulna, Satkhira and Bagerhat districts is practised in conjunction with rice culture. During late December to March, brackishwater carrying post-larvae and juveniles of marine shrimp, freshwater prawns and various fish, is allowed into the impounded areas. Through exchange of water during subsequent tides, stocking is maximized. The harvest takes place during June to August yielding annually an average of 280-450 kg per ha, which is to be considered low. Shrimp ponds in the district have a low salinity, which favours the culture of *Macrobrachium rosenbergii*. The small prawns are purchased from gatherers and stocked into ponds. Lately, the conflict between shrimp and rice culture in the Khulna district has been increasing. Important activities in both crops overlap each other and many rice cultivating peasants see the lease period of their land terminate, because the land-owner sees more profit in shrimp farming. Also there is increasing concern about the salinization of the silt which will make it unsuitable for agricultural practices.

Since independence some fragmentary research on brackishwater aquaculture has been going on. Mostly, efforts have centred around the growth rates of *M. rosenbergii* and *P. monodon* and the abundance of *P. monodon* in their natural environment. Efforts to promote systematic research into all aspects of shrimp farming have recently been undertaken by BOBP in a shrimp culture demonstration farm in Satkhira in the Khulna district.

10. SOCIO-ECONOMICS

Traditionally, marine fishing was practised at subsistence level by the **Jaladas** of the Hindu communities. They have been operating and living in isolated villages along the coast. Within the fishing communities, there are two distinct groups: those who own boats and fishing gear and those who work only as fishing crew. Most fishermen are landless, and are, therefore, employed only during the fishing season since other employment possibilities are almost non-existent. A few revert to estuarine fishing when the marine fishing season is over. A majority of the fishermen thus rely on moneylenders during off-fishing season to meet their subsistence needs. This has invariably led most fishermen to be chronically indebted, mostly to fish traders.

With the increasing commercialization of marine fisheries, and the rise in landlessness due to population pressure on limited agricultural lands, a large number of Muslims began taking up fisheries as a full-time job. Most of the motorized small-scale fishing boat owners now are Muslims and they hire Hindu or Muslim fishermen as crews on a share of catch basis (and in a few cases on wage basis). The most common practice is for a boat and gear owner to pay an agreed percentage of the value of each catch after covering operating costs (i.e., the cost of fuel, ice and food for crew). The sharing arrangement varies from area to area, on the type of fishery and between periods in a fishing season. Around Chittagong and Cox's Bazar, the most common practice is for the boat and gear owner to take 60% of the value of each catch after covering operating costs, and for the crew to share the remaining 40%. The entitlement of each crew member varies depending on the type of function he performs.

Under the Danish Boatbuilding and Mechanization Project, the boat rental scheme was reviewed and assessed by Feldman et *al.* (1982). The following extracts are reproduced from their report.

"The fishing villages are composed of many occupational categories although the label fishing village is given even if a small number of families is directly involved in fish catching. However, because of the low status given to jele (fishing) families, such families tend to live in a single **para** in the village. The term **para** or neighbourhood refers to a set of households which may be relatively autonomous from the village in terms of primary social relations and/or kinship. It is, nonetheless, integrated into the village in terms of sources of labour, sources of capital, village politics and village resources. That is, the village context hinders or enables members of a village **para** to participate in selected activities and occupations. In order to fully appreciate the conditions of particular families within a **para** it is important to understand the general conditions in the village as a whole.

"Fishing **paras** are complex social units since the jele community may include families who are involved in different aspects of the fishing sector. The male heads of household, for instance, may be involved in a variety of fish catching operations and relations. Some fishermen are sea fishermen and earn their primary yearly income during the dry season from October to March as fish labourers, **majhi** or **bohoddar**. A **bohoddar** is a skilled fisherman who organizes large crews for fishing expeditions. In most cases the **bohoddar** owns a significant proportion of the required inputs and may hire or share the remaining inputs with other resource owners. In many instances the **bohoddar** is forced to borrow money to initiate participation during each season but access to loans and his large share of the catch put him in an advantageous position vis a vis other fish catchers.

"A **majhi** is a head fisherman, who has experience in the sea and heads a team of seven or eight fish labourers. He is usually the most experienced crew member and is often responsible for the entire fish catching operation during a particular season. A fish labourer is a person who works as a crew member and who earns either a fixed wage for the entire dry season or a wage plus

a share of the catch. The crew members are divided according to the nature of their work — catching, drying, transporting and support services such as cooking -and are usually paid according to their participation in the production process.

“It should be noted here that the phrase “fishing families” refers to those families who have been traditionally involved in fish catching, drying, salting, and small-scale selling. The *jele* label is usually given to such families and may include both Muslims and Hindus. The term ***jolodas***. refers specifically to Hindu marine fishermen and this label usually implies a family genealogy tied to fishing occupations. Marine fishermen are usually these low caste Hindus.

“In cases where families do not earn their primary income from fishing, *jele* is not an appropriate label. For example, people engaging in tank or pond fishing may do this work on a part-time basis for their consumption needs or, when necessary, on an informal exchange basis. These families may remain agriculturists or agricultural labourers. Riverine and pond fishermen, who earn their primary income from fish production, however, have also been given the label *jele* and may be either Hindu or Muslim.

“Families whose main occupation is in fish business—for example, transporting, ice production and large-scale selling -are considered small and large business families rather than fishing families. Similarly the ***aratdar*** or fish trader, with access to large godowns, is a businessman, who is particularly known for his role in providing credit to many fishermen at high interest rates and with special riders requiring the sale of the catch to himself at below-market prices. ***Aratdars*** are also influential in setting fish marketing and wholesale prices.”

According to the “Report on Marine Fishing Village Identification Survey in Bangladesh, 1967-68” (Anonymous, 1972), there were 706 villages which have at least one marine fishing family living within them. Fully 51% of these villages were located in Chittagong district. Statistics from this survey indicate that of the 28,754 households in the marine fishing community, 20,682 (or 72%) were in the Chittagong district. One reason for this concentration is the significant differences in population density of the areas surrounding the Bay of Bengal. Although the data obtained during this survey are now outdated, and also because the administrative units/areas have been recently revised, it provides a general picture of marine fisheries especially with regard to fishermen’s households, ownership of boats and fishing gear. It is, therefore, reproduced as Appendix 10.1.

Compared to about 40 motorized boats when the survey was undertaken in 1967-68, there are not less than 3,000 motorized boats presently operating in the Bay of Bengal, with plank-built boats having replaced dug-out boats. This would imply that more marine fishing boats are now able to fish farther offshore than in the past. Since most of the motorized boats are based around Cox’s Bazar, it would seem that Cox’s Bazar has continued to be the major centre for marine fishing. Moreover it is closer to the main fishing grounds than other major centres. The continuous rise in the price of fuel has also increased Cox’s Bazar’s importance, as it is close to the main fishing grounds.

When the survey was conducted there were very few management units that operated more than one boat. At present, however, the number of motorized boats that tow 3-5 smaller non-mechanized boats to the fishing grounds seems to be substantial, particularly around Cox’s Bazar. This development shows the rapid commercialization of marine fishing. A good indication of this is that a large number of people who traditionally were not directly involved in fishing are now buying motorized boats and recruiting fishing crews to operate them.

A substantial proportion of the marine fishermen at the time of the survey were already fishing only as workers (about 47% of the total number of fishermen). It is very likely that this proportion has increased since then due to the rapid increase in the motorization of boats. Moreover, greater competition by larger and market-oriented management units has led to a relative reduction in the number of small owner-operated boats.

There was another survey conducted in 1974-75 by BJMSS which revealed that about 149,000 fishing families were engaged in marine and estuarine fisheries. Only 87% of these families had homesteads. About 10% had landholdings of more than one acre, while 25% had one acre or

less. On an average, every 3.2 families owned a boat; 57% of the fisheries population was **below** the age of 19 years. Of the total of 248,000 fishermen, 156,000 were engaged in full-time fishing. The balance 92,000 engage in part-time fishing and other activities like fish trading, fish selling and employment as wage labourers or in the service sector (Karim, 1977).

As of 1980-81, the number of fishermen in the marine sector was 412,000 (Anonymous, 1982). For many fishermen, marine fishing is a seasonal occupation. In the main season (October-February), migration takes place from Chittagong district to the Sunderbans area (mainly Dubla Island) and from the inner regions of the delta out into sea. Only men participate in these migrations. They establish temporary settlements and live in bamboo and leaf sheds, isolated from basic services. Fresh drinking water is a major problem. The big fish they catch are sold fresh to traders or in the market place, while the rest is sun dried on bamboo racks near the sheds. The fishing operation is led by bohoddars who in most cases are indebted to big fish traders. At the end of the fishing season they immediately start to organize for the next season by contracting crew members, paying them an advance and repairing or purchasing craft and gear. Most crew members work on a fixed salary but sometimes also on a share basis. Uncertain factors such as weather conditions, currents and fish movements determine the financial success or failure of this undertaking.

Fishing is traditionally a low-status occupation and the majority of the fishing families belong to socially neglected classes. Only 14% of the total fishing population may be considered as literate; no more than one per cent have secondary or higher education. The low status of fisherfolk, their illiteracy and marginal economic position make them highly dependent on the mercy of the middlemen. Most are either indebted to fish merchants or local contractors to whom they are bound to sell their catch below the market rates. They borrow money drawing on future catches, in order to equip themselves with craft and gear for the coming fishing season or just to maintain their family. In the absence of mutual organization, they have little scope to liberate themselves from a continuing cycle of indebtedness.

Living conditions of fisherfolk, particularly in the slums of urban areas, leave much to be desired. These areas are characterized by congestion, sub-standard housing and inadequate municipal facilities such as water, refuse disposal and sanitation. In the rural areas housing and basic infrastructure are equally inadequate.

There are no subsidy schemes, duty exemptions and concessions for any of the inputs of small-scale fishermen. There are no welfare schemes specifically oriented to the fishermen's needs apart from the welfare schemes extended for the weaker sections of the society. Institutional finance is available at the normal banking rate of 13% for activities like inland and coastal aquaculture. The loan amount is limited to Tk 18,000 (US \$ 720) for inland fish culture; for coastal/brackishwater aquaculture the loan amount is decided on merits.

11. FISHERIES ADMINISTRATION AND INSTITUTIONS

11.1 Fisheries administration

Until June 1977, the Forest, Fishery and Livestock Division of the Ministry of Agriculture was the main administrative body for fishery administration and management. Subsequently, the Government transferred "Marine Fishery, Fishing and Fisheries beyond territorial waters (including deep sea fishing), Fish Harbours, Fish Quality Testing Laboratories at Chittagong and Khulna, and other ancillary organizations" to the Ministry of Commerce. Since December 1977, however, the Government reconsolidated both marine and inland fisheries in a newly established Ministry of Fisheries and Livestock. Subsequently, in 1981, fisheries was accommodated in the Ministry of Agriculture, along with livestock, as a separate division. The main public sector agencies of this division entrusted with implementation of fishery development activities are the Directorate of Fisheries and the Bangladesh Fisheries Development Corporation (BFDC). The organization chart at Appendix 11.1 shows the main set-up in the Directorate of Fisheries along with its functions.

Besides this Ministry, other ministries directly or indirectly involved with fisheries activities are:

- (a) the Ministry of Law and Land Reforms,
- (b) the Ministry of Local Government, Rural Development and Cooperatives,
- (c) the Ministry of Industries and Commerce, and
- (d) the Planning Commission.

A general chart showing the affiliations of various fishery organizations of the respective ministries is shown in Appendix 11.2.

Fisheries administration and management is thus characterized by multiple control. The Second Five-Year Plan (1980-1985) points out that tackling the problems related to the development of the fisheries sector is complicated by the absence of any central control and coordination for fisheries activities. Even the Planning Commission is stated to have at least three divisions with various members independently responsible for planning and coordinating the fisheries activities of various implementing Ministries.

11.1.1 Directorate of Fisheries

The Directorate of Fisheries was established in 1943 to take care of research, extension, training, administration of the fishery ordinance, fishermen's welfare, promotion of fishery development, legislation, licensing, certification, etc. Presently the major tasks under the responsibility of the Directorate are production-oriented research, reclamation of Government derelict ponds and other impoundments for fish culture, extension and in-service training for the departmental officers.

An outlay of Tk. 818 million (US \$32.7 million) has been provided to the Directorate of Fisheries out of the total plan outlay of Tk. 7,500 million (US \$ 300 million) for fisheries development.

11.1.2 Directorate of Cooperatives

The Directorate of Cooperatives of the Ministry of Local Government, Rural Development and Cooperatives is responsible for the organization of fishermen into cooperatives and the registration of cooperative societies. It provides direct supervision to the apex cooperative society, the Bangladesh Jatiya Matshyji Samabaya Samity (BJMSS). The BJMSS is authorized to introduce innovations in the fishing field : crafts, gears, ice plants, cold storage units, etc.

