

# MARINE SMALL-SCALE FISHERIES OF WEST BENGAL: AN INTRODUCTION



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This document attempts a brief, factual presentation of data and baseline information on the main features of marine small-scale fisheries in West Bengal, India

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

This document has been compiled by the Bay of Bengal Programme for Fisherfolk Communities from reports of consultants, staff of BOBP and from material obtained from the Directorate of Fisheries, West Bengal.

The Bay of Bengal Programme is a regional fisheries programme that covers seven countries bordering the Bay of Bengal — Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. It is small-scale fisheries oriented and strives for the socio-economic betterment of small-scale fisherfolk communities of the region by developing and demonstrating new ideas or technologies, methodologies or systems.

This paper is an information document and has not been officially cleared by the Governments concerned or by the FAO.

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## 1. INTRODUCTION

The state of West Bengal is situated between latitudes 21°5' N and 24°5' N and longitudes 86° E and 89° E. It is the northernmost Indian state bordering the Bay of Bengal and has to its south the Indian state of Orissa, while Bangladesh is to its north and north-east. (Appendix 1.1 shows the administrative districts of West Bengal. Appendix 1.2 shows the state's coastal areas, as also important fishing centres along the coast.)

West Bengal is one of the more densely populated states in India (population density of 615 people/km<sup>2</sup> as compared to the All-India average of 216). The population is, however, mostly rural and the work-force predominantly agrarian. (Appendix 1.3 gives some pertinent state data and comparative All-India figures where applicable.)

West Bengal has a short coastline — only about 64 km, spread along the southern edge of its two maritime districts, 24 Parganas and Midnapore. This represents approximately one per cent of India's coastline.

The marine resource base comprises 780 km<sup>2</sup> of inshore area (upto 20 m depth), 1815 km<sup>2</sup> (between 20 m and 80 m depth) and a continental shelf of 17,049 km<sup>2</sup> (upto 200 m depth). Brackishwater areas in the deltaic region encompass a territory of 200,000 ha.

With a very large body of inland water for capture and culture fisheries, West Bengal is better known for its considerable inland water fish production. The marine fisheries sector has developed gradually, only during the late '50s.

By tradition, fish is an important part of the diet in West Bengal and the main role of the fisheries sector has been as a provider of food. There is a strong consumer preference for fresh-water fish, marine fish being mainly preferred in the coastal and tribal hill areas. But the gap between supply and demand of freshwater fish, coupled with high prices, has resulted in a steadily growing demand for marine fish in other parts of the state.

About 85,000 fishermen earn their livelihood wholly or partially from marine fishing in the two maritime districts. Motorization of fishing craft was first attempted in the late '50s, but the tempo increased only from the late '70s, with the introduction of financing schemes through the co-operative sector. The influx of refugees from Bangladesh into 24 Parganas also had an impact on the development of craft and gear.

Prior to the Sixth Plan period (1980-85) very little was done to improve the infrastructure facilities for marine fisheries. Since then, major and minor schemes to provide berthing, landing and post-harvest facilities are remedying the situation. The Seventh Plan (1985-90) focussed on the need for welfare measures, infrastructure development, deep sea fishing, motorization of the fleet and diversification of fisheries besides development of the brackish water sector? Priority, however, continues to be given to inland fisheries.

## 2. FISHERY RESOURCES

The south-west monsoon influences West Bengal's fisheries to a great extent. The peak season is during the fair weather period, from mid-October to end-February.

The continental shelf of West Bengal is wide and shallow. The 50 m isobath is between 30 and 60 nautical miles from the coastline. The marine fishery is concentrated within this area (Refer Appendix 2.1).

No exploratory fishing has been conducted specifically in West Bengal waters. But estimates of potential yield have been made by several people on the basis of bio-productivity and trawl surveys of the continental shelf of West Bengal, Orissa and Bangladesh.

The *Rv Dr Fridtjof Nansen* survey (1979-1980) in the upper Bay of Bengal (the area adjacent to Swatch of No Ground, Bangladesh) and exploratory fishing by the Fishery Survey of India off northern Orissa found significant quantities of demersals, such as croaker, catfish, threadfin breems, bulls eye, ribbonfish, shark and skate, and pelagics, such as Indian mackerel, scad, sardine-like fish and anchovy, in the 50-100 m depth range. (Appendix 2.3 gives the bottom trawl and pelagic trawl catch rates: Also refer to BOBP/WP/36 and BOBP/REP/39.)

Potential also exists for exploitation of tuna and pelagic shark in the pelagic zone beyond the continental shelf. (Refer BOBP/WP/36 and BOBP/REP/40). And deep sea lobster, shrimp, snake mackerel, bulls eye, threadfin, catfish and other small deep-water fin fish species are available in significant quantities in the 200-300 m deep sea bottom (BOBP/WP/53).

The distance to the edge of the continental shelf, however, precludes the use of most craft at present found in the small-scale sector.

### 3. PRODUCTION

Appendix 3.1 shows the fishing area in West Bengal waters that is at present exploited by the motorized and non-motorized sector.

The bulk of India's fleet of shrimp trawlers operates in the Sandheads area and accounts for an estimated 20,000 t of shrimp and quality fish. It is conservatively estimated that about 100,000 t of by-catch is discarded by this fleet.

Appendix 3.2 gives detailed production of the motorized and non-motorized sectors in the period 1980-84. Appendix 3.3, from the same source (CMFRI), gives the district-wise production break-up. The tables reveal that the average annual total landings are similar for the two districts, though there are considerable differences during some years. The motorized sector accounts for 56% of the catch.

Pelagics form 40% of the total catch, comprising *hilsa* shad, hairtail, Bombay duck, small clupeids and engraulids. Among the demersals, pomfret, croaker and catfish are the more important varieties. Pomfret, *hilsa* shad and catfish are the dominant species in gillnet operations, though shark, ray and threadfin are also obtained. Ribbonfish, croaker, Bombay duck, prawn and small clupeids are caught mostly by set bag-net.

Non-penaeid shrimps are the largest catch by non-motorized boats and are followed by Bombay duck and croakers.

Most of the fishing is inshore at present. To avoid over-exploitation, fishing further offshore (beyond 50 m depth) needs to be encouraged.

### 4. UTILIZATION

The larger, motorized gillnetters carry ice. Landed fish is repacked in ice and is transported, as soon as possible, by road. Ice production is 400 t/day in 24 Parganas and 100 t/day in Midnapore district. Fish from small traditional boats is landed daily, but this catch is generally un-iced.

Drying fish is an important activity, especially for landings made with set bagnets. Such dried fish as Bombay duck and ribbonfish are for human consumption, but dried trash fish is meant for fish meal. Salt-dried shark meat and shark fins are mainly exported.

Freezing plants mainly process shrimp products for export. There is no canning industry in West Bengal for marine products. But processing of shark for liver oil is done commercially in the state.

Assuming that 90% of West Bengal's population of approximately 64 million people (1988) consume fish, the total demand for fish is estimated at about 700,000 t annually. The estimated production of 540,000 t of fresh-water and marine fish clearly indicates a market deficit, only a part of which is met by supply from other states. The consumer preference for fresh-water fish has been an important reason for the emphasis on inland fishery development.

Calcutta plays a pivotal role in the marketing of fish in West Bengal. There are several wholesale markets, the most important being Howrah, Chhaglhate, Sealdah and BK Pal. (Namkhana and Diamond Harbour are important wholesale markets outside Calcutta.) The daily volume is approximately 70-80 t at Howrah and 20 t at Sealdah during peak winter season. Appendix 4.1 provides information on fish flow in West Bengal.

There are about 120 retail markets in the Calcutta area, some private and some controlled by the Calcutta Municipal Corporation. The Central Fisheries Corporation, established in 1965 for fish marketing, was not able to sustain itself.

Marketing channels distinguish:-

- \* Fresh fish and dry fish
- \* Inland water fish and marine and estuarine fish
- Fish produced in West Bengal vs fish supplied from other states
- Local coastal retail vs Calcutta retail vs interior West Bengal.

The dried fish trade needs special mention. The major wholesale markets for dried fish are Terry Bazaar in Calcutta and Uluberia in Howrah district. Traders usually stock-pile during the peak season for sale throughout the year. Most dried fish is sold to the hilly areas of West Bengal, Assam and Tripura. Some local demand for dried Bombay duck is noted in Calcutta.

Marine fish generally fetches a lower price than fresh water fish. However, certain marine species fetch high prices, e.g. bekti, because of its importance on ceremonial occasions, and *hilsa*.

West Bengal's fisheries exports are largely confined to cultured brackish water shrimp. The export of marine products through Calcutta port is detailed in Appendix 4.2. In part, these exports include shrimp produced in Orissa. A negligible amount of fresh fish is exported. Some catfish is sent to Bombay, both for local consumption as well as for export to West Asia.

To make up for the 'fish deficit', a large quantity of fish is transported into West Bengal, mainly through the Howrah market. Appendix 4.3 gives the quantities. The main marine fish are bekti, pomfret, *hilsa* and catfish. Although fish imports from Bangladesh have officially stopped, it is likely that some comes in through the Suderbans illegally.

## 5. FISHING FLEET

Fishing craft have evolved in West Bengal over the years from riverine boats to more seaworthy versions. In general, the traditional craft are characterized by a high sheer aft, arc bottom sections and a rockered bottom. They go by different local names such as *chot*, *salti*, *dinghi*, *bachary* and *pattia*. These names are at first confusing, as the differences are small. Hybrid versions further exacerbate this identification problem.

Except for the *pattia* from Orissa, all boats are carvel-planked in *sal* or *asna* wood. The planks are stapled together with MS staples and the frames are subsequently nailed in.



Motorization of traditional craft which started in the mid-'70s received governmental (Fisheries Department) support during the '80s.

Boat construction is of acceptable quality. There also does not appear to be any problem of timber shortage, though the price of sal wood has gone up considerably in recent years.

There is a distinct difference in hull form between traditional craft used in shallow coastal waters and those that operate in deeper waters. The shallow 'arc' section is replaced by a deeper 'V' section, though the construction and the layout are the same. Motorization has also resulted in appropriate changes to the hull design. The larger boats sport a transom stern, with a distinct aft superstructure for the galley and toilet. This is similar to what is found in Bangladesh craft.

Boats of modern design are now being introduced by the Fisheries Department to co-operatives under the NCDC scheme.