11.1.3 Integrated Rural Development Programme

The Integrated Rural Development Programme (IRDP) is an autonomous body of the Ministry of Local Government, Rural Development and Cooperatives, and coordinates all aspects involved in uplifting the socio-economic conditions of the rural poor. The programme links the broad policies laid down in the National Plan with planning of concrete activities at the micro level. For the implementation of micro plans at the village level, coordinated actions are undertaken with cooperatives of various levels. IRDP has mainly emphasised the introduction of a two-tier cooperative system with a view to building up viable rural institutions through which small farmers can actively participate in the development activities of Government.

IRDP has been in operation since 1970 and has its head office at Dhaka. It stands for a production-oriented approach aiming at boosting agricultural production, mainly food production, in the shortest time possible. Its fishery activities relate to fish culture in Bogra and Mymensingh under the IRDP-1 Project, which is implemented with the assistance of the World Bank.

11.1.4 Ministry of law and land Reforms

This Ministry controls all the public waters and leases exclusive exploitation rights of unit areas by auction, generally on a short-term basis. More recently, this Ministry has also been involved in fish culture in Government-owned ponds, with technical and organizational cooperation with the Directorate of Fisheries and the Ministry of Local Government, Rural Development and Cooperatives.

11.1.5 Ministry of Local Government, Rural Development and Cooperatives

Besides its usual functions, the Ministry of Local Government, Rural Development and Cooperatives is involved in fish culture in collaboration with the Directorate of Fisheries and the Ministry of Land Administration and Land Reforms.

11.1.6 Planning Commission

The responsibility for national planning and overall coordination of all development activities lies with the Planning Commission. The Fisheries Section of the Agriculture Division is the main functional unit of the Planning Commission for fishery-related activities. The Fisheries Section has as its main responsibilities :

- (a) formulation of fishery policies and objectives
- (b) formulation of strategies and programmes for fishery development
- (c) preparation of national development plans for fisheries
- (d) technical evaluation of all fishery projects-of both internal and external origin -for consideration and approval by the Government
- (e) field inspection to monitor project implementation
- (f) periodical review of on-going projects
- (g) periodical evaluation of the National Plan, and
- (h) inter-sectoral and intra-sectoral coordination in the field of fisheries.

11.2 Fisheries Institutions

11.2.1 Research

Till recently, fisheries research was undertaken independently by the Marine Biological Laboratory, Chittagong ; Fisheries Technological Research Station, Chandpur ; Freshwater Fisheries Research Station, Chandpur; and Aquaculture Experiment Station, Mymensingh.

Recently, a composite organisation -the National Fisheries Research Institute (NFRI) — has been set up to strengthen and coordinate the entire fisheries system, both inland and marine, to devote more attention to programmes of adaptive research, to experiment and standardise techniques for augmenting and managing all living resources and to develop processed fishery products for the domestic and export markets. This is an autonomous body under the administrative control of the Ministry of Agriculture/Fisheries and Livestock Division. The present research stations are being re-designated and revamped to be encompassed within the NFRI, which will have two additional stations to handle brackishwater and coastal aquaculture. Thus, NFRI will have the following five stations :

- Riverine Fisheries Research Station, Chandpur;
- Freshwater Aquaculture Research Station, Mymensingh ;
- Marine Fisheries & Fisheries Technological Research Station, Chittagong ;
- Brackishwater Fisheries Research Station, Khulna ; and
- Mariculture and Coastal Aquaculture Research Station, Cox's Bazar.

11.2.2 Training

The BFDC established a training centre in 1973-74 to create a cadre of qualified skippers, marine engineers and other crew for the operation of trawlers. The objectives of the centre are to impart training in the field of navigation, marine engineering, electronic engineering, refrigeration engineering, radio engineering and operation, trawling operation and care, fish processing and boatswain duties. At present the centre and its activities have been transferred to the Marine Fisheries Academy under the Ministry of Shipping.

11.2.3 Universities

At the Bangladesh Agricultural University at Mymensingh there is a full-fledged Faculty of Fisheries which provides a formal curriculum in the field of fisheries. This curriculum includes a

four-year programme after the Higher Secondary Certificate level, leading to a B.Sc. (Hons.) (Fisheries) degree, and a one-year master's degree programme leading to an M.Sc. degree in fisheries.

The universities at Chittagong, Dhaka and Rajshahi have their own academic programmes in the fisheries field. The Chittagong University has under its control an Institute of Marine Science, which has a Department of Marine Biology: the University has a two-year master's degree programme in marine biology, following a two-year B.Sc. course. The universities of Dhaka and Rajshahi offer specialization in some fishery subjects in their one-year master's degree course, after a three-year B.Sc. (Hons.) degree in zoology, or a two-year master's degree after a two-year B.Sc. course.

12. INDUSTRY ORGANIZATIONS

12.1 Fisheries corporations

The Bangladesh Fisheries Development Corporation (BFDC), established in 1964, is deeply involved with the fisheries administration as it shares responsibilities in the field of policy making and strategy development in the fisheries sector. It takes such measures as it thinks fit for the development of fisheries and fishing industries in Bangladesh.

The functions of the Corporation are to

- take measures for the development of fisheries and the fishing industry;
- establish the fishing industry;
- establish units for capture of fish and promote a better organization for exploitation of fish wealth ;
- acquire, hold or dispose of fishing boats, fish carriers, road and river transport and all equipment and accessories necessary in connection with the development of the fishing industry;
- establish units for preservation, processing, distribution and marketing of fish and fish products ;
- advance loans to fishing industries, and to fishermen's cooperative societies;
- encourage establishment of fishermen's cooperative societies;
- undertake surveys and investigation of fish resources;
- establish institutes or make arrangements for training and research in the methods of catching, processing, transportation, preservation and marketing of fish ;
- set up organizations for the export of fish and fish products;
- acquire, hold and dispose of such other properties as are required for carrying out all or any of the above mentioned purposes.

The management of the Corporation is subject to the rules and regulations of the BFDC Act. The general direction and administration rests with a Board with a maximum of five members to be appointed by the Government. At least two of these five Directors must be engaged on a full-time basis. One of them functions as Chairman and Chief Executive. BFDC has its headquarters in Dhaka where 117 people are employed : 39 officers and 78 staff.

For plan period 1980-85, the BFDC has a financial outlay of Tk 713.5 million (US \$ 28.5 million), consisting of Tk 615.0 million on the investment side and Tk 98.5 million on the non-investment side.

Appendix 12.1 summarizes the status of completed projects of the BFDC.

Another corporation active in the fisheries sector is the Bangladesh Sugar and Food Industry Corporation (BSFIC) under the Ministry of Industries. Among other activities, the BSFIC owns

and operates five fish processing plants, two in Khulna and three in Chittagong. It is an exporter of processed fish, shrimp and frog legs.

12.2 Fisheries cooperatives

As mentioned earlier in Chapter 11, the task of organizing fishermen into cooperatives and registering cooperative societies is the responsibility of the Directorate of Cooperatives of the Ministry of Local Government, Rural Development and Cooperatives. The Directorate supervises directly the apex cooperative society — Bangladesh Jatiya Matshyji Samabaya Samity (BJMSS).

Records show that at the time of the partition of India in 1947, about 120 fishermen's cooperatives existed. These societies, however, remained neglected until 1960. In that year an effort was made to organize them into meaningful and functional cooperatives by the establishment of an apex cooperative organisation — the Provincial Fishermen's Cooperative Society, now the BJMSS, catering to both marine and inland sectors. The objectives of BJMSS are :

- to improve the socio-economic condition of fishermen and encourage thrift, self-help and mutual cooperation ;
- to procure and supply fishing inputs to the fishermen at reasonable prices;
- to issue loans to the affiliated societies for financing their members;
- to introduce innovations and advanced techniques in fishing ;
- to set up ice plants, cold storages, workshops, net making machines; and
- to arrange marketing of fish and establish fish processing units for exporting fish and fish products.

Besides the BJMSS as the apex society, there are 88 intermediary and 4,243 primary societies. As of June 1983, the total individual membership of the primary societies numbered 537,224. BJMSS employs a total staff of 144 persons. The staff consists of executive and administrative officers, accountants, supervisors, engineers, mechanics and supporting staff.

The major function of the apex society is the execution of the supply and service programme. BJMSS imports fishing materials for their members. These imports are exempt from all taxes and dues. In the period 1972-77, it imported nylon rope, marine diesel engines, floats, etc., with a total value of Tk 50 million (US \$ 2 million). Presently the major activities concern the establishment of fishery infrastructure, coastal fishing with mechanized and non-mechanized boats, marketing, two ice plants (each 33 t capacity), processing (dressing, packaging, freezing) and export of processed fish, shrimp and frog legs.

The major sources of finance for BJMSS consist of share capital and savings. It has the exclusive right to obtain loans from the Government or from the Bangladesh Bank on a 100% guarantee by the Government.

Table 12.2.1 contains information on the number of societies under the BJMSS, their membership, share capital, working capital, reserve fund and deposits.

Table 12.2.1

Some financial features of the BJMSS (in million Taka)

(Source : Anonymous, 1983c)

Type of societies	No. of societies	No. of members	Paid up share capital	Working capital	Reserve fund	Deposits (savings)
Apex (National)	1	88	1.34	110.32	7.09	4.79
Intermediary (Central)	88	3,866	2.28	18.18	0.62	3.59
Primary	4,243	537,224	5.16	37.12	1.78	7.36

During the period 1961-62 to 1982-83, BJMSS received a total amount of Tk. 85.12 million (US \$ 3.4 million) from the Government and the Bangladesh Bank.

A large number of primary societies still do not have boats and a large number of intermediate societies do not have any facilities. To remedy this situation a scheme, "Development of Fishermen Cooperatives," has been sanctioned. The total cost involved in this scheme is estimated to be Tk. 100 million (US \$ 4 million). The scheme envisages the establishment of ice plants, a freezing plant, the issue of mechanized boats, country boats and fish carriers, fish markets, fish net factory, and a shrimp culture project.

12.3 Deep sea fishing industry

Under the existing system, permission for importation or construction of trawlers is granted by the Investment Board of the Ministry of Industries and Commerce (Industries Division). Between 1977 and 1982, the Investment Board permitted 57 deep sea fishing units in the private sector to operate 183 trawlers, two floating vessels and one mother vessel. Of these 57 units, however, permission for 14 units comprising 28 trawlers was subsequently cancelled. As against the above permission, 46 trawlers belonging to 14 private companies and one public (BFDC), were in operation as of June 1983. Towards the end of 1983, there were 23 units including BFDC, having an effective fleet strength of 65 trawlers (47 fish trawlers and 18 shrimp trawlers) (Shahidullah, 1983).

13. GOVERNMENT POLICY

The Government policy in terms of objectives and strategies for overall development of the country has been laid down in the Second Five-Year Plan, covering the period 1980-1985 (Anonymous, 1980a). The objectives of this Plan have been formulated in the context of the overwhelming problems of poverty, unemployment, illiteracy, and malnutrition of the masses, mostly living in the rural areas. These problems have become more serious over time, due to the high growth rate of population, combined with the slow growth of the economy. With the awareness that only humble success can be achieved in overcoming these massive problems in a medium plan period, the Second Five-Year Plan has as its objectives :

- to bring about a noticeable improvement in the standard of living by ensuring adequate supplies of the basic needs;
- to bring about significant improvement in the quality of life in the rural areas through greater participation of the masses in development activities through local bodies;
- to expand opportunities for gainful employment, beyond the growth of labour force, so that people have access to resources for their basic needs;
- to eliminate illiteracy and make significant progress towards comprehensive development of human resources;
- to reduce the rate of population growth ;
- to attain a higher degree of self-reliance;
- to move towards a more equitable distribution of income, resources and opportunities for better social justice ;
- to accelerate food production beyond self-sufficiency in the shortest possible time; and
- to accelerate the pace of economic development.

The awareness that Bangladesh is one of the poorest countries in the world with a per capita annual income of US \$ 120 (1980), places the major thrust of the plan on a significant reduction of poverty.

The specific objectives of fisheries development are :

- to improve the nutritional level of the people through increased production and consumption of fish ;

- to expand employment opportunities and to improve the socio-economic conditions of rural people in general and fishermen and fish farmers in particular;
- to accelerate the development of selected fishery products such as shrimp, crab, frog leg, turtle, shark fin, aquarium fish, etc., mainly for export;
- to improve traditional technologies and to introduce simple tested and employment-oriented technologies to accelerate the utilization of local resources;
- to organize and mobilize the rural labour force for the development of fisheries through fisheries extension services;
- to intensify research activities in both inland and marine fisheries.

For the development of inland fisheries, the focus is the conservation of available resources, water management in rivers and lakes, providing training and infrastructure for raising fry and fingerlings, dyking of water areas for fish culture, making available credit and technical know-how to cooperatives of rural youth, women, landless labourers or private entrepreneurs and the establishment of model and demonstration fish farms. Cage culture of fish and fish culture in paddy fields will also be supported.