**Table 5.1**  
**Typical dimensions of West Bengal fishing craft**

Name	LOA (m)	B(m)	D(m)	CUNO	Hp
1. Non-motorized <i>chots, saltis, dinghis, bachary</i> boats	8.0	1.8	0.7	10.08	
2. Motorized <i>chot</i>	9.0	2.0	0.8	14.40	1 0-20
3. Motorized gillnetter (small)	9.3	3.0	1.2	33.50	20-25
4. Gillnettercum-trawler	11.8	3.4	1.5	60.18	50-80
5. Large gillnetters	16.0	4.5	1.9	136.80	100-1 20

**Table 5.2**  
**Distribution of boats in Midnapore & 24 Parganas**

Name	Midnapore	24 Parganas	Total
Non-motorized boats	1700	2000	3700
Motorized	900	1500	2400
Total	2600	3500	6100

**Table 5.3**  
**Distribution of boats by size**

Length (m)	Midnapore	24 Parganas	Total
6 to 8 m non-motorized	1700	2000	3700
6 to 10 m motorized	500	800	1300
10 to 12 m motorized	350	550	900
12 m motorized	50	150	200
Total	2,600	3,500	6,100

## 5.1 Fishing Gear & Methods

The main fishing methods in West Bengal are drift gillnetting for *hilsa* and other species and *Behundi* nets. They are used both in the estuary, during summer, as well as in the open sea, during the winter months. Bottom-line fishing and gillnets are also used, but to a lesser extent, in both the maritime districts. Seasonal gear, such as boat seines and encircling gillnets, are also employed besides shore seines.

In recent times, bottom trawling has been observed from the Midnapore centres of Saula, Sankarpur and Digha. Many boats are of Orissa origin.

**Table 5.4**  
**Fishing gear, species & season**

Fishing Gear	Species	Season	Fishing area
1. Drift gillnets	Pomfret, threadfin, <i>hilsa</i> , seer, croaker, catfish	Ott-Feb May-Oct	Bay of Bengal Estuarine
2. Set bagnet (Behundi)	Bombay duck, croaker, ribbonfish, small pomfret, shrimp, penaeid and non-penaeid	Sep-Feb May-Ott	from temporary camps, Bay of Bengal Estuarine
3. Bottom longline ( <i>Dhon</i> )	Threadfin, croaker, ray, catfish	Sep-Feb	Bay of Bengal
4. Bottom set gillnets	Large perch, polynemus, catfish, ray	Ott-Mar	"
5. Boat seine & encircling gillnet	Hilsa, catfish, threadfin	Sep-Feb	"
6. Shore seine	Sardine, non-penaeid shrimp	Year-round	"
7. Trawling	Croaker, ribbon fish, catfish, prawn	Nov-Feb	"

### Drift Gillnets

PA multifilament (210 d 6 to 9) and PA tyre cord are the most popular gillnets. Smaller boats sometimes use HDPE (0.25 mm). Mesh size ranges from 17-125 mm for *hilsa*. Average size per piece is 100 x 200 meshes and, depending on the boat, about 200-400 pieces are carried. Floats are plastic, sinkers are of brick.

Investment on nets is between Rs 30,000 and Rs 70,000 for a 12 m boat. HDPE nets are cheaper.

Smaller mesh — 65 mm PA monofilament — nets are used for mackerel and small hilsa from small motorized boats.

### Set Bagnet

Locally called the *Behundi*, the set bagnet is widely used in West Bengal both in the open sea as well as in the estuary. Netting is of HDPE. The bigger bagnets are serviced by one motorized launch and six non-motorized traditional boats. They are fixed in waters upto 30 n miles from shore at depths of 20 metres. The smaller nets, which are usually deployed in shallow water close to the shore, are operated by smaller motorized boats. The codend mesh size varies from 12 mm for the bigger nets to as low as 6 mm in the smaller nets. Stakes are of bamboo and floats are of HDPE carboys (barrels).

The operation usually consists of a group of fishermen (16-30) operating one motorized boat and 4 or 5 non-motorized boats to service 7 to 10 nets. The motorized boat is used to tow the other boats as well as to bring back the catch as and when the nets are flipped over. Each net costs approximately Rs 6000.

One reason for the extremely small mesh is the occurrence of non-penaeid shrimp (*acetius*) in abundance. These shrimp are sun-dried for human consumption.

The bulk of the catch, consisting of ribbonfish, Bombay duck and small clupeids, is sundried. There is sometimes a market for a part of the fresh catch. Trash fish is usually dried separately for fish meal.

### **Bottom Longline**

The bottom longline is not used as much as the two nets mentioned earlier. However, it is found in both districts, though its popularity is greater in the 24 Parganas district (Frazierganje).

This gear is generally used from small traditional boats motorized with 10-20 hp engines. Hooks 6 & 7 are used on HDPE (3 mm) snoods 0.5 m long tied to a PA mainline of 4 mm. Bait is generally small trash fish from Behundi catches. About 2000 hooks are set per boat. Twenty anchors of 4.5 kg each and 40 brick sinkers of 0.5 kg each are used for sinkers. Twenty plastic cans of 5-litre capacity are used as floats.

Fishing trips vary from one day to seven days, depending on the base of operations. Ice is normally taken in insulated boxes installed in each boat.

### **Bottom Setnets**

Large mesh HDPE nets of 250 mm mesh size for large-size perch, bream, catfish, ray and jewfish are used by boats operating from Kakdweep (24 Parganas). Each piece of net is 30 meshes deep and 30 metres long. Twelve such pieces go into the making of a large net. Two anchors, 130 kg each, are used to set the net. Five-litre plastic cans and 5 kg brick sinkers are used on the head and foot ropes.

### **Encircling Gillnets**

Locally called kachal and *jangal*, encircling gillnets require a group operation in which one motorized boat and six non-motorized boats, with a total crew of 40, participate. Though the operation is the same, the kachal net has a bag while the jangal is deeper. Both are of PA multifilament or tyre cord and are of 65 mm mesh. Both gears are operated in the winter months for hilsa and catfish.

### **Trawl**

The migration of trawlers from Orissa to Digha has resulted in some motorized gillnetters adapting their boats to hand trawling, especially on the Midnapore coast. Though this is a specific gear for shrimp, the small mesh-size results in the catch of many juvenile commercially valuable species. This trash catch is used mainly to make fish meal. The penaeid shrimp are exported.

## **6. INFRASTRUCTURE**

There are a large number of fishing centres in West Bengal. The term 'fishing centre' is used rather than 'landing centre' because many important centres do not even possess a jetty. The many creeks and river inlets permit mooring of the craft near the village.

The size and importance of the fishing centre is often dependant on the season. For example, the more important set bagnet centres in Midnapore and 24 Parganas are nearly deserted in the off-season.

**Table 6.1**  
**Important fishing centres in West Bengal**

District	Centre	Nearest Town	Distance (km)	Access
24 Parganas	Diamond Harbour	Calcutta	47	Road & Rail
	Kakdweep	Diamond Harbour	41	Road
	Namkhana	Kakdweep	13	Road
	Raidighi	Calcutta	70	Road
	Frazierganje	Namkhana	20	Road or River
	Jambu Island	Namkhana		River
Midnapore	Junput	Contai*	11	Road
	Saulaghat	Contai .	16	Road
	Jaldah	Contai *	35	Road
	Sankarpur	Contai'	35	Road
	Digha	Contai*	45	Road

\*Contai is 150 km from Calcutta by road.

(Refer Appendix 1.2 to see how these fishing centres are dispersed and Appendix 6.1 for the infrastructure they have )

#### **Landing/Berthing Facilities**

The large tidal amplitude makes the construction of fixed jetties impractical in most places. As a result, the boats usually land their catch on the bank. The only harbour serving small fishing boats with a jetty is Sankarpur in Midnapore District. A similar set-up is planned for Frazierganje under a Government of India-sponsored scheme.

Washing platforms have been provided at Junput, Jaldah and Namkhana. Many centres (Frazierganje, Jambu Island, Junput, Jaldah) are merely temporary camps, in existence only from October to mid-February when behundi net fishermen, besides a few gillnet and line fishermen, use them as bases. Tube wells have been dug for fresh water supply in most of these fishing centres.

#### **ice**

Ice availability was, in general, found to be adequate in 24 Parganas, ice being supplied to the main centres from private and cooperative sector plants in the vicinity. Ice production is about 400 t/day at Kakdweep and Namkhana in 24 Parganas.

The ice supply in Midnapore is, however, inadequate at present. ice production is only 100 t/day at Contai, Sankarpur and Digha where there are private and co-operative sector plants.

The distance of some of the fishing centres from the main towns poses problems for some operators. Ice is sometimes transported in "carrier" launches to Jaldah.

Ice is used only for quality fish caught by encircling gillnets. Most of the Behundi catch is dried, though some is sold fresh for local consumption. Boats engaged in long-voyage fishing (mainly with gillnets) carry ice in insulated ice boxes installed on board.

There is no cold storage facility at any of the centres.

## **Transport**

Iced fish is transported to the main markets in Calcutta, Diamond Harbour and Kharagpur by light commercial vehicles and trucks. Some fish is also transported by launches as well as by rail in 24 Parganas district. As mentioned earlier, road access to the main centres is good. Even landing centres at beach settlements like Jaldah and Digha can be reached by driving along the hard beach at low tide.

For short distances, fish is transported by bicycles and cycle-carts

## **Fuel & Lubricating Oil**

Namkhana and Diamond Harbour in 24 Parganas and Contai in Midnapore District are the main centres for diesel and lubricating oil supply. However, enterprising traders stock diesel oil at minor centres and sell it at a premium.

## **Repair Workshops & Mechanics**

Since the early '80s, there has been a rapid increase in motorization of traditional craft, Government-supported and otherwise. Engine spares are usually procured from Calcutta, but running spares are usually available in the main centres or nearby towns.

Mechanics are usually available at all centres to attend to minor problems. For more serious problems, including machining of stern-gear bushes, shafts etc., the fishermen have to travel to the nearest town. There is no serious problem on this front, as complaints can be attended to within a day, at most, due to the short distances.

## **Boat-Building**

Boat-building facilities are available at Namkhana in 24 Parganas and Sankarpur in Midnapore District. Traditionally, boats have been built in centres like Junput, Saulaghat and Kakdweep. As with workshops, timber depots and saw mills are within a day's reach from any centre.

## **7. SOCIO-ECONOMICS**

No detailed socio-economic survey has been conducted on marine fisherfolk in West Bengal. The Indian Statistical Institute undertook a techno-economic survey of fishermen in West Bengal in 1985-86, but it was limited to only 170 households in the two coastal districts. Some of the findings — which should be viewed with caution — are:

- practically all fishermen belong to Scheduled Castes viz Jalia Kaibarta, Jhalo Halo, Mal and Rajbhansi;
- the average size of the household is 6 to 7;
- about 90% of the households consider fishing/the fishing industry as their major source of income;
- 67% of households are involved in marine fishing;
- 63% of households have upto one acre of land;
- children below 12 account for 35% of the fisherfolk population;
- 54% are illiterate, 25% are below primary school level, 12% have attended primary school;
- the occupation is hereditary for 74% of the fishermen;

- 34% of the households own a non-motorized boat and 6% own a motorized boat;
- 57% of the households are in debt; and
- 55% of the households spend upto Rs 100 per capita per month; 30% Rs 101-140 and the rest over Rs 140.