In the marine fisheries sector, the Plan provides for the following :

- Coastal fisheries will be exploited largely through small-scale fisheries entrepreneurs, cooperatives or individuals. New motorized boats will be added subject to careful reassessment of the fish resource position of the sea;
- Diversification in fishing technology will be suitably introduced for increasing the productivity of each fishing unit;
- A band of at least 30 miles of the sea from the coastline will be strictly preserved for the small-scale fisheries sector using motorized/sail boats. This coastal band should be declared out of bounds for any fishing trawler — national or joint venture;
- All-weather trawlers, especially those with freezing facilities, will be introduced to exploit known fish and shrimp grounds on the continental shelf of Bangladesh ;
- The provision of harbours and jetties with ancillary facilities like fish markets, cold storage, ice plants, repair facilities and navigational aids, will **be** made throughout the coast. Distribution and market facilities for marine fish will be created.

14. DEVELOPMENT PLANS

14.1 The First and Second Five-Year Plans

After Independence, planned development of fisheries started with the First Five-Year Plan for 1973-78. The main objectives of this Plan were: increasing fish production, maximising the utilization of both inland and marine fishery resources, improving the socio-economic conditions of fisherfolk, creating more employment opportunities in fishing and ancillary industries and increasing the export of fish.

The financial outlay proposed for implementing the programme was Tk. 451.48 million (US \$ 18.05 million). Extreme global economic instability, however, made a revision of the First Plan necessary in 1975. Taking resource limitations and past experience into consideration, some adjustments were made and a three year programme, covering the period 1975/76 to 1977/78, prepared. The main modification effected in this new programme concerned a shift in emphasis from deep sea fishing by trawlers to the fishing of near-shore waters by country-built motorized boats. The tentative outlay for this revised plan was Tk. 370 million (US \$ 14.8 million).

The Second Five-Year Plan covers the period 1980-1985. The launching of this Plan was delayed by two years in order to develop a substantive plan on solid foundations, including

improved quantitative data. The gap between the periods covered by the two Five-Year Plans was filled by a Two-Year Plan for 1978-I 1980.

The responsibility for drafting the various Plan schemes and programmes lies with the Planning Commission of the Ministry of Planning. Implementation of the plans and schemes falls within the competence of the Project Implementation Division of the same Ministry. The overall Five-Year Plans serve as a guide for the preparation of Plan Implementation Programmes. The first element of a Plan implementation Programme is made up of various sectoral action programmes. For each sector, the action programme sets targets in quantitative terms during the period covered by the Five-Year Plan and determines the inputs and resources needed in each year, as well as other policy measures required for the achievement of targets. The second element of the Plan Implementation Programme is a set of Annual Development Plans in which the assumptions made for drafting the Five-Year Plans are reviewed from year to year. Also, unforeseen developments and their consequences for the planning policies can be taken note of in the annual plans. Concrete projects for development are identified in the annual plans. The main executing bodies for implementing the development plans in the fisheries sector are the Directorate of Fisheries and the BFDC.

Appendix 14.1 presents a breakdown of the proposed financial outlay for different activities in the fisheries sector and for the different implementing agencies in the Second Five-Year Plan.

14.2 Bilateral and multilateral projects

Foreign aid plays an important part in the development efforts. Multilateral assistance consists of national technical assistance projects financed by UNDP and executed by FAO, and sub-projects of BOBP, the FAO-executed regional fisheries project for the Bay of Bengal. The FAO/UNDP assistance in the development of marine fisheries dates back to the 1960s.

There are three on-going FAO/UNDP projects: (i) the Fishery Advisory Service Project whose activities are geared to assist in raising national expertise in planning the development and management of fisheries activities; (ii) the Fishery Resources Survey Systems Project which has been designed, among other things, to assess the present state of the fisheries and their potential for development, establish a system of collecting basic information for the fishery sector such as the socio-economic situation of different classes of fishermen, the type and distribution of fishing boats and gear, fish handling and marketing methods, etc. The main aim is to provide information in a form that would facilitate the design of investment projects and other development schemes in fisheries; and (iii) the Marine Fisheries Research Management and Development Project under the FAO/UNDP programme, designed to strengthen the newly created Department of Marine Fisheries based at Chittagong with technical assistance, equipment and facilities for staff training in marine biological research and exploration, for marine resources monitoring and management, for fishing gear and craft development, and for fish products marketing and utilization studies.

Several sub-projects are being executed in Bangladesh under the FAO/SIDA regional project "Development of Small-Scale Fisheries in the Bay of Bengal" which covers Bangladesh, India, Malaysia, Sri Lanka and Thailand. The main activities concern studies on the motorization of small country (Chandi) boats for *Hilsa* fishing with low power diesel engines, improvement of the efficiency of large-mesh driftnets and set bagnets, finding cheaper synthetic netting materials adapted to the type of fishing done in Bangladesh, developing locally suited techniques of commercial shrimp culture through coastal aquaculture experiments, and investigating means and ways for expanded family-oriented extension services,

Under a regional FAO/UNDP Project — "Marine Fishery Resources Management in the Bay of Bengal" — a review of the fishery and biology of the *Hilsa* has been made with an indication of possible lines of further study at national and bilateral levels for better understanding of *Hilsa* stocks.

The Asian Development Bank (ADB) is providing US \$ 10.8 million of a US \$ 20 million fisheries credit project from its special funds to be implemented through the Bangladesh Krishi Bank.

The project is designed to finance mainly the purchase of multipurpose and gillnet fishing vessels equipped with engines and nets by groups of fishermen, and of ice-making plants and insulated trucks by private operators.

The Danish bilateral assistance, executed through DANIDA (Danish Development Agency), most of which is directed through BFDC, constitutes the largest component of the external assistance programme in marine fisheries. Its major engagement has been in the Chittagong Fish Harbour: (i) rehabilitation of the harbour by reducing the number of trawlers (from 19 inefficiently run trawling boats to five) (ii) supply of equipment for renovation and expansion of facilities for repair and maintenance workshops (iii) provision and operation of two ice trawlers and (iv) technical assistance for management of all harbour operations.

Perhaps DANIDA's major contribution to date has been the development of a full fledged boatyard, operated by BFDC, at the Chittagong Fish Harbour. With the assistance of Danish experts and financing, a 12 m wooden boat has been developed which when motorized with a 22 hp inboard diesel engine was found to be well adapted to fishing in the shallow waters of the Bay of Bengal. Today, about 550 such boats have been constructed, equipped and distributed. The building capacity of the yard, which is now fully managed by BFDC, is at present estimated at about 15 boats per month.

To determine the economically feasible type of trawlers, trawler equipment and gear for fishing in the Bay of Bengal, a pilot project on construction and introduction of mini-trawlers has been made operational. Under this project, four mini-trawlers are to be constructed. With assistance from DANIDA, BFDC has plans to establish a number of new fish landing terminals in the delta area where the aim has been to equip each landing terminal with a covered wholesale fish market, ice plants, refrigerated storage for ice and fish, fresh water supply, and workshops. However, due to the unstable nature of the banks of the rivers and channels and their frequent destruction during the monsoon season, work has been progressing much slower than anticipated. So far, construction of such terminals has been limited to Patharghata and Khepupara. The original plan of building a terminal at Haji Mara still stands, funds permitting. Under the same programme, the existing ice-making and cold storage facilities at Cox's Bazar are being expanded. The existing block-ice making plan of five tons per day capacity will be augmented by another 30 t per day capacity, and a 30 t cold storage capacity will be added to the existing 10 t for storing ice and fish. In addition, a 120 kWh stand-by generator will be provided to counteract the frequent electric power cuts at Cox's Bazar. A wholesale fish market at Chittagong will be established by 1986.

DANIDA has also, more recently, taken up an integrated development project in Noakhali with major emphasis on extension services.

More details of these bilateral and multilateral projects may be found in Appendices 14.2 and 14.3

14.3 Private organizations

An important organization through which international funds are channelled is the Bangladesh Rural Advancement Committee (BRAC). It is a voluntary organization engaged in various activities to promote economic and social development of the rural areas. It was founded and is managed by Bangladesh nationals with the exception of one expatriate volunteer and some occasional consultants on short-term assignments, when local expertise is not available. The operational costs of BRAC are borne by overseas non-profit organizations and international agencies such as OXFAM Canada, Canadian International Development Agency (CIDA), Bread for the World (Germany), Community Aid Abroad (Australia), etc. The major activities include fisheries along with cooperative formation, introduction of agricultural education, family planning, health, introduction of agricultural technology, development of community centres and the formation of youth groups. In the Sulla area, BRAC has launched an economic support programme for fishermen, who have been organized into cooperative societies, through delivery of boats and nylon twines. Also, a credit scheme has been set up in order to free fisherfolk from indebtedness to moneylenders. Other organizations active in fishery development since the early seventies are the Christian Commission for Development in

Bangladesh (CCDB) and Caritas Bangladesh. The CCDB implemented the Moheshkhali Cooperative Fisheries Development Project, under which mechanized fishing boats were distributed ; and a workshop for servicing of marine engines has been established at Cox's Bazar. Another programme of CCDB concerns the Fisheries Cooperative Marketing Development Project for the establishment of ice plants and the distribution of country boats and gear, and carrier vessels fitted with diesel engines. Since 1973, Caritas, Bangladesh has implemented the Kalidaha Fishing Project for mechanized fishing about 60-70 miles south-west of Chittagong. Also, training, education and extension programmes are included. Another project implemented by Caritas is the Baniarchock Fishery Project, a marketing cooperative society in the Madripur subdivision of Faridpur.

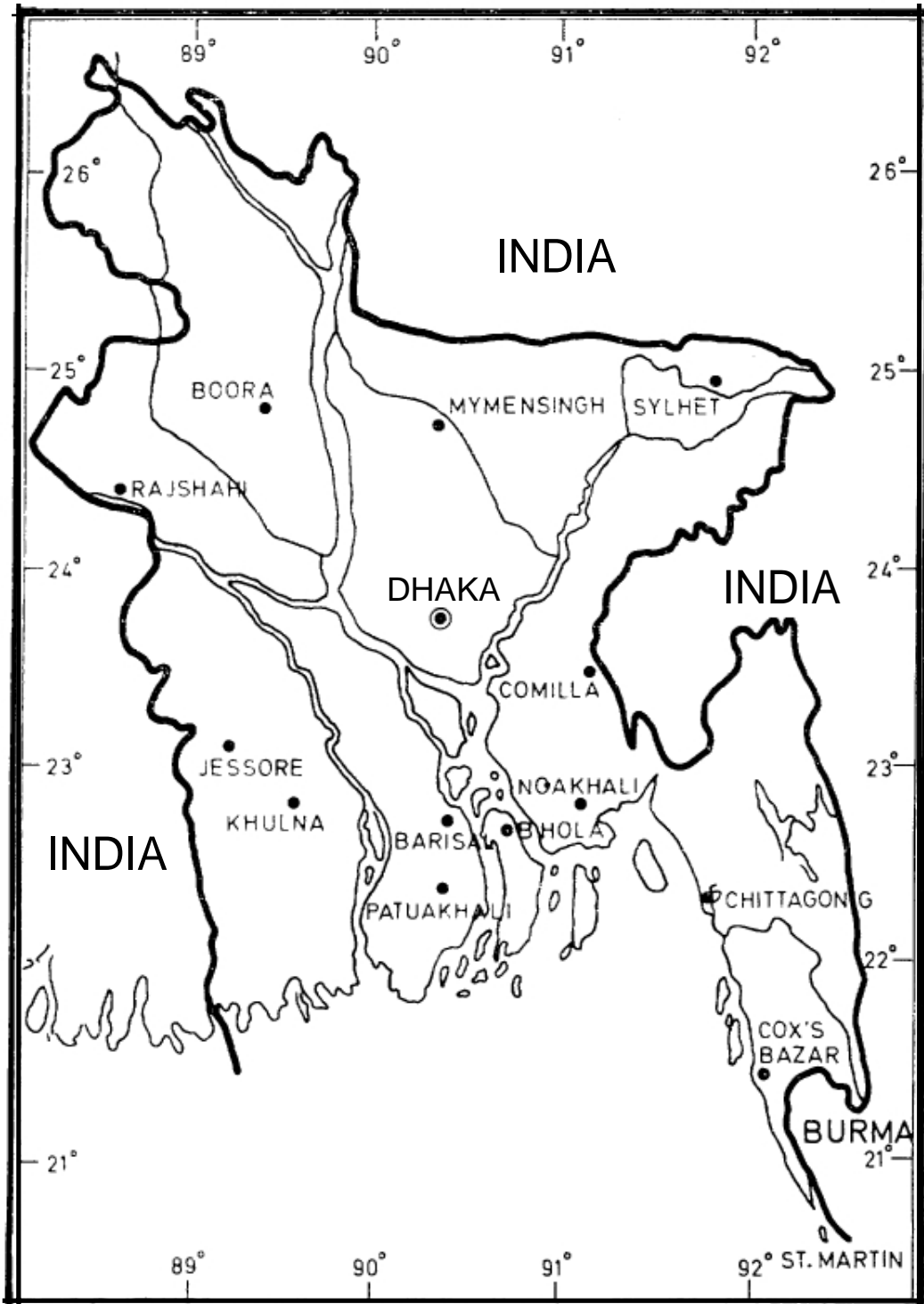
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MAP OF BANGLADESH



. Appendix 1.2

COUNTRY DATA

Source: Anonymous, 1983 a 8 b

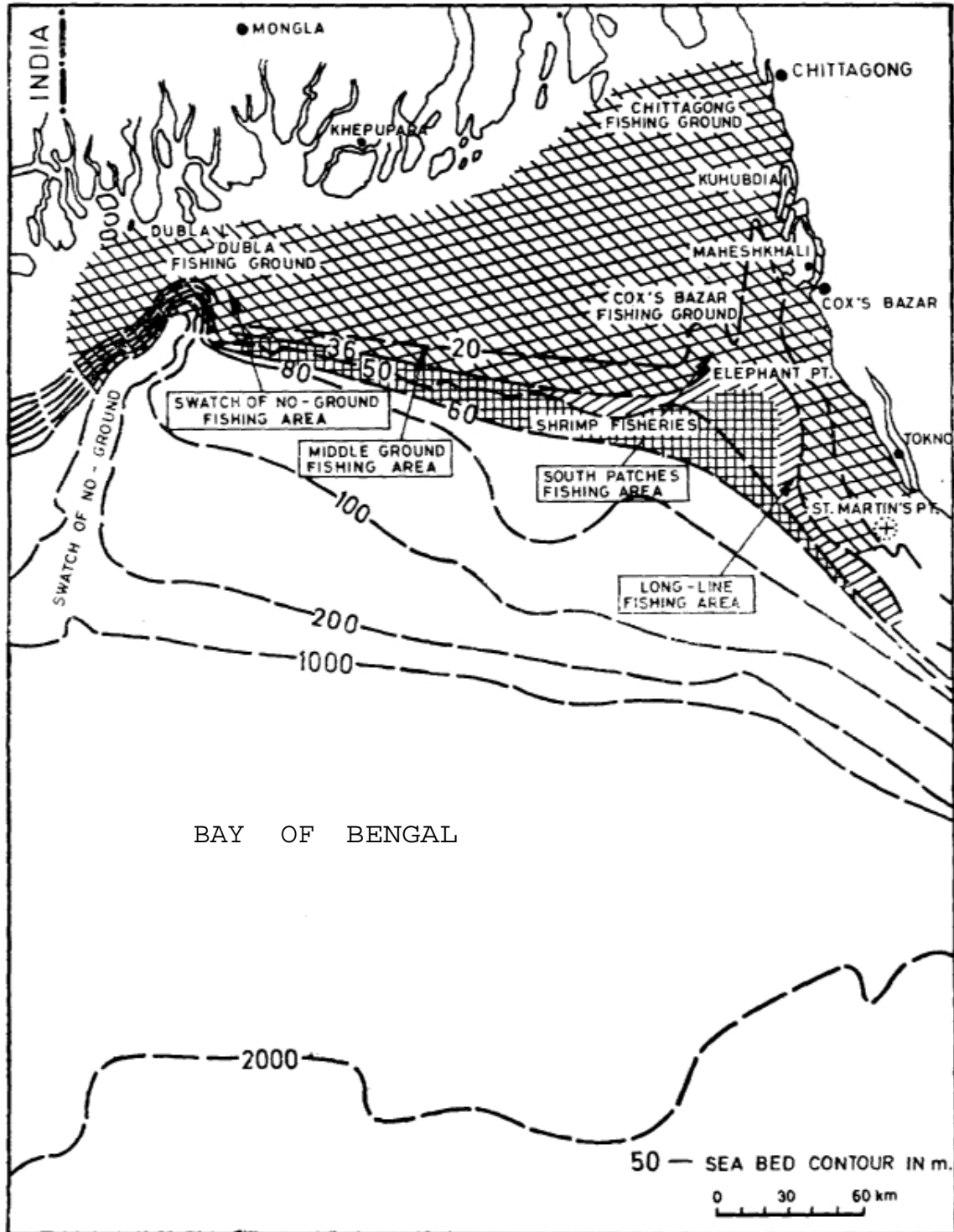
1. Location	Latitudes 20°34'N — 26°38'N Longitudes 88°0 'E — 92°41 'E		
2. Size	Area (km ²)	..	143,998
	Coastline (km)	..	480
	Continental shelf (km ²)	..	66,440
3. Population (1982)	Total (million)	..	92.6
	Density (no/km ²)	..	643
	Birth rate (‰)	..	34.8
	Death rate (‰)	..	11.9
	Growth rate (‰)	..	22.9
4. Education (1981)	Adult literacy rate (%) (age 15 years and above)	..	29.2
	Male	..	39.7
	Female	..	18.8
5. Health (1982)	Persons per physician	..	8,810
	Persons per hospital bed	..	3,765
6. Nutrition (7976-77)	Per capita calorie intake (kcal)		
	Rural	..	1,707
	Urban	..	1,866
	Per capita protein intake (g/day)		
	Rural	..	41.4
	Urban	..	49.9
	Annual per capita consumption (kg) (1982-83)		
	Food	..	166.5
	Fish	..	7.4
	Meat	..	3.7
	Eggs (no)	..	18
7. Employment (7980) (percentage distribution)		<i>Male</i>	<i>Female</i>
	Professional & technical	.. 2	2
	Service	.. 11	25
	Agriculture	.. 74	48
	Others	.. 13	25
8. Gross National Product (1982-83)	Total (million Taka) (constant price)		72,041
	(current price)		275,374
	Per capita (Taka) (constant price)		770
	(current price)		2,942
	Annual growth rate of real per capita GNP (%) (Period 1972-73 — 1982-83)		3.4

9. Trade (1981-82)		Value (million Tk)	%
Exports			
Jute, raw	.. ..	1,9995	16.1
Jutegoods	. . . .	6,331.3	51.1
Shrimp, fish and frog legs	.. ..	1,034.2	8.3
Leather	.. ..	1,072.7	8.7
Tea	.. ..	813.2	6.6
Others	.. ..	1,136.1	9.2
Total	.. ..	12,387.0	100.0
Imports		Value (million Tk)	%
Manufactured goods	.. ..	8,015.8	22.6
Food	. . . .	6,575.2	18.5
Machinery	. . . .	5,367.4	15.1
Chemicals, drugs and medicines		4,563.5	12.8
Minerals, lubricants and fuel	.. ..	3,949.6	11.1
Crude material	. . . .	2,461.3	6.9
Animal, vegetable oil	.. ..	1,970.6	5.5
Others	. . . .	2,639.8	7.5
Total	. . . .	35543.2	100.0
Trade Balance			
(1981-82 prov.)			
Export (million TK)	. . . .	12,387	
Import (million TK)	. . . .	35,543	
Trade balance (million TK)	. . . .	23,156	
10. Prices (7982-83)			
General wholesale price index			
(1973-74=100)			
	. . . .	258	

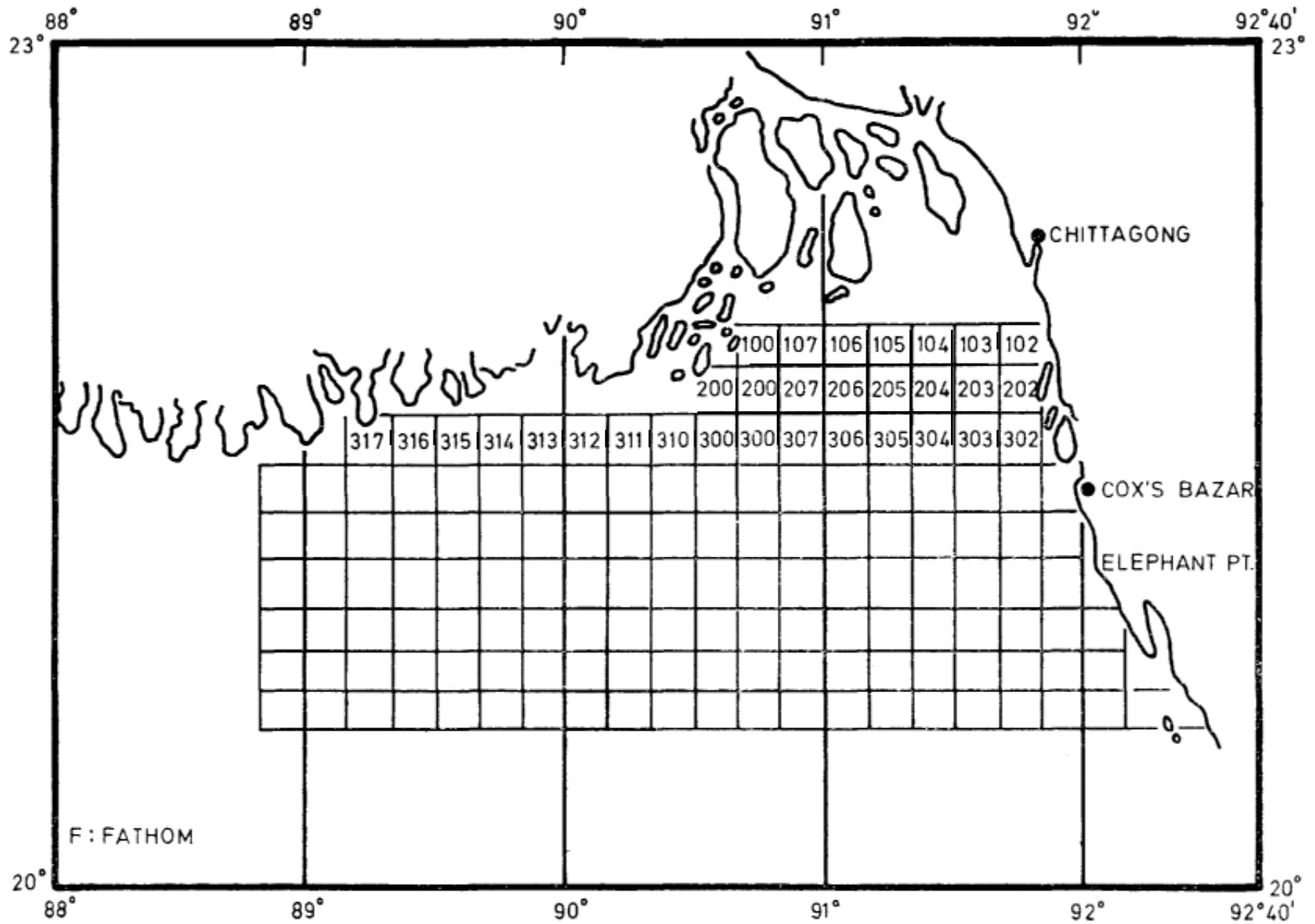
Appendix 2.1

THE DEPTH CONTOURS AND THE PRESENT FISHING GROUND

(Source: FAO, 1982)



Appendix 2.2
 FISHING GROUNDS OF THE UPPER BAY OF BENGAL IDENTIFIED BY TRAWL SURVEY



[32]

Appendix 3.1

FISHING CRAFT AND GEAR USED IN ESTUARINE AND COASTAL FISHING

(Source: Mohiuddin *et al.*, 1980; Penn, 1982)

Fishing implement	1967/68 ¹	1974/75 ²	1979/80	1981/82
Indigenous Craft	9,563	46,355	12,000	12,000
Plank-built boats	7,393	45,199		
Dugouts	2,170			
Motorized Boats	41	1,156	1,400	2,700 ⁴
Trawlers		20 ³		36
Gear	22,905			
Gillnets	4,878			
Seine nets	2,601			
Set bagnets	4,808		(Details not available)	
Castnets	4,906			
Longlines	2,215			
Miscellaneous	3,497			

¹ Data relate to marine fisheries only.

² Data relate to both estuarine and marine fisheries

³ 1976 figures.

⁴ No. of boats registered with the Mercantile Department.

Appendix 3.2

DISTRIBUTION OF MARINE DIESEL ENGINES AND MOTORIZED BOATS

Year	Marine Diesel Engines		Motorized boats	Total
	BFDC	BJMSS	BFDC	
1961/62				
to	—	26	—	26
1965/66				
1966/67				
to	295*	407	—	702
1969/70				
1970/71	—	103	—	103
1971/72	—	235	—	235
1972/73	—	192	—	192
1973/74	—	87	—	87
1974 /75	46	127	—	173
1975/76	106	57	—	163
1976 /77	83	110	—	193
1977/78	20	186	60	266
1978/79	50	187	123	360
1979/80	50	40	86	176
1980/81	130	48	130	308
1981 /82	370	143	100	613
TOTAL	1,150	1,948	499	3,597

* 285 out of the 295 engines were 12 hp Volvo Penta outboard engines (petrol) under FAO/FFHC which are now out of operation.