The two predominant fishing methods of West Bengal are set bagnetting and gillnetting. The former is widely used in Midnapore District, while the latter is more popular in 24 Parganas

Set bagnet fishing was initially a subsistence fishery restricted to estuaries. It took on commercial proportions only during the late '50s.

Generally, most of the crew of a fishing team consists of family members, with the Bahardar, or owner, often the head of the joint family. Though most crew members are hired on a wage basis, the more important ones are entitled to a share. Shelter and food is provided free during the fishing season.

Financing of the whole operation, which comprises of several units, is undertaken by a *laya*. A group of *layas* at a fishing camp constitute the committee to oversee the total operations during the set bagnet season.

Credit needs prior to the commencement of the season include advance payments to crew, purchase of inputs and repair of craft and gear. These needs are mostly met by dried-fish traders.

In gillnet operations, on the other hand, there are instances where each crew member contributes a few nets to the boat's complement and the earnings are shared pro *rata*. For more capital-intensive operations, the owner hires a crew on a share-cum-wage basis.

Advance payment to crew prior to the start of the fishing season is fairly common. Finance is usually available to boat operators from fresh fish merchants and their agents.

With a view to improving the socioeconomic status of fisherfolk, several community development schemes were undertaken during the Sixth Plan, including the sinking of tubewells for drinking water, the construction of link roads, the training of fisherwomen in net-making and the construction of dwelling houses. Fishermen have even been employed as labour for house construction under the Rural Landless Employment Guarantee Programme.

## 8. COASTAL AQUACULTURE

Of all the maritime states, West Bengal has the largest brackishwater culture potential. It has been estimated that there is about 200,000 ha of water area, out of which 85,000 ha has been found suitable for culture. At present, about 35,000 ha has been brought under cultivation, an utilization of about 40%. This also represents 75% of the total area cultivated in the whole of India.

South 24 Parganas accounts for 83% of water area brought under culture in the private sector. This area is almost exclusively used for paddy-cum-fish culture. At present, the average production is reported to be 800 kg/ha/annum — 200 kg of prawn and 600 kg of mullet. The production of cultured prawn has increased from 3600 t in 1980 to 6800 t in 1987.

It is reported that about 900 million seeds of *Penaeus monodon* are collected annually by about 40,000 persons, including women and children. There is, however, a need to establish prawn hatcheries to meet the requirements for semi-intensive culture of another 30,000 ha.

The programmes for development of brackishwater fisheries under consideration are:

- creation of a Brackishwater Fish Farmers' Development Agency (BFDA);
- establishment of two model fish farms at an estimated cost of Rs 20 million with UNDP assistance:

- development of a brackishwater fish farm on Nazachar island (opposite Haldia) and rehabilitation of poor fishermen there;
- setting up of 10 seed banks; and
- setting up of a low-cost prawn hatchery on an experimental basis.

A UNDP-funded brackishwater fish farm complex is to be established in Digha covering a water-spread of 177 ha at an estimated cost of Rs 16.6 million. The complex will have 170 ponds forming eight farms of different dimensions. Work on a pilot project was started in June 1988. The Central Institute of Coastal Engineering's Project for Fisheries is coordinating this project.

BOBP has undertaken several activities in West Bengal which aim to improve the income of fry catchers and reduce wastage of both tiger prawn fry and other species. These include nursery ponds, cages and less destructive methods of fry collection. BOBP will also provide technical assistance, including training, for small-scale penaeid shrimp hatcheries. A pilot hatchery will be set up in the Midnapore District.

## 9. INDUSTRY ORGANIZATIONS

### 9.1 Marine Products Export Development Authority (MPEDA)

The regional office of MPEDA, located at Calcutta, has two wings: exports and shrimp farming. The former is headed by a Deputy Director at Calcutta and the latter by an Assistant Director at Canning. The organization, in collaboration with the State Government, provides, at regular intervals, 15 days' training to fish farmers/entrepreneurs for prawn seed collection and farming.

The following subsidy schemes for prawn farming are operated by MPEDA:

**Prawn Farms:** Farmers owning suitable water areas and registered with MPEDA are eligible to get a subsidy of Rs 7500 per ha, upto a maximum of Rs 75,000 per individual, for setting up prawn farms.

**Prawn seed banks:** The quantum of subsidy is 50% on the cost of equipment purchased, subject to a maximum of Rs 20,000 per seed bank. The beneficiary should have his own land, or have a lease for not less than five years, adjacent to an estuary/brackishwater area which has potential for prawn seed resources.

**Prawn Hatcheries:** (i) For State Governments/State Government undertakings, a subsidy to the extent of 50% of the capital cost, subject to a maximum of Rs 500,000 per hatchery; for a joint venture project wherein the State Government has an equity participation of more than 50%, the maximum subsidy shall be Rs 250,000 per hatchery. (ii) For private entrepreneurs, the subsidy is 15% of the capital cost, subject to a maximum of Rs 150,000.

**Prawn Feed:** On the basis of the cost of prawn feed at Rs 5.60/kg, subsidy is 50% of the cost for those having more than 2 ha water area and 75% of the cost for those having less than 2 ha water area.

### 9.2 West Bengal State Fisheries Development Corporation

Initially set up for the development of marine and brackishwater fisheries, the Corporation's present marine activities include the charter of four shrimp trawlers to a private company. The Corporation has four brackishwater fish farms at Alipore, Digha, Fraserganje and Henry's Island. Indian major carp, mullet, sea perch and *P. monodon* are the species under culture. The Corporation is also engaged in freshwater fish farming, a reservoir fisheries project and sewage-fed fisheries.

### 9.3 West Bengal Fisheries Corporation

Established in 1980 in Calcutta as the West Bengal State Fish Seed Development Corporation, the corporation assumed the present name in 1985. Its activities are: (i) production of fish seed; (ii) trading in fish; (iii) a fishing harbour at Sankarpur; and (iv) the creation of landing, berthing and some infrastructural facilities at six centres.

#### **9.4 Brackishwater Fish Farmers Development Agency (BFDA)**

For development of brackishwater farming, the Government has three BFDA's for the coastal districts of North 24 Parganas, South 24 Parganas and Midnapore. In addition to arranging for finance, the agencies offer training and extension facilities to disseminate modern technology. Emphasis is laid on small farmers' production groups who will identify the areas for development. Scientific training in commercial collection of shrimp and fish seed, begun with the support of MPEDA, will be extended to cover a wider target group. Propagation of low cost hatchery management practices are encouraged; establishment of one experimental hatchery at Digha is slated for 1989. The agency will also arrange financial assistance, in the form of state grants and loans, from nationalised banks.

#### **9.5 Fishermen's Cooperative Societies (FCS)**

A three-tier system of management and administration operates in the State at primary, central (district) and state levels. On the marine side, there are 38 primary societies having a membership of 1605; there are two central societies, one of which (The West Bengal State Fishermen's Cooperative Federation Limited) is also a member of the apex (state level) body. The primary societies are engaged in production, the central societies are concerned with procurement and supply of inputs and the apex body looks after management of the different cooperative societies under them, arranging supply of inputs and procurement of finance for development in the cooperative sector.

The management and administration of the FCS are under the Department of Fisheries and all Government-owned fishery water areas have been settled with the FCS.

The major areas of activity of the apex body in the marine and brackishwater sectors are:

- reclamation of derelict waters under the Rural Landless Employment Guarantee Programme (RLEGP);
- rehabilitation of the fishermen of Nayachar island;
- implementation of an Integrated Marine Fisheries Project (IMFP);
- conducting leadership development training programmes;
- setting up of ice plants by the central societies; and
- construction of community halls.

#### **9.6 National Cooperative Development Corporation (NCDC)**

The NCDC disburses assistance for the following activities:

- share capital assistance to the State/Central primary level cooperatives for marketing, supply and distribution;
- purchase of surface transport vehicles, including refrigerated/insulated vans, by the cooperatives;
- development of fish farms and establishment of seed farms/hatcheries;
- establishment of different kinds of processing units;
- procurement of motorized country boats (including BLCs), fishing nets and other fishing requisites;
- establishment of fish net-making units;
- construction of godowns for storage of fish products, nets, equipment etc; and
- establishment of retail fish stalls with the necessary equipment/installations.

An integrated marine fisheries project was set up in 1985-86 with the assistance of the National Cooperative Development Corporation (NCDC). The outlay was Rs 72.3 million, of which the assistance from NCDC was Rs 62.5 million, consisting of a loan of Rs 49.7 million and a subsidy of Rs. 12.8 million.



The principal components of this project are: (i) introduction of two types of motorized gillnetter-cum-trawlers, 128 boats of 11.8 m length and 72 boats of 13.5 m length; (ii) two ice plants, one cold storage, three godowns, five transport vehicles and other miscellaneous items; (iii) setting up of a project implementation cell; and (iv) margin money for working capital for the apex body.

Fifty boats of 11.8 m length have already been distributed by the end of 1989

## **10. FISHERIES ADMINISTRATION & INSTITUTIONS**

A Cabinet Minister is in charge of Fisheries and is assisted in administration by a Secretary to the Government and his staff. The chief department in his Ministry is the Department of Fisheries.

The Directorate of Fisheries, headed by a Director, is responsible for administration and development of fisheries and the welfare of fisherfolk. The Institute for Wetland Management and Ecological Design, the West Bengal Fisheries Corporation and the West Bengal Fisheries Development Corporation are independent bodies. The latter two avail of state participation in share capital and financial assistance out of the budget allocation to the Fisheries Department. The Director of Fisheries is a director in both the corporations. He is also the *ex-officio* Additional Registrar of Cooperative Societies in the fisheries sector and is assisted by an Assistant Registrar of Cooperative Societies at the headquarters.

At the headquarters, the Director is assisted by an Additional Director for general administration, a Joint Director responsible for the zonal offices, a Deputy Director for marine fisheries and a Deputy Director for brackishwater fisheries. More details are available in Appendix 10.1.

Away from headquarters there are the Monitoring Evaluation Marketing and Statistics wing (MEMS), in Calcutta, a Research wing and a Training wing in Kalyani and the four zonal offices viz. Calcutta, Northern, Central and Western zones. (Appendix 10.2)

Of the four zones, only Calcutta and the Western zone have marine activities supervised by Assistant Directors based in Diamond Harbour and Contaj respectively; one each for marine and brackishwater activities. They are also responsible for development, training and extension at the grassroots level and are assisted by District Fisheries Officers for training and extension separately, with training centres at Namkhana and Ramnagar. In addition, Fisheries Extension Officers are posted in each Block Development Office. There are 348 blocks in the state, of which only 26 are concerned with the marine/brackishwater sector.