Note : BFDC-Bangladesh Fisheries Development Corporation
BJMSS-Bangladesh Jatiya Matshyji Samabaya Samity.

Appendix 3.3

CHARACTERISTICS OF TRADITIONAL AND MOTORIZED FISHING FLEET

Type of boat	Length of craft (m)	Breadth (m)	Depth (m)	No. of crew	Propulsion	cost ('000 TK)	Fishing gear
A. Traditional							
Dinghi	6 - 7	1.0 - 1.2	0.9	1 - 2	oar/sail	10 - 15	gillnets/ longlines
Chandi	10 - 15	1.4 - 1.8	1.0	7 - 15	oar/sail	20 - 30	gillnets
Balam (medium)	10 - 15	1.5 - 2.0	1.2	10 - 15	oar/sail	35-40	gillnets
Balam (large)	15 - 20	2.0 - 2.5	1.2 - 1.5	20 - 30	oar/sail	45 - 60	gill/behundi nets
B. Motorized							
Cox's Bazar type	12 - 14	3.0 - 3.2	1.2 - 1.5	8	22 - 33 hp	140 - 180	gill/behundi nets
Modified Cox's Bazar type	12.0	3.0	1.2	6	22 hp	—	-do-
Chandi	12 - 13	1.6 - 1.8	1.0	10	9 hp	50 - 60	gillnets
Longliner	6 - 7	1.0 - 1.2	10.9	6	10-15 hp	40 - 50	longline

Appendix 3.4

COSTS AND EARNINGS ESTIMATE FOR TRADITIONAL AND MOTORIZED CHANDI BOATS

	Traditional Chandi boats	Motorized Chandi boats
Earnings		
Landings of hilsa (kg)	6300	13200
Value of landings (Tk)	69300	145200
Investment (Tk)		
Craft	30000	30000
Engine	—	48000
Nets	35000	35000
Total	<u>65000</u>	<u>114000</u>
Operating costs (Tk)		
Fuel and oil	—	11350
Food (5 Tk/day/man)	14250	14250
Crew share :		
(Gross earning- Food) 0.5	27525	—
(Gross earning — Food — Fuel) 0.375	—	44850
Gear repair/replacement	11000	11000
Engine repair	—	4500
Hull repair	3000	3000
Total	<u>55775</u>	<u>88950</u>
Capital costs (Tk)		
Hull (10 years)	3000	3000
Engine (6 years)	—	8000
Total	<u>3000</u>	<u>11000</u>
Total costs (Tk)	<u>58775</u>	<u>99950</u>
Return (Tk)	10525	<u>45250</u>
Rate of return (%)	16	40

Source: Anonymous 1984

Appendix 3.5

ECONOMICS OF A 38' MOTORIZED GILLNET BOAT

INVESTMENT

Cost of wooden hull	Tk. 100,000	
Cost of marine diesel engine 20-24 hp	80,000	
Cost of fishing gear (net — 500 lbs, rope 240 lbs, floats, etc.)	57,000	
Other expenses including registration fee, insurance etc.	10,000	Tk. 247,000

GROSS INCOME

Fish catch 160 kg per day for 160 fishing days at Tk. 10 per kg		Tk. 256,000
--	--	-------------

OPERATIONAL COSTS

Fuel 8 lubricating oil, etc. (Fuel 8 gal/day, 160 days at Tk. 34)	Tk. 43,520	
Repair and maintenance	20,000	
Landing, marketing and service charges (6%)	15,360	
Feeding charges of crew at Tk. 12 per day	20,160	
Salary of crew	<u>44,000</u>	Tk. 143,040

PROFIT AND LOSS

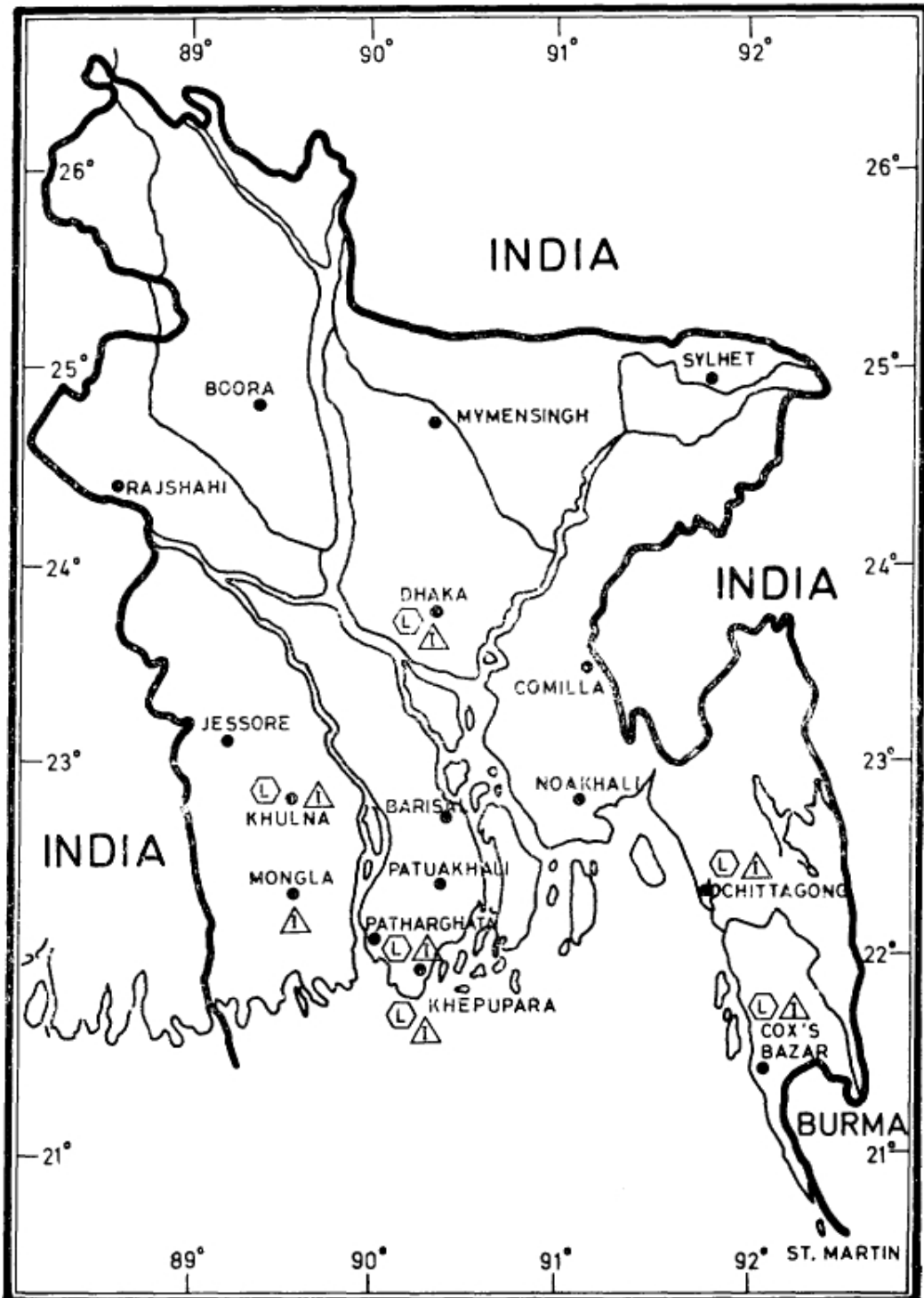
Income		Tk. 256,000
Expenditure		

1. Operational expenses	Tk. 143,040	
2. Depreciation		
Boat (10%)	10,000	
Engine (10%)	8,000	
Fishing gear (25%)	14,250	
3. Interest on investment (12%)	<u>26,640</u>	
		Tk. <u>204,930</u>

PROFIT		Tk. <u>51,070</u>
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Appendix 4.1

FISH LANDING CENTRES, ICE PLANT Et COLD STORAGES OF BFDC



LANDING CENTRES - (L) 1 w 130 148 m 284 148 | S BT

DHAKA, CHITTAGONG COX'S BAZAR. KHULNA, PATHARGHATA, KHEPUPARA

ICE PLANT & COLD STORAGE - (I)

DHAKA. CHITTAGONG, COX'S BAZAR KHULNA, MONGLA, PATHARGHATA, KHEPUPARA

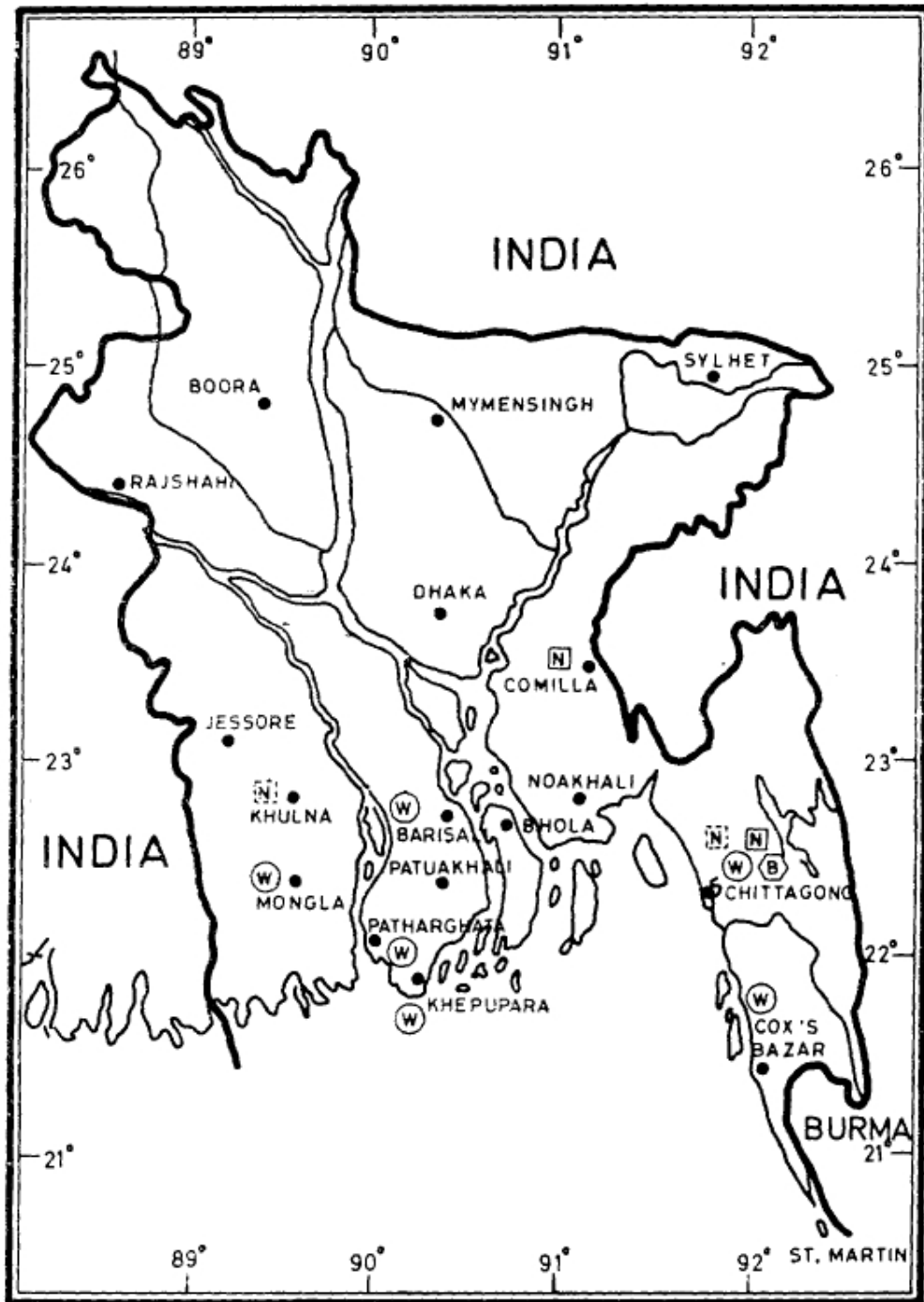
Appendix 4.2

ICE PLANT AND COLD STORAGE FACILITIES IN COASTAL DISTRICTS AS OF 1982-83

Source: BFDC Records

Name of district	Agency	No. of ice plants		Capacity (t/day)		Cold storage capacity (t)		
		Block ice	Flake ice	Block	Flake	ice	Fish	Ice/Fish
Chittagong	BFDC	2	5	45	75	325	105	30
	BJMSS	4	2	33	43	50	—	—
	BSFIC	3	—	19	—	8	—	—
	Private	61	1	355	7	25	—	49
Sub total		70	8	452	125	408	105	79
Barisal	BJMSS	1	—	10	—	—	—	—
	Private	31	—	314	—	—	—	300
Sub total		32	—	324	—	—	—	300
Patuakhali	BFDC	1	—	15	—	—	—	40
	BJMSS	2	—	20	—	—	—	—
	Private	6	—	59	—	—	—	25
Sub total		9	—	94	—	—	—	65
Khulna	BFDC	1	1	35	25	200	200	50
	BJMSS	1	—	10	—	—	—	—
	BSFIC	2	—	10	—	—	—	—
	Private	17	—	292	—	—	—	—
Sub total		21	1	347	25	200	200	50
Noakhali	BJMSS	1	—	10	—	—	—	—
	Private	3	—	19	—	—	—	1,000
Sub total		4	—	29	—	—	—	1,000
Grand total		136	9	1,246	150	608	305	1,494

Appendix 4.3
NET—MAKING PLANTS, BOATBUILDING YARD AND WORKSHOPS



WORKSHOP—(W) 1 w 143 191 m 227 191 | S BT

CHITTAGONG, COX'S BAZAR, BARISAL . MONGLA, PATHARGHATA,
 KHEPUPARA

BOAT BUILDING YARD—(B)

CHIT TAGONG

NET MAKING PLANTS

COMILLA & CHITTAGONG (Existrng) — (N)

CHITTAGONG & KHULNA (Proposed) — (N)

Appendix 5.1

YEARWISE PRODUCTION OF INLAND & MARINE FISH IN BANGLADESH

(Tonnes)

Year	Inland	Marine	Total
1964/65	718	81	789
1965/66	720	81	801
1966/67	721	81	802
1967/68	723	81	804
1968/69	726	82	808
1969/70	727	83	810
1970/71	729	85	814
1971/72	729	85	814
1972/73	731	87	818
1973/74	732	88	820
1974/75	733	89	822
1975/76	545	95	640
1976/77	541	100	641
1977/78	533	110	643
1978/79	527	118	645
1979/80	524	122	646
1980/81	525	125	650
1981/82	556	130	686
1982/83	584	144	728
1983/84	579	172	751

(Source: Directorate of Fisheries)

Appendix 5.2

COMMERCIAL SPECIES OF MARINE FISH AND PRAWNS

(Source: Hussain, 1982; Scientific names and English names corrected as per FAO species identification sheets)

<i>Scientific name</i>	<i>English name</i>	<i>Local name</i>
1. <i>Hilsa ilisha</i>	River shad	Ilish (hilsa)
2. <i>Hilsa kelee</i>	Kelee shad	Chandana
3. <i>Hilsa toli</i>	Toli shad	
4. <i>Polynemus indicus</i>	Indian (salmon) threadfin	Lakhua (Lakya)
5. <i>Eleutheronema tetradactylus</i>	Four-finger threadfin	Taliya
6. <i>Lates calcarifer</i>	Giant seaperch (cock-up)	Koral, Bhekti
7. <i>Promicrops lanceolatus</i> (<i>Serranus lanceolatus</i>)	Grouper (Mottled brown seabass)	Bole, Koral
8. <i>Sillago sihama</i>	Silver sillago (lady fish)	Hundra tulardandi
9. <i>Scomberoides commersonianus</i> (<i>Chorinemus lysan</i>)	Leather-skin (Queen fish)	Chappa
10. <i>Lutjanus johnii</i>	Red snapper	Rangachoukya
11. <i>Lobotes surinamensis</i>	Triple tail	Somudrakoi
12. <i>Pomadasys hasta</i>	Lined silver grunter	Sadh datina
13. <i>Protonibea diacanthus</i> (<i>Johnius diacanthus</i>)	Spotter croaker	Kala datina
14. <i>Otolithes ruber</i> (<i>Otolithes argenteus</i>)	Tiger-toothed croaker	Sadha poa Rupa poa
15. <i>Pennahia argentata</i> (<i>Johnius argentatus</i>)	Silver pennah croaker	Lal poa
16. <i>Pterolithus maculatus</i> (<i>Otolithes maculatus</i>)	Blotched tiger-toothed croaker	Guti poa
17. <i>Otolithoides biauritus</i> (<i>O. brunneus</i>)	Bronze croaker	Lambu
18. <i>Panna microdon</i> (<i>Otolithoides microdon</i>)	Panna croaker	Leijya poa
19. <i>Lepturacanthus savala</i> (<i>Trichiurus savala</i>)	Hairtail	Chhuri

<i>Scientific name</i>	<i>English name</i>	<i>local name</i>
20. <i>Trichiurus lepturus</i> (<i>T. haumela</i>)	Hairtail	Chhuri
21. <i>Scombromorus guttatus</i>	Spanish mackerel	Maittya
22. <i>Euthynnus affinis</i>	Little tuna	Born. maittya
23. <i>Rastrelliger kanagurta</i>	Indian mackerel	Champa
24. <i>Pampus argenteus</i> (<i>Stromateus argenteus</i>)	Silver pomfret	Foli chanda
25. <i>Pampus chinensis</i> (<i>Stromateus chinensis</i>)	Chinese pomfret	Rup chanda
26. <i>Formio niger</i> (<i>Parastromateus niger</i>)	Black pomfret	Hail chanda
27. <i>Ariomma indica</i> (<i>Psenes indicus</i>)	Indian drift fish	Malkan chanda
28. <i>Tachysusus gagoroides</i>	Catfish	Guizza, Gongra
29. <i>Arius (Tachysurus)</i> <i>thalassinus</i>	Catfish	Kata, Gongra
30. <i>Congresox (Muraenesox)</i> <i>talabonoides</i>	Indian pike-conger (eel)	Kamila, Kaila
31. <i>Decapterus maruadsi</i>	Round scad	Nilambari
32. <i>Megalaspis cordyla</i>	Hardtail scad	Kauwa
33. <i>Nemipterus japonicus</i>	Threadfin bream	Rupban
34. <i>Ilisha megaloptera</i> (<i>I. filigera</i>)	Big-eyed ilisha	Choikya
35. <i>Ilisha spp.</i>	Ilisha	Choikya
36. <i>Reconda russeliana</i>	Smooth-back herring	Phatra
37. <i>Setipinna taty</i>	Hairfin anchovy	Phase phaisya
38. <i>Coilia dussumieri</i>	Pointed tail anchovy	Alua, Kariali
39. <i>Carcharhinus melanopterus</i>	Black finned shark	Kala hangor kamot
40. <i>Sphyrna blochii</i>	Hammer-headed shark	Moishya hangor
41. <i>Pristis microdon</i>	Sawfish	Aishya karati hangor
42. <i>Rhynchobatus djiddensis</i>	Skate	Pitambari
43. <i>Himantura uarnak</i>	Sting ray	Haush, Sankush
44. <i>Penaeus monodon</i>	Tiger prawn	Bagda chingri
45. <i>P. semisulcatus</i>	Tiger prawn	
46. <i>Penaeus indicus</i>	Brown prawn	Chaptra, Changa, Chamma
47. <i>Metapenaeus monoceros</i>	Brown prawn	Honey kucho
48. <i>Metapeneus brevicornis</i>	Brown prawn	Chaga
49. <i>Perapenaeopsis uncta</i>		Tarachingri

Appendix 7.1

YEARWISE WHOLESALE RATES (Tk/kg) OF COMMERCIAL FISHES AT BFDC MARKETS IN CHITTAGONG AND COX'S BAZAR

(Source: BFDC)

Sl. NO.	Species	1979/80		1980/81		1981/82		1982/83		1983/84	
		Chittagong	Cox's Bazar	Chittagong	Cox's Bazar	Chittagong	Cox's Bazar	Chittagong	Cox's Bazar	Chittagong	Cox's Bazar
1.	Silver pomfret	15.24	12.00	—	20.00	—	25.00	19.18	17.25	25.21	20.00
2.	Black pomfret	10.50	6.50	12.00	9.50	14.00	12.25	12.18	12.00	14.02	13.50
3.	Hilsa (Hilsa shad)	—	—	—	—	—	—	N.A.	N.A.	N.A.	N.A.
4.	Hilsa (Toli shad)	—	a.00	—	12.00	—	18.00	7.17	6.75	8.56	7.00
5.	Indian mackerel	2.50	2.50	3.50	3.50	4.00	3.50	7.28	6.50	7.37	a.00
6.	Spanish mackerel	—	2.00	—	4.00	—	6.66		6.00	—	7.50
7.	Croaker (Jewfish)	5.71	5.50	a.00	7.00	12.00	10.00	8.41	7.20	9.78	12.50
8.	Catfish	3.74	4.00	4.00	6.66	5.50	a.00	3.41	3.00	3.66	3.10
9.	Shark	1.80	2.00	2.00	2.50	2.75	2.50	(4.19)* 1.64	1.50	(4.65)* 1.63	1.50
10.	Indian threadfin (Indian salmon)	12.85	12.00	15.00	13.00	18.00	15.00	19.35	16.50	22.35	20.00

* Rate for bigger sizes

N.A.-Not available

Appendix 8.1

EXPORT OF FISH AND FISH PRODUCTS FROM BANGLADESH

(Source: Directorate of Fisheries)

(Quantity in tonnes)

(Value in Tk. million)

Item	1975-76		1976-77		1977-78		1978-79		1979-80		1980-81		1981-82		1982-83		1983-84	
	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value
Frozen shrimp	1,057	82.60	5,038	246.20	5,109	253.08	6,924	437.70	8,657	528.55	5,649	560.42	6,838	904.40	9,114	1,466.72	NA	1,555.01
Frozen fish	2,489	78.30	26	0.80	497	17.21	121	5.22	308	11.78	784	43.22	703	41.83	1,294	77.05	NA	141.71
Fresh fish	1,236	17.80	248	4.05	120	2.16	216	0.36	—	—	—	—	—	—	—	—	—	—
Frog legs	76	1.48	919	19.28	979	21.44	3,150	89.02	1,509	39.52	677	44.74	1,589	112.10	2,028	144.56	NA	192.52
Dried and salted fish, processed fish and fish products including shark fins and fish maws	76	3.25	120	7.20	187	13.29	226	14.28	437	17.88	500	34.72	335	29.52	435	38.38	NA	53.64
Total	4,934	175.43	634	277.53	6,892	307.18	10,436	546.58	10,911	597.73	7,610	683.10	9,464	1087.85	12,872	2,726.71		1,942.88

Appendix 10.1

DISTRIBUTION OF MARINE FISHING VILLAGES, FISHERMEN'S HOUSEHOLDS AND FISHERMEN (1967-68)

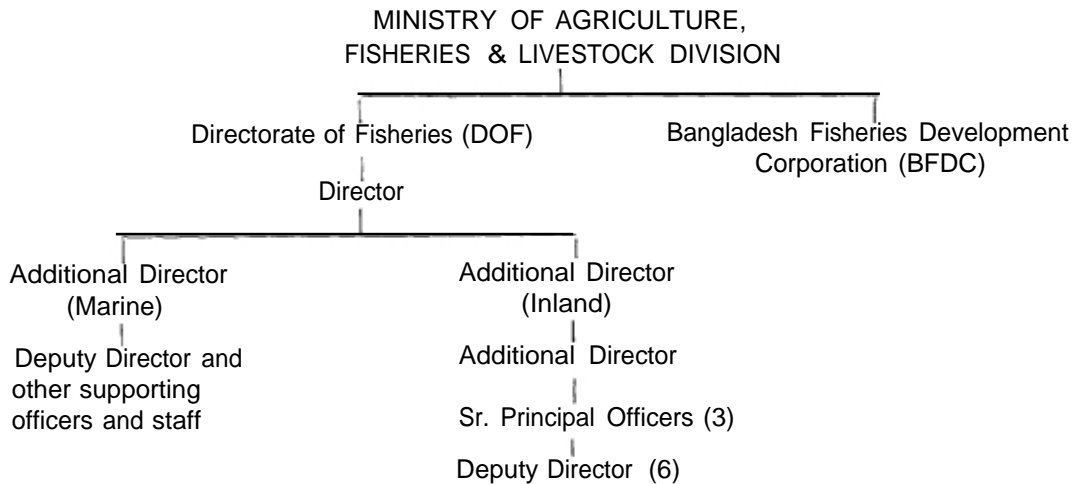
(Source: Anonymous, 1972)

District	Fishing villages	Fishermen's households			Fishermen				
		with boat and gear	without boat but with gear	Workers	Total	with boat and gear	without boat but with gear	Workers	Total
Chittagong	361	5,100	7,327	8,255	20,682	9,945	10,192	12,205	31,842
Noakhali	43	771	40	765	1,576	952	15	850	1,817
Barisal	91	711	—	1,303	2,014	1,283	—	1,706	2,989
Patuakhali	164	719	129	2,214	3,062	1,013	150	2,502	3,665
Khulna	46	332	32	1,034	1,398	507	47	1,065	1,619
Jessore	1	7	—	15	22	7	—	15	22
Total	706	7,640	7,528	13,586	28,754	13,207	10,404	18,343	41,954