The Research wing at Kalyani is at present involved only with inland fisheries. The Training wing is responsible for (a) training of directorate staff, bank officers and progressive farmers, (b) preparation of syllabi for lower level training and (c) publication of extension material.

There are state-level fish farms in each district run by independent farm managers (usually DFOs) directly guided by headquarters. The two marine districts are 24 Parganas (North & South) and Midnapore (West & East).

### **10.1 Research Institutes**

The Central Inland Fisheries Research Institute (CIFRI) at Barrackpore and the Central Institute of Brackishwater Aquaculture (CIBA) at Kakdwip conduct research in their respective fields besides providing assistance to the state by way of training.

A proposal to set up a centre for Marine Sciences at Diamond Harbour sponsored by the Department of Ocean Development of the Government of India is under active consideration.

## 11. GOVERNMENT POLICY & PLANS

There does not appear to be any laid-down policy, but objectives are set out for each five-year plan. The strategy for fisheries development is not engineered solely to increase fish production, but to serve the primary sector of the rural economy by generating employment for rural people and ensuring the socioeconomic upliftment of the fisherfolk. The basic objectives of the current plan (1985-90) are;

- augmentation of table-fish production;
- improvement of socio-economic conditions of the fisherfolk;
- generation of rural employment and income; and
- protecting and improving the environment.

On the important issue of land-lease policy, the government seems to aim at equitable distribution rather than increased production. Under the latest amendment of Land Reforms Act of 1955, the water areas for fisheries have been acquired by the government. These areas may be given to fish farmers within limits of 3.5 to 9.8 ha to each farmer, based on the number of family members. While no brackishwater land reclamation is contemplated for agriculture, lease of surplus water bodies to private entrepreneurs may be considered.

### Development Plans

Appendix 11 .I gives the plan outlays from 1951-1 990 and it can be seen that outlays have surged from Rs 280 million for the Sixth Plan (1980-85) to Rs 800 million for the Seventh Plan (1985-1990).

However, this figure has been pruned by the Planning Commission at the centre to Rs 384 million (Appendix 11.2). And the allocation for the marine and brackishwater sectors is about 20% of the amount.

In the State Plan budget itself, there are special allocations for Tribal people and Scheduled Castes. There are additional components such as Central Assistance, Institutional Finance and separate allocations for the Rural Landless Employment Guarantee Programme. For 1988-89 alone this component is nearly Rs 376 million in addition to the State Plan Budget of Rs 90 million.

Table 11.1 compares budget allocations for the Sixth and Seventh Plans for the marine and brackishwater sectors.

**Table 11.1**

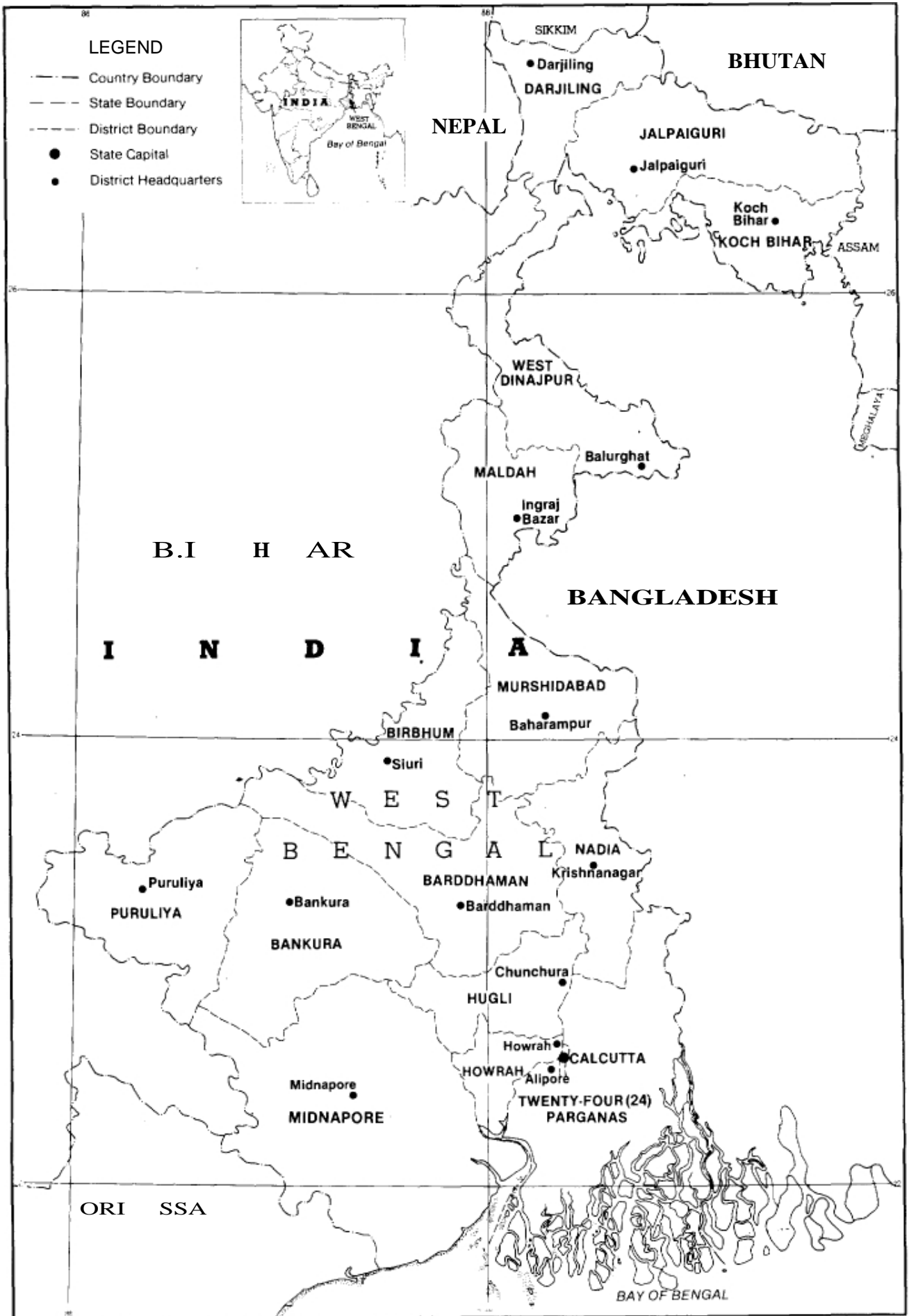
Schemes	Vi Plan (Rs million)			VII Plan (Rs. million)	
	Alloca- tion	Expen- diture (1980-85)	(Utili- zation %)	Alloca- tion	Expen- diture (1985-88)
<b>Marine</b>					
1. Fishing harbour and infrastructure facilities at landing places	220	117	(53)	261	234
2. Mechanization of boats	120	22	(18)	232	69
3. Fishing nets and other requisites	113	179	(158)	120	63
4. Processing and marketing	40	34	(85)	95	85
Sub-total	493	352	(71)	708	451
<b>Brackishwater</b>					
5. Establishment and development of brackishwater fish farms	106	14	(13)	40	34
6. Assistance to private sector	65	37	(57)	22	8
Sub-total	171	51	(12)	62	42
Total	664	403	(61)	770	493

The main points to note are:

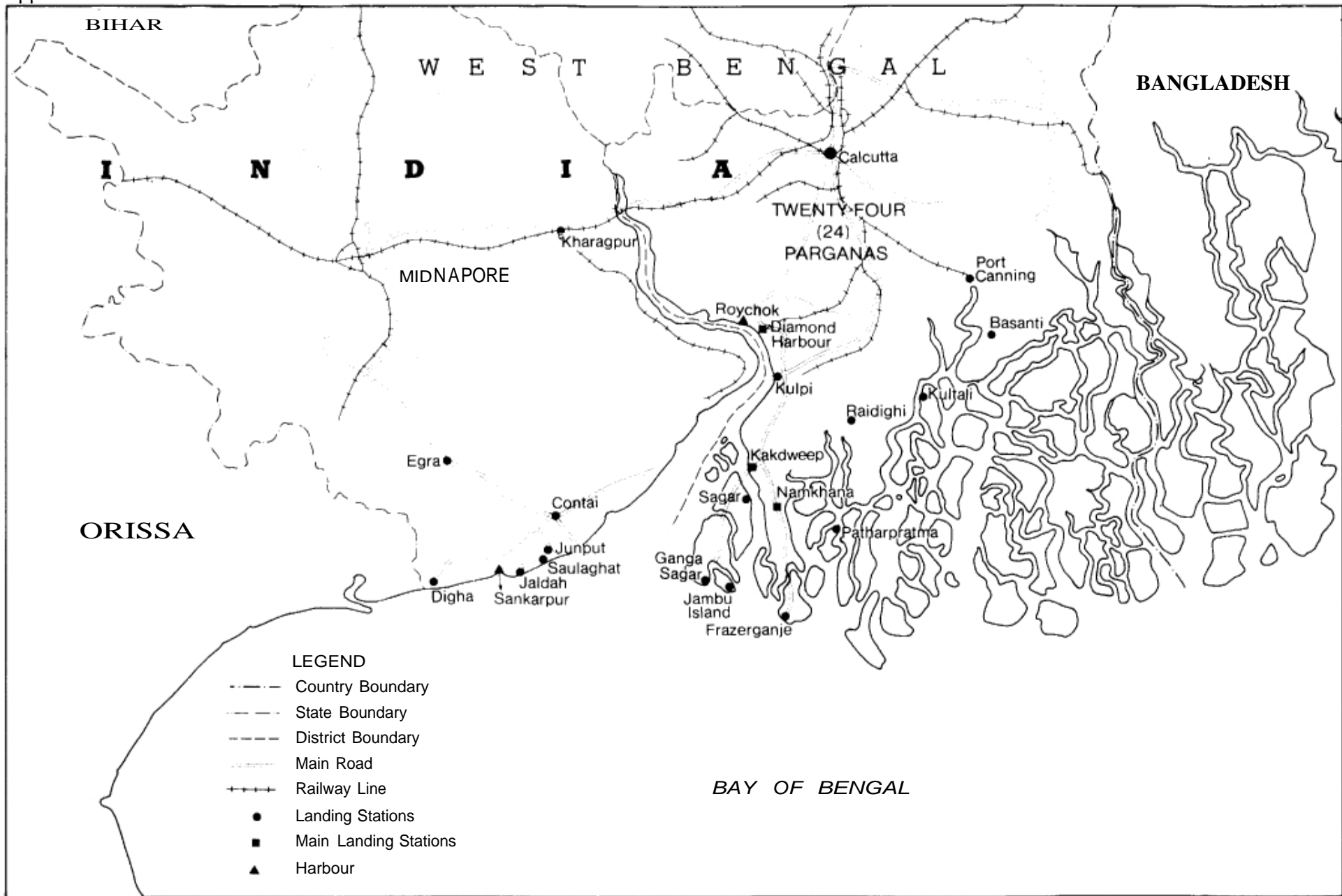
- The total allocation has been increased by 16%, but this is due to 44% increase in the marine sector, while the provision for the brackishwater sector has been considerably reduced — to one-third of that of the previous plan.
- In the marine fisheries sector, schemes relating to the establishment of landing, berthing and infrastructure facilities have received top priority, followed by schemes providing assistance to fishermen for fishing nets and other fishing requisites. Another major scheme relates to processing/marketing and motorization of traditional crafts. The latter scheme appears to have suffered heavily during the Sixth Plan period.

## 12. Bibliography

1. Growth of marine fisheries in West Bengal — DOF publication 1984.
2. Endeavour and achievements — DOF publication 1986.
3. Fisheries development in West Bengal at a glance — DOF publication 1988.
4. A study of fishermen in West Bengal 1985-86 — Indian Statistical Institute & DOF publication 1986.
5. Rapid assessment survey on the status of mechanized & motorized fishing crafts in West Bengal coastal areas — ME & MS wing of DOF 1989.
6. A project profile of fishermen's cooperatives in West Bengal.
7. Economic review 1988-89, Government of West Bengal.
8. An appraisal of the marine fisheries of West Bengal — CMFRI 1987
9. BOBP/WP/36, 39, 40, 53.



FISHING CENTRES OF WEST BENGAL



## Appendix 1.3

### WEST BENGAL STATE DATA

<b>Location</b>	Northern part of Bay of Bengal, coastal borders with the state of Orissa in the south, and Bangladesh in the east. Latitudes: 21.5 N – 24.5 N Longitudes: 86°E – 89°E		
			All India*
<i>Size</i>	Area	— 87,853 km <sup>2</sup>	2.6%
	Coastline	— 64 km	1.0%
	Continental shelf (200 m)	— 17,000 km <sup>2</sup>	4.8%
Population	Total (1981)	— 54.5 million	8.0%
	Urban	14.4 million	9.0%
	Rural	40.1 million	7.6%
	Density (nos/km <sup>2</sup> )	615.0	216.0
	Growth rate (period 1971-81)	— 23.2%	25.0%
	Birth rate (1983)	— 36.0	35.3
	Mortality rate (1983)	— 11.6	13.0
<i>Education</i>	Literacy rate (1981) Total	— 40.9%	36.2*
	Males	— 50.5%	46.9%
	Females	— 30.3%	24.8%

#### School Enrolment as % of the Age Group Population

Level	Age group	West Bengal (1981)	All India (1981)
Primary School	5-9	86.5	79.4
Secondary School	10-14	26.6	32.3
Higher Education	15-24	5.2	5.5

\* West Bengal's share as % of all-India. or all-India rate, as applicable.

<b>Trade</b>	Exports	Products exported from West Bengal to other states include jute yarn, tea, engineering goods, tobacco, leather products.
	Imports	Products imported into West Bengal from other states include coffee, cotton, wheat (products), fish.
<b>State Administration</b>	West Bengal is divided into three divisions. Within each division districts form the administrative units. There are 16 districts, two of which cover the coastal area. They are Midnapore and 24 Parganas. Very often, for practical purposes, Midnapore is divided into East and West Midnapore and 24 Parganas into North and South Parganas. Every district is again divided into (development) blocks.	

**Appendix 1.3 (Contd.)****Net National Product 1985-86**

Particulars	1985-86		
	West Bengal	India	West Bengal as % of India*
1. NNP (80-81 prices) Rs billion	103.5	1,406.4	7.4
2. NNP (80-81 prices) Rs per capita	1,733	1,863	
3. NNP (current prices) Rs billion	165.3	2,064.1	8
4. NNP (current prices) Rs per capita	2,767	2,734	

Source: (1) Economic Survey, GOI, 1988-89

(2) Estimates of State Domestic Product: 1970-71 to 1986-87

**State Domestic Product by Sector of Activity 1987-88**

Sector	Percentage
1. Agriculture	<b>39.0</b>
2. Forestry	0.1
3. Fishery	2.4
4. Mining and Quarrying	0.8
5. Manufacturing	14.1
6. Construction	5.0
7. Trade and Commerce	20.5
8. Transport, storage and communication	<b>4.9</b>
9. Other services	13.2
Total	100.0

Source: Economic Review 1988-89, Government of West Bengal

**Appendix 1.3 (Contd)**

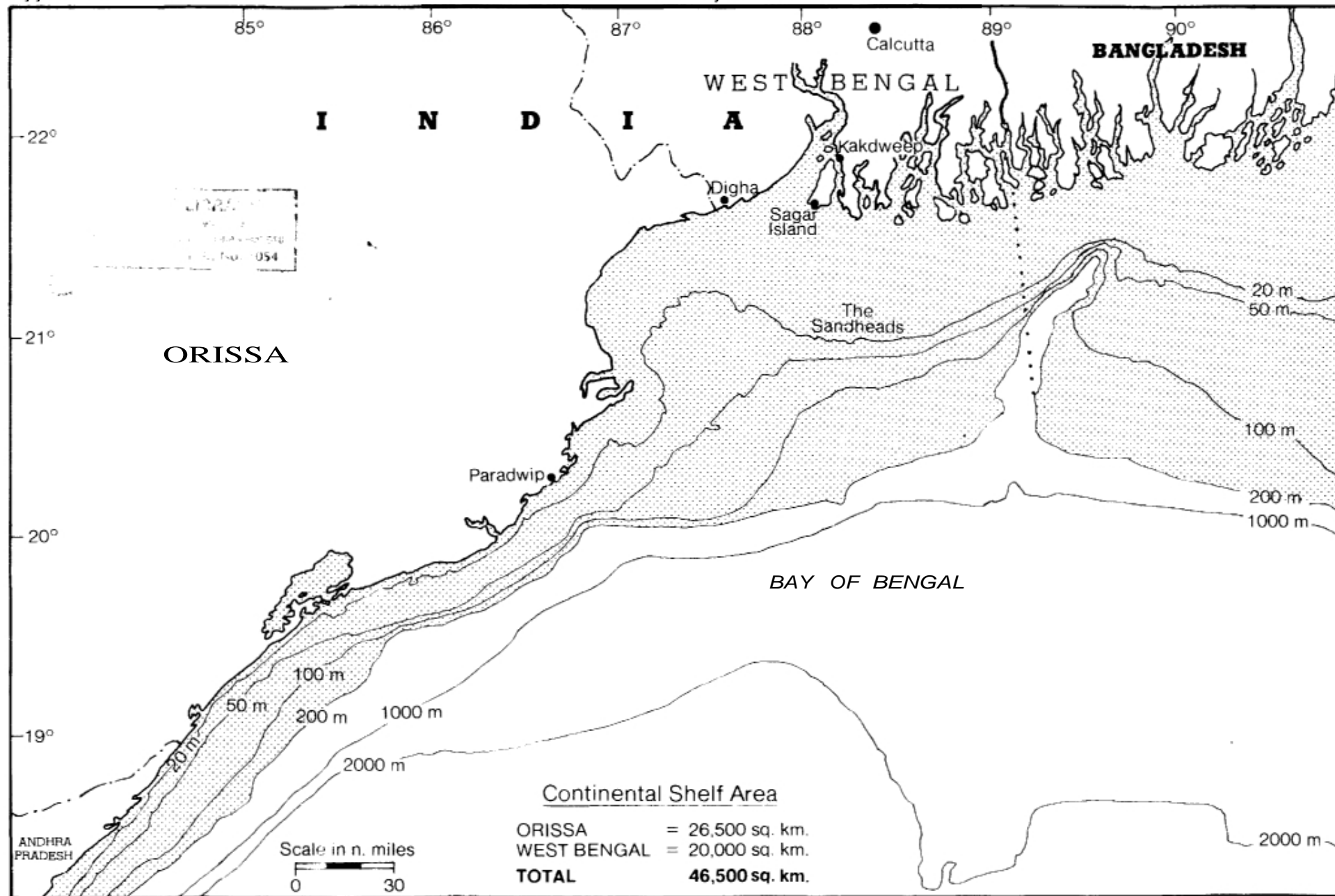
**Population by Category of Workers (1981)**

Category	% of total population			Total workers	
	West Bengal	India	West Bengal	India	
			%	Total No. in million	Total No. in million
<b>Total main workers</b>	28.3	33.8	100.0	15.4	222.5
1. Agriculture					
a) Cultivators	8.4	14.0	29.8		41.6
b) Agricultural labourers	7.2	8.4	25.3		24.9
2. Livestock, Forestry, Fishing, Hunting, Plantations, Orchards	0.9	0.8	3.3		2.2
3. Mining and Quarrying	0.3	0.2	1.0		0.6
4. Manufacturing, Processing, Service, Repairs	4.7	3.8	16.6		11.3
5. Construction	0.4	0.6	1.4		1.6
6. Trade and Commerce	2.5	2.1	8.4		6.3
7. Transport, Storage and Communications	1.1	0.9	4.1		2.7
8. Other services	2.8	3.0	10.1		8.8
Marginal workers and non-Workers	71.7	66.2			