Appendix 11.1

ORGANIZATION CHART OF THE DIRECTORATE OF FISHERIES

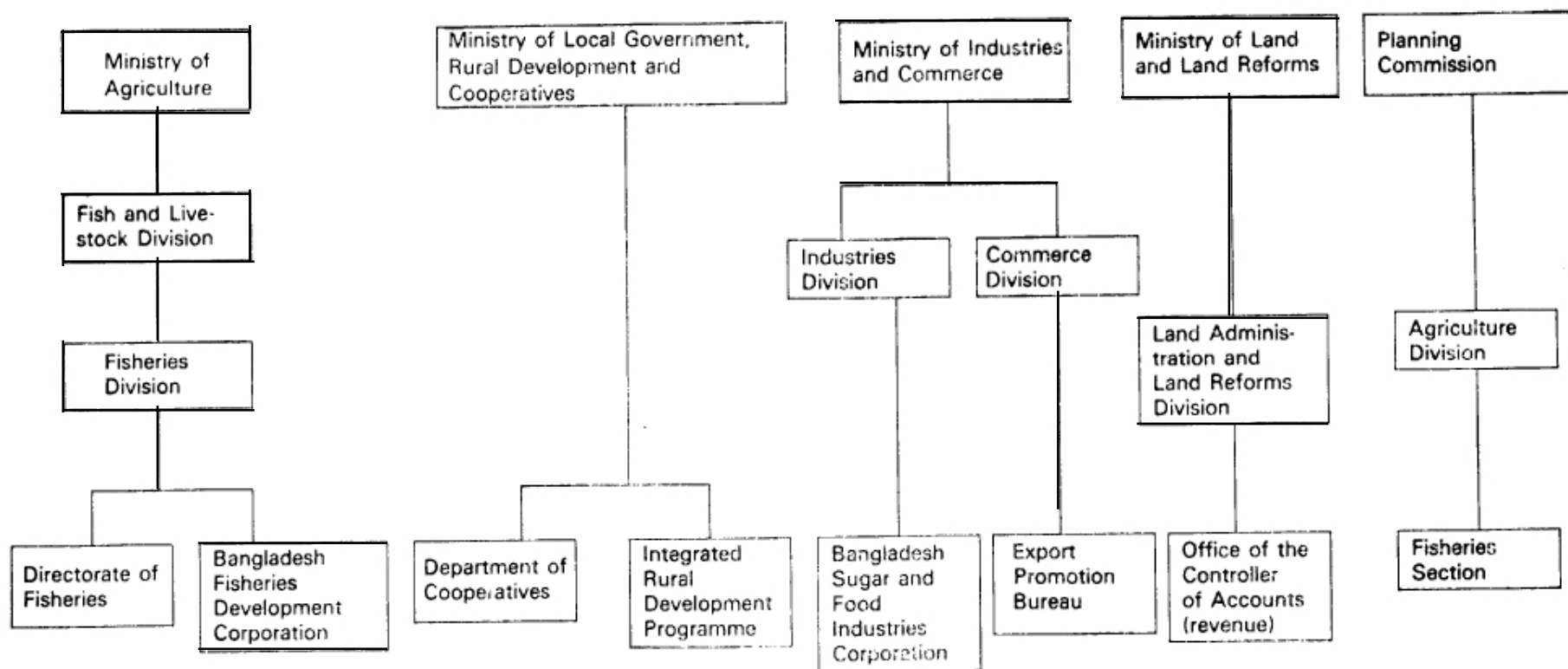
(Source: Anonymous 1983d)



Functions of the Directorate of Fisheries

1. Operation of nursery fish farms and seed multiplication farms to supply quality fish, fingerlings to the fish farmers.
2. Management of government fisheries to increase production.
3. Formulation and execution of development projects to develop fishery resources.
4. Dissemination of modern ideas and methods of fish culture, conservation of fish, fishery management, etc., to the people.
5. Management and conservation of fish and other aquatic organisms of economic importance.
6. Marine fishery exploration and biological research, population studies and management.
7. Conduct of fishery research both biological and technological.
8. Extension and training of fishery personnel.
9. Enforcement of Fish Act, 1950 on the Protection and Conservation of Fish.
10. Collection of fishery statistics.
11. Advising the government in formulating policies relating to fisheries.

Appendix 11.2 – CHART SHOWING THE AFFILIATION OF VARIOUS FISHERY ORGANIZATIONS UNDER THEIR RESPECTIVE MINISTRIES



Appendix 12.1

PROGRESS OF PROJECTS UNDERTAKEN BY BFDC

(Source: Anonymous, 1982b)

1. Net factory at Comilla

The BFDC took over the Comilla Fish *Net* Factory from the Directorate of Fisheries in 1965. The existing factory had only two old cotton net manufacturing machines (one was installed in 1952 and another in 1957) and one old cotton twisting machine installed in 1960. Both these looms have become obsolete and spare parts could not be made available to them. BFDC set up two nylon net making machines in 1967-68 in the same premises. In 1981-82. BFDC added two more net making machines. During 1981-82, 618 lb of nets were produced, Total expenditure and income were Tk. 4.88 million and Tk. 4.85 million, respectively. Of the four looms, two looms were undergoing major repair and as such, there was a shortfall in production. Both these machines are likely to resume production from 1982-83.

2. Fish harbour and landing facilities

A modern fish harbour, big enough to cater to the need of 68 trawlers each of 100 feet length, was constructed in Chittagong on the left bank of the river Karnafuli, during the period 1965-66 to 1979-80 with Japanese Government assistance. The facilities provided at the fish harbour are (i) fish auction hall, (ii) 30 t block ice plant and 20 t flake ice plant, (iii) cold storage (for fish 105 t, ice 250 t), (iv) warehouse, (v) slip-way to accommodate vessels upto 100 feet length, (vi) administrative building, (vii) water tank to supply water to trawlers, (viii) residential accommodation, etc. Another 30 t flake ice plant has been constructed in the harbour. These were, to some extent, under-utilized due to lack of skilled manpower in the trawler fleet, *etc.*

3. Fish processing, Cox's Bazar

Under the processing project located at Tekpara, Cox's Bazar, one 2-ton freezing plant with 20 t frozen storage, one fish meal grinder ($\frac{1}{2}$ t/day), one fish drying kiln(2 t raw fish per 8 hours) were provided. During 1981-82, 769 t ice, 83 t fish meal, 14 t frozen shrimp and eight ton shark liver oil have been produced. Total expenditure and income during the year were Tk. 3.55 million and Tk. 3.42 million respectively. Due to the exorbitant price of burning wood the drying kiln had to be abandoned.

4. Wholesale fish market, Cox's Bazar

The fish landing terminal with wholesale facilities has been established on the bank of the river. One flake ice plant (5 t/day), one block ice plant (15 t/day) with ice fresh fish storage capacity of 30 t have been provided there. During the year total fish landing and ice production were 543 t and 177 t, respectively. Expenditure and income during the year were Tk. 0.38 million and Tk. 0.68 million, respectively.

5. Wholesale fish market, Khulna

The project is equipped with fish landing and wholesale facilities. Total fish landing during the year was 2,899 t. Total expenditure and income were Tk. 0.37 million and Tk. 0.64 million respectively.

6. Marketing and distribution of fishes, Pagla, Dhaka

Under the project the Corporation has set up a fish refrigeration complex consisting of one 30 t block ice plant, 200 t fresh fish cold storage, 200 t ice storage, 15 t freezing plant and 550 t frozen storage. During the year 1981-82, 5,938 t ice have been produced and 162.5 t shrimp and 499 t fish have been frozen by BFDC. Expenditure and income were Tk. 3.49 million and Tk. 3.25 million, respectively.

7. Boatbuilding and mechanization

This project was undertaken with a view to procuring 554 marine diesel engines of 20-25 hp with accessories, twine, etc., and to constructing 554 wooden boats of 38' length to fit the engines in the boats and distribute these mechanized boats to the fishermen in 1975/76. During 1981/82, 30 marine diesel engines and wood treatment plant, spare parts and other accessories were procured, and 30 mechanized boats constructed and 16 mechanized boats distributed to the fishermen. To date, a total of 540 boats have been constructed, 550 engines procured and 444 distributed. Total expenditure and income during the year were Tk. 5.25 million and Tk. 9.01 million, respectively.

8. Mechanization of country fishing boats, Barisal

This project envisages the procurement of 500 marine diesel engines, nylon twine, synthetic floats, etc., and distributing the same to the fishermen of the coastal areas on cash/hire purchase basis for mechanizing their country fishing boats. During 1981/82, 23 engines were distributed to the fishermen. Total income and expenditure were Tk. 0.59 million and Tk. 0.35 million, respectively.

9. Fish and fish by-product processing unit, Chittagong

This project was undertaken for the procurement of one fish meal plant (25 t raw material/day), one shark liver oil plant (500 kg/hour), one freezing plant (15 t/day) with cold storage, water treatment plant and deodorant plant, stand-by generator and construction of factory building, office room and installation of plant and machinery. During 1981/82, 7,792 t ice, 28 t frozen shrimp, 219 t frozen fish and 33 t fish meal have been produced. Since the inception of this scheme, construction of factory building and office room have been completed; plant and machinery have been procured and installed and put to operation. Total income and expenditure during the year were Tk. 8.04 million and 6.79 million, respectively.

10. Two-trawler project

This project is running on its revenue earning. A total of 759 t of fish was caught by this trawler during 1981/82 and an amount of Tk. 3.62 million was earned as sale proceeds of fish. An amount of Tk. 3.80 million was spent for the operation of the trawler.

11. Four-trawler project

This project too runs on its revenue earning. During 1981/82, 198 t of fish was caught and an income of Tk 0.74 million was earned as sale proceeds of fish; Tk. 2.26 million has been spent for operating the trawler.

12. Mechanization of country fishing boats with ancillary facilities

The project was undertaken for the procurement of 658 in-board marine diesel engines, nylon twine, two net-making machines, workshop equipment and accessories. 650 engines had been procured in 1980/81, Of these, 250 engines were sold to fishermen on a cash payment basis during 1981/82. The net making machines were installed and put to operation during 1981/82.

Appendix 14.1

FINANCIAL OUTLAY FOR FISHERIES IN THE SECOND FIVE-YEAR PLAN (1980-85)

(Source: Anonymous, 1980a) (Tk. in crore)*

Organization	Investment	Non-investment	Total
Fisheries and Livestock Division	15.74	6.10	21.84
Directorate of Fisheries	46.48	35.33	81.81
BFDC	61.50	9.85	71.35
Public Sector Total	123.72	51.28	175.00
Private and Co-operative	401.25	134.00	535.25
Total	524.97	185.28	710.25
Protection Vessel	39.50	0.25	39.75
Grand Total	564.47	185.53	750.00

* 1 Crore=10 million; 26 Taka = 1 US \$ (approx)

Breakdown of the Proposed Financial Outlay

(Tk. in crore)

Heads/ Programmes	Public Sector				Private/ cooperative sector	Total for each head/ programme
	F & L Division	DOF	BFDC	Total		
1	2	3	4	5	6	7
Research, survey and feasibility	21.84 (21.84)	3.96 —	0.24 (0.24)	26.04 (22.08)	— —	26.04 (22.08)
Training	—	1.78	1.34 (1.34)	3.12 (1.34)	—	3.12 (1.34)
Fisheries extension	—	9.78	—	9.78	—	9.78
Fish seeds	—	38.49	—	38.49	70.00	108.49
Fishing crafts	—	—	52.59 (52.59)	52.59 (52.59)	200.00 (160.00)	252.59 (212.59)

Appendix 14.1 (Contd.)

Net factory	—	—	3.48 (3.48)	3.48 (3.48)	5.25 (4.00)	8.70 (7.48)
Fish landing, processing, storage and distribution facilities	—	—	10.70 (10.70)	10.70 (10.70)	21.00 (18.00)	31.70 (28.70)
Production (including development of water bodies, fish feeds, fertilizer, etc.)	—	27.80	3.00	30.80	239.00	269.80
Total	21.84 (21.84)	81.81	71.35 (68.35)	175.00 (90.19)	535.25 (182.00)	710.25 (272.19)
Protection Vessels	39.75 (39.75)	—	—	39.75 (39.75)	—	39.75 (39.75)
Grand Total	61.59 (61.59)	81.81	71.35 (68.35)	214.75 (129.94)	—	750.00 (311.94)

Note : Figures within parantheses are for marine fisheries.

Appendix 14.2

FAO - EXECUTED FISHERIES PROJECTS IN BANGLADESH

(Source: FAO)

- 1. Symbol and Title of Project:** BGD/79/015 (UNDP), Fisheries Resources Survey System

Starting Date : 9 August 1980, NTE date 30 June 1985, Duration 4 years and 11 months

International Assistance : US \$ 1,660,522

Objectives : To make a preliminary estimate of the present state of fisheries and develop a system of information collection from all sources related to the fishing industry of Bangladesh.