- Non-remunerated workers and persons outside the labour force

Source: Census of India, 1981





Appendix 2.2

**SOME COMMERCIAL MARINE/ESTUARINE FISH OF WEST BENGAL**

Family Name	Local Name	English Name	Scientific Name
Ambassidae	<i>Khone Bhetki</i>	Commerson's glassy perchlet	<i>Ambassis commersoni</i>
Apolectidae	<i>Pomfret/Bahull Baoul Firka</i>	Black pomfret	<i>Apolec tus niger</i>
Ariidae	<i>Tangral/Kaatta/ Samudrik arr</i>	Catfish	<i>Arius spp</i>
Ariommidae		Indian driftfish	<i>Ariomma indica</i>
Belonidae	<i>Samudrik kankley</i>	Round-tail needlefish	<i>Strongylura strongylura</i>
Carangidae	<i>"Sardine"/Hooroori</i>	Scad	<i>Megalaspis cordylal Decapterus spp</i>
Carcharhinidae	<i>Kamat</i>	Baby shark	
Carcharhinidae	<i>Hangor/shark</i>	Yellow dog shark	<i>Scoliodon la ticaudus</i>
Centropomidae	<i>Bhekki</i>	Giant sea perch	<i>La tes calcarifer</i>
Chanidae	<i>Milk fish</i>	Milk fish	<i>Chanos chanos</i>
Chirocentridae	<i>Samudrik jolal Samudrik chela</i>	Wolf herring	<i>Chirocentrus spp.</i>
Clupeidae	<i>Koka iiish</i>	Kelee shad	<i>Hilsa kelee</i>
Clupeidae	<i>Khoira</i>	Chacunda gizzard shad	<i>Anodontostoma chakunda</i>
Clupeidae	<i>Khoira</i>	Sardine	<i>Sardinella spp.</i>
Clupeidae	<i>Phansha</i>	Russel's smooth-back herring	<i>Raconda russeiana</i>
Clupeidae	<i>Hilsa</i>	Hilsa shad	<i>Hilsa iiisha</i>
Clupeidae	<i>Khoira</i>	Bloch's gizzard shad	<i>Nema talosa nasus</i>
Clupeidae	<i>Chandana ilish/ Kajli ilish</i>	Toli shad	<i>Hilsa toli</i>
Cynoglosidae	<i>Kukurjibh/Paa ta</i>	Tongue sole, sole	<i>Cynogiossus spp.</i>
Dasyatidae	<i>Shankush/Shankar mach</i>	Sting ray	<i>Das ya tis spp.</i>
Engraulidae	<i>Phansha/Tapral/ Tapre/Tapda</i>	Indian ilisha/Herring	<i>Ilisha spp.</i>
Engraulidae	<i>Phansha/Tapral/Tapre</i>	Th ryssa	<i>Thryssa spp.</i>
Engraulidae	<i>Phansha/Tapral/ Tapre/Tapda</i>	Gangetic anchovy	<i>Setipinna phasa</i>
Engraulidae	<i>Amadi</i>	Korua grenadier anchovy	<i>Coilia re ynaidi</i>
Engraulidae	<i>Phansha/Tapral/ Tapre/Tapda</i>	Whitebait	<i>Stolephorus spp.</i>
Engraulidae	<i>Ruli</i>	Grenadier anchovy	<i>Coilia dussumieri</i>
Ephippidae	<i>Samudrik chanda</i>	Spotted drepane	<i>Drepane punctata</i>
Gerreidae	<i>Samudrik chanda</i>	Whipfin mojarra	<i>Gerres filamentosus</i>
Gerreidae	<i>Samudrik chanda</i>	Longfin mojarra	<i>Pentaprion longimanus</i>
Harpadontidae	<i>Lutia, bumaloh, nehare, bambla</i>	Bombay duck	<i>Harpadon nehereus</i>
Leiognathidae	<i>Samudrik chanda</i>	Striped ponyfish	<i>Leiogna thus fascia tus</i>
Lobotidae	<i>Pa yra chanda</i>	Brown tripletail	<i>Lobotes surinamensis</i>
Loliginidae/Sepiidae	<i>Dhalla/"Octopus"</i>	Squid/Cuttlefish	<i>Loiigo spp., Sepia spp.</i>
Mugilidae	<i>Parshe y/Parse</i>	Goldspot mullet	<i>Liza parsia</i>
Mugilidae	<i>Ain</i>	Flathead grey mullet	<i>Mugil cephalus</i>
Mugilidae	<i>Parshey/Parse</i>	Borneo mullet	<i>Liza macroiepsis</i>

Family Name	Local Name	English Name	Scientific Name
Mugilidae	<i>Corsula/Bhangon/Ingelee</i>	Corsula mullet	<i>Rhinomugil corsula</i>
Mugilidae	<i>Bhangon</i>	Tade grey mullet	<i>Liza tade</i>
Mullidae		Goatfish	<i>Upeneus spp.</i>
Muraenesocidae	<i>Barn</i>	Pike conger	<i>Muraenesox spp.</i>
Myliobatidae	<i>Shankar mach</i>	Spotted eagle ray	<i>Ae toba tus spp.</i>
Nemipteridae		Threadfin bream	<i>Nemipterus japonicus</i>
Ophichthidae	<i>Barn</i>	Bengal snake-eel	<i>Pisodonophis boro</i>
Penaeidae	<i>Honne chingri</i>	Speckled prawn	<i>Metapenaeus monoceros</i>
Penaeidae	<i>Chabra</i>	Prawn	<i>Penaeus spp.</i>
Penaeidae	<i>Channe chingri</i>	Yellow prawn	<i>Metapenaeus brevicornis</i>
Penaeidae	<i>Bagda</i>	Giant tiger prawn	<i>Penaeus monodon</i>
Penaeidae	<i>Chapda chingri</i>	Indian white prawn	<i>Penaeus indicus</i>
Penaeidae	<i>Hende Bagda</i>	Green tiger prawn	<i>Penaeus semisulca tus</i>
Plotosidae	<i>Kandhia</i>	Striped catfish-eel	<i>Plotosus linea tus</i>
Plotosidae	<i>Kan-magur</i>	Canine catfish-eel	<i>Plotosus canius</i>
Polynemidae	<i>Tapshey mach</i>	Paradise threadfin	<i>Polynemus paradiseus</i>
Polynemidae	<i>Sahall/Guchia/Gurjali</i>	Fourfinger threadfin "Indian salmon"	<i>Eleutheronema tetradactylum</i>
Polynemidae	<i>Gurjali</i>	Seven-finger threadfin	<i>Polydactylus heptadactylus</i>
Polynemidae	<i>Gurjali</i>	Blackspot threadfin	<i>Polydactylus sextarius</i>
Polynemidae	<i>Gurjali</i>	Indian threadfin	<i>Polydactylus indicus</i>
Portunidae	<i>Kakda</i>	Crab	
Priacanthidae		Bigeye/Bullseye	<i>Priacanthus sp.</i>
Pristidae	<i>Korat mach</i>	Sawfish	<i>Pristis spp.</i>
Rachycentridae		Black kingfish	<i>Rachycentron canadus</i>
Rhinobatidae	<i>Shanker mach/Hangor</i>	Shovelnose ray/ Guitarfish	<i>Rhinobatos spp.</i>
Scatophagidae	<i>Paira chanda</i>	Spotted butterflyfish	<i>Scatophagus argus</i>
Sciaenidae	<i>Bhola</i>	Two-bearded croaker	<i>Daysciaena albida</i>
Sciaenidae	<i>Bhola</i>	Jewfish/Croaker	<i>Johnius spp., Otolithus spp., Otolithoides spp.</i>
Scombridae	<i>"Mackerel"</i>	Indian mackerel	<i>Rastrellicer kanagurta</i>
Scombridae	<i>Bijram/Mackerel</i>	Seer fish/Spanish mackerel	<i>Scomberomorus spp.</i>
Scyllaridae	<i>Chingda</i>	Mud lobster	<i>Thenus orientalis</i>
Sergestidae	<i>Chingri/Gogua</i>	Paste shrimp	<i>Penaeus spp.</i>
Sillaginidae	<i>Samudrik belle</i>	Silver sillago	<i>Sillago sihama</i>
Sillaginidae	<i>Toolmach/Tool-belle</i>	Gangetic whiting	<i>Sillaginopsis panijus</i>
Sphyrnidae	<i>Magar/Hangor/ Shankar mach</i>	Hammerhead shark	<i>Sphyrna spp.</i>
Squillidae	<i>Polta</i>	Mantis shrimp	<i>Oratosquilla nepa</i>
Stromateidae	<i>Chandi/Pom fret</i>	Chinese pomfret/ White pomfret	<i>Pampus chinensis</i>
Stromateidae	<i>Chandi/Pomfret</i>	Silver pomfret	<i>Pampus argenteus</i>
Teraponidae	<i>Boorgoonil/Jerryel Ka t-koi</i>	Jarbus terapon	<i>Terapon jarbua</i>
Trichuridae	<i>Rupaba til/Churi/Patia</i>	Ribbonfish/Hairtail	<i>Lepturacanthus spp., Trichiurus spp.</i>

## Appendix 2.3

### Catch Rate of Selected Demersals from Bottom Trawl Survey in kglhr

Species groups	Depth Range: 50-74 m		75-79 m		>100 m	
	Season: Nov/Dec '79	May '80	Nov/Dec '79	May '80	Nov/Dec '79	May '80
Arridae (catfish)	399.2	6.7	17.7	—	—	1.1
Luanidid (snappers)	37.4	2.8	4.2	—	—	—
Pomadouridid (sweet lips)	11.4	0.8	0.5	—	—	—
Sualurdal (croakers)	12.7	10.9	6.1	5.4	0.3	0.6
Nemipteridae	4.0	13.3	169.2	41.3	4.5	—
Priacanthidae (bullseye)	0.3	1.1	19.0	12.5	6.3	39.9
Mullidae (goatfish)	14.1	2.3	1.8	—	—	—
Synodeniidae (lizardfish)	6.2	9.1	19.2	1.9	1.9	1.8
Trichiuridae (ribbonfish)	21.1	—	0.8	—	—	—
Others	31.2	21.0	20.3	1.4	0.7	6.9
Total (Finfish)	537.6	68.0	258.8	62.5	13.7	50.3
Shark/skate	7.3	0.7	2.5	0.3	0.0	0.0
Crustaceans	2.3	2.3	12.0	2.3	5.5	1.1

### Catch Rates of Selected Pelagics in Bottom Trawl Survey in kglhr

Depth Range:	50-74 m		75-79 m		>100 m	
	Season: Nov/Dec '79	May '80	Nov/Dec '79	May '80	Nov/Dec '79	May '80
Carangidae (jack/scad)	10.4	288.3	56.1	12.1	0.1	0.6
Clupeidae (sardine)	22.4	1.1	0.6	—	—	—
Engraulidae (anchovy)	13.2	0.1	—	—	—	—
Scombridae (mackerel)	71.4	502.2	99.7	—	—	—
Sphyraenidae (barracuda)	1.2	29.9	1.6	0.2	—	—
Others	4.4	96.4	36.2	0.8	—	—
Total	123.0	918.0	194.2	13.1	0.1	0.6