Present Status : The project is carrying out work on the mapping of large and small water bodies; the Government of Bangladesh will be provided with basic data on aquatic and fishery resources to facilitate planning on future development.
- 2. Symbol and Title of Project:** BGD/81/034 (UNDP), Fisheries Advisory Service, Planning, Processing and Appraisal.

Starting Date : 1 January 1982, NTE date 30 June 1986, extended up to 31 December 1986.

International Assistance : US \$ 1,276,979.

Objectives: To enhance fish production.

- Present Status : Activities of this project are a follow-up of the previous UN DP Project BG D/72/076, Fishery Advisory Services, completed in 1981.
3. Symbol and Title of Project : BGD/80/025 (UNDP), Strengthening of the National Programme for Marine Fisheries Resource Management, Research and Development.
- Starting Date : March 1983, duration four years
- International Assistance : US \$ 3,793,645
- Objectives : Institution-building and research on resources and their exploitation.
- Present Status : The project is operational and utilizes a Government research/training vessel.
4. Symbol and Title of Project: RAS/76/003 (UNDP), Network of Aquaculture Centres in Asia. (NACA)
- Starting Date : 4 September 1979, NTE date 31 December 1983, since extended up to December 1987.
- International Assistance : US \$ 3,205,635 (for whole region) during first phase plus US \$ 487,000 during extended period.
- Objectives : To carry out multi-disciplinary long-term research and to train core personnel.
- Present Status : The following countries participate in the project :Bangladesh, Hong Kong, India, Indonesia, Malaysia, Nepal, Philippines, Singapore, Sri Lanka, Thailand and China.
5. Symbol and Title of Project: RAS/81/051 (UNDP), Marine Fishery Resources Management in the Bay of Bengal.
- Starting Date : The project became operational on 1 January 1983 for four years.
- International Assistance : US \$ 900,000 (for whole region).
- Objectives : To improve capability in marine fishery resources assessment and promote cooperation between the participating countries with regard to shared stocks.
- Present Status : UNDP has confirmed financial support for 1983-86; and the major ongoing work includes studies of tuna in the Maldives and Sri Lanka, hilsa in Bangladesh, mackerels in the Malacca Straits; and compilation of statistics and stock assessment models.
6. Symbol and Title of Project: GCP/RAS/040/SWE (SIDA), Development of Small-Scale Fisheries in the Bay of Bengal.
- Starting Date : 1 November 1978, NTE date 31 December 1986.
Duration 8 years and 2 months
- International Assistance : US \$ 10,550,077 (for whole region)
- Objectives : To develop, demonstrate and promote new technologies and methodologies in craft, gear, aquaculture and extension to improve the conditions of small-scale

fisherfolk and the supply of fish from the small scale sector.

Present Status :

Pilot activities have covered craft (motorization of the Chandi in Bhola island) ; gears (trials to improve a variety of traditional gears such as large-mesh driftnets, small-mesh gillnets and set bagnets, and to introduce new gears like high-opening bottom trawls) ; aquaculture (shrimp culture demonstration in Satkhira) ; and extension (income-earning activities and group organization of women in villages near Chittagong).

The conduct, findings and present status of these activities are described in several technical papers, both released and under print, which are listed below:

1. BOBP/WP/5 : Improvement of Large-Mesh Driftnets for Small-Scale Fisheries in Bangladesh. G. Pajot, Madras, India, September 1980.
2. BOBP/WP/12 : Trials in Bangladesh of Large-Mesh Driftnets of Light Construction. G. Pajot and T. K. Das, Madras, India, October 1981.
3. BOBP/WP/13 : Trials of Two-Boat Bottom Trawling in Bangladesh. G. Pajot and J. Crockett, Madras India, October 1981.
4. BOBP/WP/28 : Fishing Trials with Small-Mesh Driftnets in Bangladesh. G. Pajot and T. K. Das, Madras, India, March 1984.
5. BOBP/REP/15 : Report of the Workshop-cum-Consultation on Development of Activities for Improvement of Coastal Fishing Families. Madras, India, May 1982.
6. BOBP/REP/18 : Motorization of Country Craft in Bangladesh. Madras, India, July 1984.
7. BOBP/WP/34 : Pilot Survey of Set Bagnet Fisheries of Bangladesh. Abul Kashem. Madras, India, August 1985.
8. BOBP/REP/24: Fisherwomen Activities in Bangladesh : A Participatory Approach to Development (In preparation).
9. BOBP/WP/42 : Improvement of Large-Mesh Drift-nets in Bangladesh. G. Pajot (In preparation).

Appendix 14.3

BILATERAL AND MULTILATERAL FUNDED FISHERIES PROGRAMMES IN BANGLADESH

(Source: Bangladesh Development Assistance Report, 1983)

I. ASIAN DEVELOPMENT BANK

1. Title of Project : Aquaculture Development Project
- Status of Project : Operational
- Starting date : 15 March 1978 (date of effectivity of loan)
- Completion date : Open
- Total external assistance : US \$ 18.8 million (Asian Development Bank)
- Objectives (to be accomplished by Project) : The objectives of the Project are both economic and social. The Project will ensure increase in fish production through aquaculture development to: (i) meet the growing local demand for fish; (ii) improve the incomes and employment opportunities of fishermen and fish farmers; and (iii) generate export earnings
- Major physical inputs (boats, shore facilities, buildings, etc.) : Fish hatcheries / ponds / pens / cages; fishing net making plant; fish processing facilities; storage facilities
- Major support services (experts, fellowships, workshops, etc.) : Consulting services to (i) assist in the preparation of tender documents including specifications, and (ii) assist in implementation and initial operation of the components.
2. Title of Project : Fisheries Credit II Development
- Status of Project : Planned TA (Technical Assistance)
- Starting date : January 1984
- Completion date : December 1985
- Total external assistance : US \$ 250,000 (TA) (Asian Development Bank)
- Objectives (to be accomplished by Project) : TA for preparation of a project for vessel mechanization, on-shore facilities and basic infrastructure facilities in coastal districts. The Project will be on the same lines as the First Fisheries Credit to Bangladesh Krishi Bank (BKB)
- Additional information : Processing schedule will be determined after actions on the first project are completed.

3. Title of Project : Aquaculture Development II
- Status of Project : Planned TA
- Starting date : October 1983
- Completion date : December 1985
- Total external assistance : US \$ 250,000 (Asian Development Bank)
- Objectives (to be accomplished by Project) : TA to prepare a project for possible financing by the Bank. The scope of the Project tentatively includes:
- (i) establishment of hatcheries for carp and shrimp production ;
 - (ii) rehabilitation of derelict tanks;
 - (iii) provision of marketing and other infrastructure facilities ;
 - (iv) cage culture and others.

II.' DANISH INTERNATIONAL DEVELOPMENT AGENCY (DANIDA)

1. Title of Project : Pilot project for construction and introduction of mini-trawlers
- Status of project : Operational
- Starting date : July 1984
- Completion date : June 1985
- Total external assistance : DKr. 3.00 million (Us \$ 452,000)
- Objectives : Construction of four mini-trawlers and their operation on a pilot basis to determine the economically feasible type of trawlers, equipment and gear for fishing in the Bay of Bengal.
2. Title of Project : Barisal Wholesale Fish Market
- Status of Project : Planned
- Starting date : July 1985
- Completion date : June 1986
- Total external assistance : Us \$ 302,000
- Objectives (to be accomplished by Project) : To establish a fish landing centre and provide better marketing and other facilities to the fishermen of Barisal area.

III. PROJECTS EXECUTED BY OTHER AGENCIES

Japan has provided a research vessel on a technical assistance programme. Other Japanese assistance is in the form of a grant of Yen 650 million for the procurement of marine diesel engines, ship equipment and net-making machines and of Yen 210 million for fishing net manufacturing machinery.

Publications of the Bay Of Bengal Programme (BOBP)

The BOBP brings out six types of publications:

Reports (BOBP/REP/. .) describe and analyze completed activities such as seminars, annual meetings of BOBP's Advisory Committee, and projects in member-countries for which BOBP inputs have ended.

Working Papers (BOBP/WP/. .) are progress reports that discuss the findings of ongoing BOBP work.

Miscellaneous Papers (BOBP/MIS/. .) concern work not originated by BOBP staff or consultants — but which is relevant to the Programme's objectives.

Newsletters (*Boy of Bengal News*), issued quarterly, contain illustrated articles and features in non-technical style on BOBP work and related subjects.

Information Documents (BOBP/INF.. .) are bibliographies and descriptive documents on the fisheries of member-countries in the region.

Manuals and Guides (BOBP/MAG/. .) are instructional documents for specific audiences.

Reports (BOBP/REP/. . .)

1. Report of the First Meeting of the Advisory Committee. Colombo, Sri Lanka, 28-29 October 1976. (Published as Appendix 1 of IOFC/DEV/78/44.1, FAO, Rome, 1978)
2. Report of the Second Meeting of the Advisory Committee. Madras, India, 29-30 June 1977. (Published as Appendix 2 of IOFC/DEV/78/44.1, FAO, Rome, 1978)
3. Report of the Third Meeting of the Advisory Committee. Chittagong, Bangladesh, 1-10 November 1978. Colombo, Sri Lanka, 1978. (Reissued Madras, India, September 1980)
4. Role of Women in Small-Scale Fisheries of the Bay of Bengal. Madras, India, October 1980.
5. Report of the Workshop on Social Feasibility in **Small-Scale** Fisheries Development. Madras, India, 3-8 September 1979. Madras, India, April 1980.
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7. Report of the Fourth Meeting of the Advisory Committee. Phuket, Thailand, 27-30 November 1979. Madras, India, February 1980.
8. Pre-Feasibility Study of a Floating Fish Receiving and Distribution Unit for Dubla Char, Bangladesh. G. Eddie, M. T. Nathan. Madras, India, April 1980.
9. Report of the Training Course for Fish Marketing Personnel of Tamil Nadu. Madras, India, 3-14 December 1979. Madras, India, September 1980.
- 10.1 Report of the Consultation on Stock Assessment for Small-Scale Fisheries in the Bay of Bengal. Chittagong, Bangladesh, 16-21 June 1980. Volume I: Proceedings. Madras, India, September 1980.
- 10.2 Report of the Consultation on Stock Assessment for Small-Scale Fisheries in the Bay of Bengal. Chittagong, Bangladesh, 16-21 June 1980. Volume 2: Papers. Madras, India, October 1980.
11. Report of the Fifth Meeting of the Advisory Committee. Penang, Malaysia, 4-7 November 1980. Madras, India, January 1981.
12. Report of the Training Course for Fish Marketing Personnel of Andhra Pradesh. Hyderabad, India, 11-26 November 1980. Madras, India, September 1981.
13. Report of the Sixth Meeting of the Advisory Committee. Colombo, Sri Lanka, 1-5 December 1981. Madras, India, February 1982.
14. Report of the First Phase of the Aquaculture Demonstration for Small-Scale Fisheries Development Project * in Phang Nga Province, Thailand. Madras, India, March 1982.
15. Report of the Consultation-cum-Workshop on Development of Activities for Improvement of Coastal Fishing Families. Dacca, Bangladesh, October 27-November 6, 1981. Madras, India, May 1982.
16. Report of the Seventh Meeting of the Advisory Committee. New Delhi, India, January 17-21, 1983. Madras, India, March 1983.
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19. Report of the Eighth Meeting of the Advisory Committee. Dhaka, Bangladesh, January 16-19, 1984. Madras, India, May 1984.
20. Coastal Aquaculture Project for Shrimp and Finfish in Ban Merhok, Kedah, Malaysia. Madras, India, December 1984.
21. Income-Earning Activities for Women from Fishing Communities in Sri Lanka. Edeltraud Drewes. Madras, India, September 1985.
22. Report of the Ninth Meeting of the Advisory Committee. Bangkok, Thailand, February 25-26, 1985. Madras, India, May 1985.

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2. Inventory of Kattumarams and their Fishing Gear in Andhra Pradesh and Tamil Nadu.
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20. Further Trials of Mechanized Trawling for Food Fish in Tamil Nadu.
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21. Improved Deck Machinery and Layout for Small Coastal Trawlers. G. Pajot, J. Crockett, S. Pandurangan and P. V. Ramamoorthy. Madras, India, June 1983.
22. The Impact of Management Training on the Performance of Marketing Officers in State Fisheries Corporations.
U. Tietze. Madras, India, June 1983.
23. Review of Experiences with and Present Knowledge about Fish Aggregating Devices.
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24. Traditional Marine Fishing Craft and Gear of Orissa. P. Mohapatra. (Under preparation)
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27. Reducing Fuel Costs of Fishing Boats in Sri Lanka. O. Gulbrandsen (In preparation)
28. Fishing Trials with Small-Mesh Driftnets in Bangladesh.
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