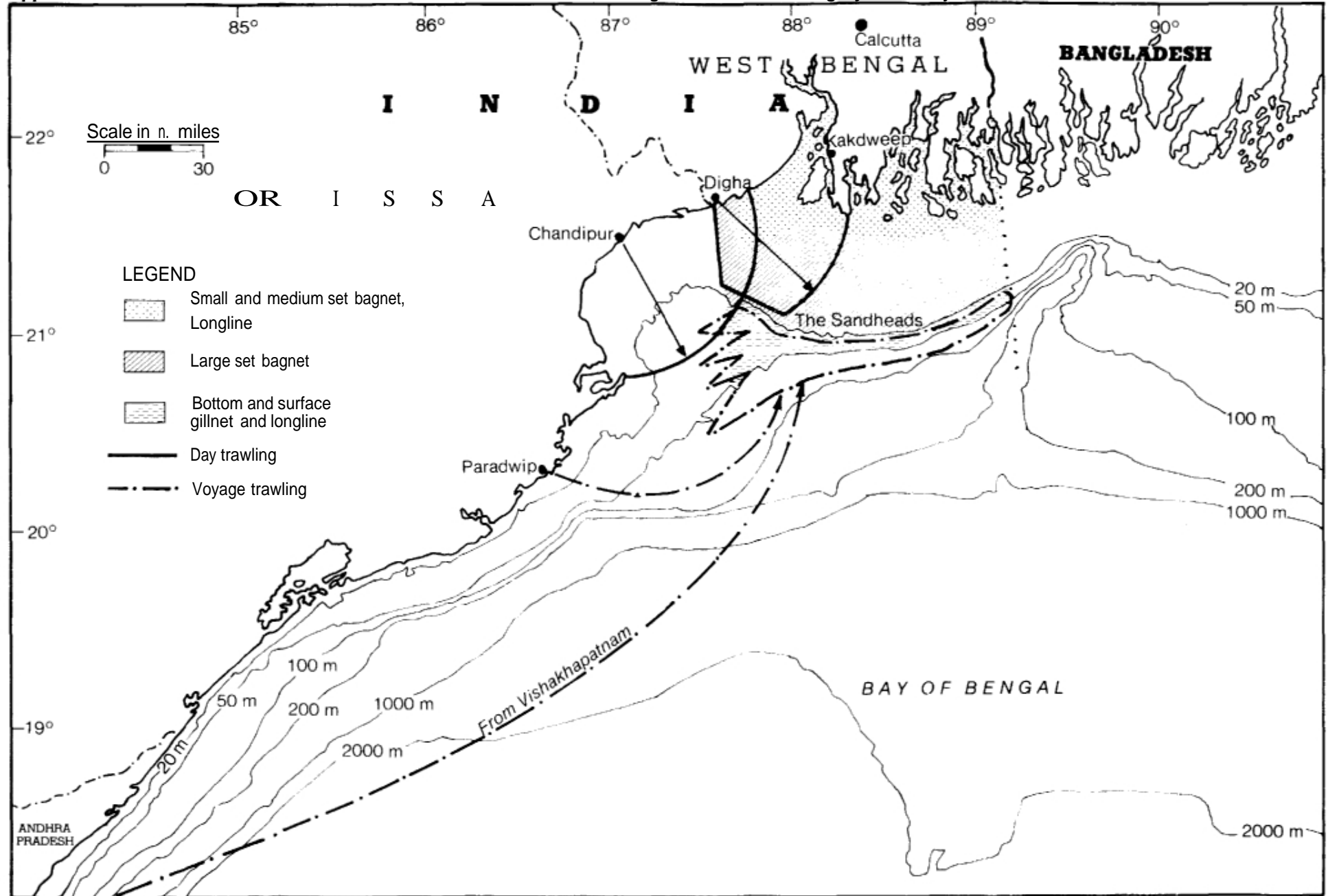
### Catch Rates of Pelagics in Pelagic Trawl Survey in kglhr

Species groups	Season: Nov/Dec '79	May '80
Clupeid	8.7	0.9
Engraulidae	5.8	3.0
Scaulidae	3.2	2.4
Trichiuridae	6.7	7.4

Source: *Dr Fridtjof Nansen survey*  
*Surveys of the Marine Fish Resources, Bangladesh*  
*Institute of Marine Research, Bergen.*

Appendix 3.1

WEST BENGAL/ORISSA – Fishing area for each category of fishery



Appendix 3.2

DETAILED BREAK-UP OF SPECIES COMPOSITION IN THE MOTORIZED AND NON-MOTORIZED SECTORS

Species	1980			1981				1982				1983				1984				
	GN	OM	NM	TOTAL	GN	OM	NM	TOTAL	GN	OM	NM	TOTAL	GN	OM	NM	TOTAL	GN	OM	NM	TOTAL
Elasmobranch	—	—	109	109	444	—	137	581	631	460	141	1,232	498	67	22	587	327	57	67	451
Catfish	105	—	616	721	1,033	2,654	758	4,445	1,099	4,967	3,009	9,075	1,083	122	296	1,501	1,406	495	310	2,211
Threadfin	69	—	117	186	197	—	115	312	80	2	51	133	31	—	10	41	60	1	10	71
Croaker	—	—	358	358	45	—	223	268	36	362	674	1,072	72	52	1,224	1,348	325	925	1,725	2,975
Pomfret	170	—	751	921	2,203	502	613	3,318	2,399	933	480	3,812	5,915	52	321	6,288	2,441	78	155	2,674
P Prawn	—	—	152	152	—	—	244	244	19	20	260	299	32	77	301	410	—	953	1,351	2,304
N P Prawn	—	—	48	48	—	—	1,251	1,251	34	214	636	884	—	85	1,614	1,699	—	80	10,655	10,735
Wolf herring	42	—	234	276	160	1	135	296	325	138	148	611	857	14	39	910	279	28	45	352
Hilsa shad	180	—	464	644	1,726	328	618	2,672	647	130	306	1,083	444	7	554	1,005	1,693	365	43	2,101
Other clupeid	66	—	822	888	1,492	2	1,728	3,222	145	1,026	2,454	3,625	178	154	1,468	1,800	829	718	4,085	5,632
Bombay duck	—	—	419	419	8	—	610	618	255	328	1,080	1,663	1,363	959	2,244	4,566	32	859	1,275	2,166
Ribbonfish	—	—	142	142	3	—	158	161	4	1	176	181	1	8	190	199	75	4,306	1,273	5,654
Carangids	—	—	130	130	4	—	58	62	60	12	11	83	381	—	33	414	91	9	1	101
Seerfish	39	—	195	234	930	—	199	1,129	579	128	122	829	714	34	52	800	223	—	26	249
Others	16	—	838	854	508	817	162	1,487	571	1,373	1,029	2,973	692	48	774	1,514	269	312	1,383	1,964
<b>TOTAL</b>	<b>687</b>	<b>—</b>	<b>5,395</b>	<b>6,082</b>	<b>8,753</b>	<b>4,304</b>	<b>7,009</b>	<b>20,066</b>	<b>6,884</b>	<b>10,094</b>	<b>10,577</b>	<b>27,555</b>	<b>12,261</b>	<b>1,679</b>	<b>9,142</b>	<b>23,082</b>	<b>8,050</b>	<b>9,186</b>	<b>22,404</b>	<b>39,640</b>

(Source: CMFRI Spl Pub No 31, 1987)

GN = motorized gillnetter; OM= other motorized; NM= non-motorized

### Appendix 3.3

#### DISTRICTWISE BREAK-UP OF FISH LANDINGS IN WEST BENGAL, 1981-84

	Midnapore			24 Parganas			Total		
	M	NM	Total	M	NM	Total	M	NM	Total
1981	6800	5250	12050	6257	1759	8016	13057	7009	20066
1982	2369	2615	4984	14637	8004	22641	17006	10619	27625
1983	2133	6936	9069	11815	2213	14028	13948	9149	23097
1984	8132	21581	29713	9345	852	10197	17477	22433	39910
Avg	4858	9096	13954	10513	3207	13720	15372	12303	27675

Source: *CMFRI Spl Pub No 31, 1987*

M — Motorized: NM — Non-motorized

### Appendix 4.1

#### FLOW OF MARINE DRIED FISH FROM WEST BENGAL

Market	Supply from	Consumption
1. Territy Bazaar	Behundi operators in 24 Parganas	Andhra, Tripura, Nagaland
2. Kerala traders	As above	Kerala
3. Uluberia	Behundi operators in Midnapore District	Local and Calcutta retail
4. Local traders	Midnapore District	Kerala', Orissa, Assam, Nagaland

### Appendix 4.1 (b)

#### FLOW OF FRESH FISH TO MARKETS IN WEST BENGAL

Market	Supply from	Type of fish	Consumption
1. Bantala	Cultured fish from producers	Carp and other fresh-water fish	Calcutta retail
2. B K Pal	As above	As above	As above
3. Canning	Producers from coastal belt of 24 Parganas	Marine and estuarine fish	Calcutta retail
4. Raidighi	As above	As above	As above
5. Diamond Harbour	Cultured fish from 24 Parganas & marine/estuarine fish from capture	Freshwater, marine & estuarine	Sealdah wholesale
6. Sealdah	Marine/estuarine fish from 24 Parganas and from Diamond Harbour agents	Freshwater, marine & estuarine	Calcutta retail
7. Howrah	Captured fish from 24 Parganas, Midnapore, Orissa, Andhra, Tamil Nadu, Bombay	Marine & estuarine	Calcutta retail — Assam, Nagaland, Bihar traders

## Appendix 4.2

### EXPORT OF MARINE PRODUCTS THROUGH CALCUTTA PORT FROM 1976 TO 1988

Year	Quantity (Tonnes)	Value (Crores* Rupees)	Share of West Bengal in All-India Export	
			% Quantity	% Value
1976	<b>2,943</b>	14.32	4.73	<b>7.96</b>
1977	3,081	16.45	4.75	9.15
1978	2,853	16.68	3.66	7.86
1979	1,266	7.77	1.37	2.96
1980	3,029	20.14	4.06	9.20
1981	3,308	32.19	4.39	11.33
1982	4,807	42.12	6.40	12.30
1983	4,638	43.29	5.38	11.95
1984	4,290	35.22	4.77	9.15
1985	3,710	37.23	4.64	9.91
1986	4,157	48.72	4.76	10.54
1987	4,441	52.73	4.98	10.77
1988	6,232	64.92	—	—

Source: MPEDA

\* 1 Crore = 10 million

## Appendix 4.3

### SUPPLIES OF TABLE FISH TO CALCUTTA/HOWRAH FISH MARKETS FROM OUTSIDE WEST BENGAL

Year	Quantity in tonnes	Supplying States
1976	20,815.9	Uttar Pradesh, Andhra Pradesh, Madhya Pradesh, Bihar, Delhi, Punjab, Orissa, Tamil Nadu, Maharashtra, Rajasthan and Gujarat
1977	21,616.5	
1978	22,788.3	
1979	25,959.5	
1980	27,021.5	
1981	27,076.1	
1982	28,803.3	
1983	29,871.7	
1984	30,196.1	
1985	30,131.0	

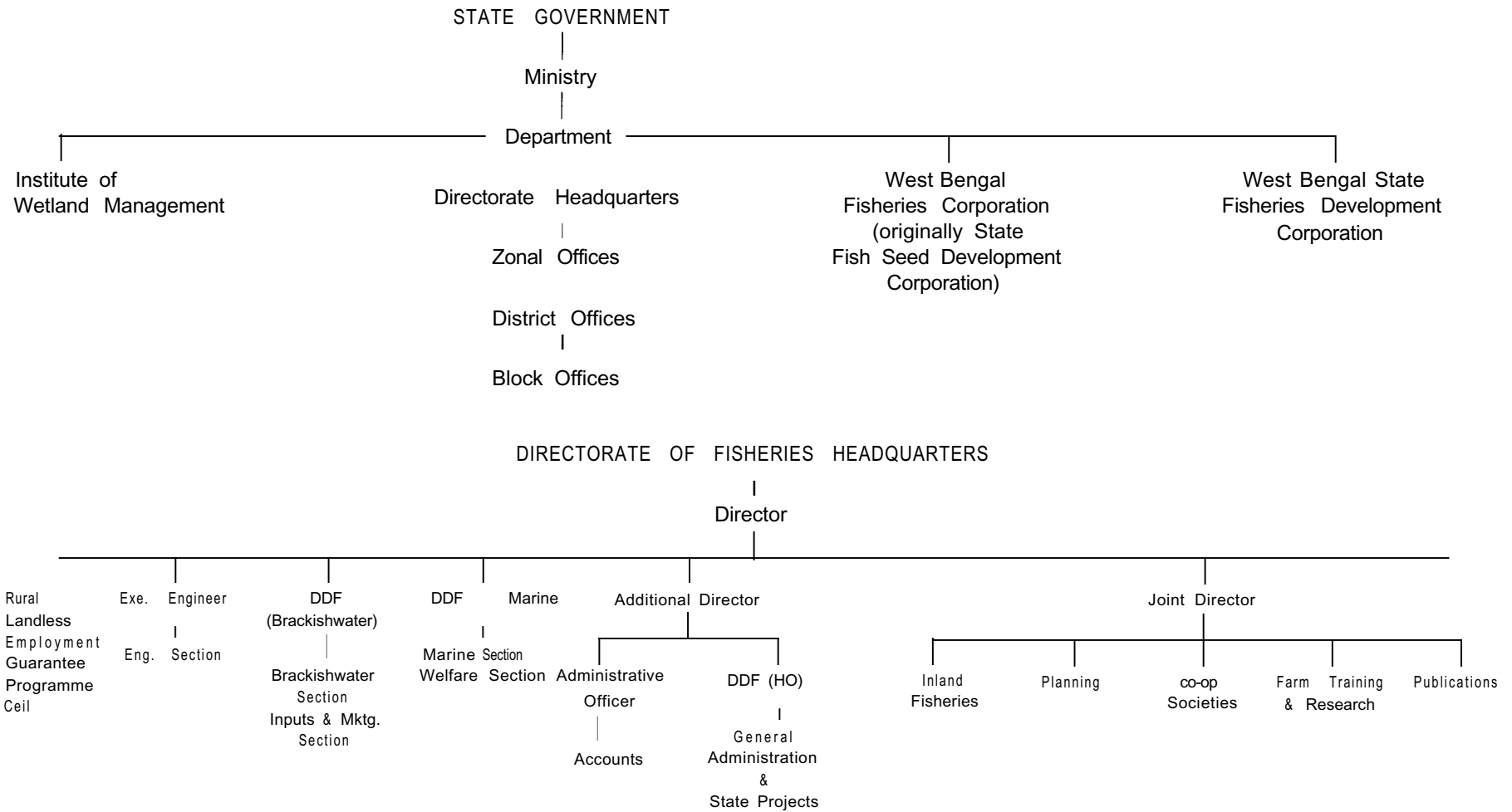


Appendix 6.1

**INFRASTRUCTURE AT MAJOR FISHING CENTRES**

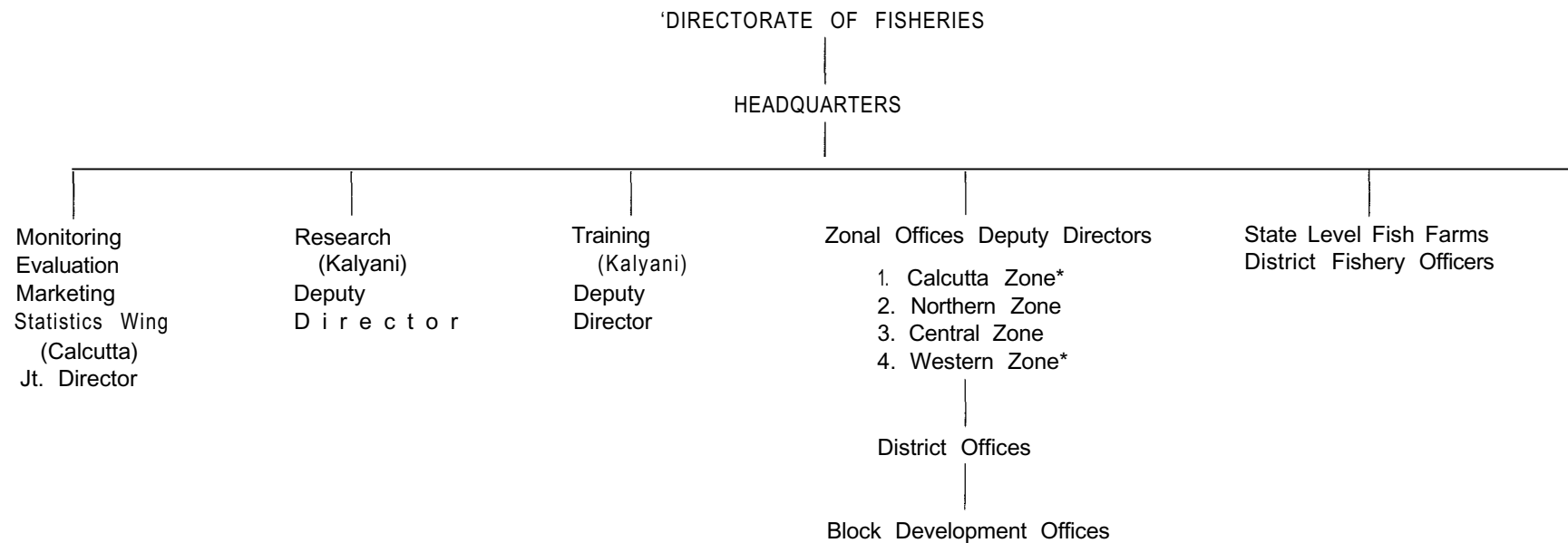
District	Centre	Harbour	Landing Jetty	Ice Plant	Boat Yard	Fishmeal Plant	Shark Oil Plant	Fish Drying
Midnapore	Digha			*		*		*
	Sankarpur	*	*	*	*			
	Jaldah				*			*
	Junput				•	☐	☐	•
24 Parganas	Diamond Harbour		*	*				
	Raidighi		*					
	Kakdweep			*	*	*	*	*
	Namkhana		*	*	*			
	Frazerganje				*		•	☐
	Jambu Island							*

**ORGANIZATION OF FISHERIES DEPARTMENT**



Appendix 10.2

**ORGANISATION OF DIRECTORATE OF FISHERIES**



• Zones with marine and brackishwater activities

## Appendix 11.1

(Rs in Lakhs)

### WEST BENGAL FISHERIES PLAN OUTLAY AND PROGRAMMEWISE ALLOCATION 1951-90

(Percentages in brackets)

	Adminis- tration	Re- search	Edu- cation	Inland Fish	Infra- structure	Deep sea	Pro- cessing and marketing	Improve- ment of craft mechani- zation	Assist- ance to co-op- eratives	Fishery Co-op erative	Fisher- men's housing	Welfare	Centrally spon- sored schemes	Central sector schemes	Auto- nomously financed schemes	Area develop- ment	Misc.	Total Outlay	Major Items
Plan I 1951-56	—	—	—	(46.2)* 29.81	—	(43.5)* 28.03	—	—	—	(3.9) 2.52	—	(5.3) 3.43	—	—	—	—	(0.07) 0.67	64.46	- Tank development scheme
Plan II 1956-61	—	(14.8) 11.58	(2.3) 1.82	(34.2)* 26.68	—	(37.0) 28.92	—	(6.4) 5.0	—	(5.1) 4.0	—	—	—	—	—	—	—	78.0	- Development of derelict tanks
Plan III 1961-66	(1.17) 2.4	(2.46) 5.05	(1.85) 1.75	(46.7)* 95.67	(6.3) 13.0	(11.7) 24.0	(7.4) 15.25	(2.4) 4.97	—	(12.1) 24.8	—	—	—	—	—	—	(8.6) 17.69	204.83	- Assistance to inland cooperatives
Plan (Annual) 1966-67	(1.05) 1.0	—	(0.95) 0.9	(44.3)* 42.1	—	—	(9.4) 8.9	(5.3) 5.0	(15.8) 15.0	(11.6) 11.0	—	—	(10.5) 10.0	—	—	(0.1) 0.1	(1.0) 1.05	95.0	- Development of derelict tanks
Plan (Annual) 1967-68	(0.6) 0.5	—	(1.4) 1.2	(50.6)* 42.9	—	—	(4.6) 3.9	(2.47) 2.0	(17.7) 15.0	(7.07) 6.0	—	—	(11.8) 10.0	—	—	(0.1) 0.1	(3.6) 5.11	84.8	- Intensive development of fisheries in community development blocks
Plan (Annual) 1968-69	(0.7) 0.5	(0.7) 0.5	(1.4) 1.0	(41.26) 28.88	(1.4) 1.0	—	(10.6) 7.44	(3.6) 2.5	(8.6) 6.0	(11.4) 8.0	—	(13.7) 2.6	(14.3) 10.0	—	—	(0.1) 0.08	(2.1) 1.5	70.0	- Intensive development of fisheries in community development blocks
Plan IV 1969-74	(0.7) 1.77	(0.6) 1.54	(0.06) 0.15	(60.9)* 151.84	—	—	(5.08) 12.67	(4.08) 10.18	(8.0) 20.0	(7.97) 19.88	—	(3.8) 9.6	(4.6) 11.44	—	—	—	(4.0) 9.98	249.4	- Intensive development of fisheries in community development blocks
Plan V 1974-78	(2.6) 20.63	(7.3) 57.5	(20.4) 161.03	(17.3) 136.73	(0.5) 4.0	—	(2.5) 20.0	(13.9) 110.17	(23.6)* 186.0	—	—	(4.5) 35.83	(4.3) 34.27	—	—	(1.0) 8.0	(1.8)** 14.0*	788.32	- Share capital assistance to WBSFDC
Plan (Annual) 1978-79	(0.96) 4.0	—	(11.5) 47.75	(7.75) 32.1	(1.2) 5.0	—	(0.96) 4.0	(11.2) 49.0	(10.9) 45.0	(2.4) 10.0	—	(6.3) 26.0	(17.5) 72.53	(0.4) 1.56	—	(0.24) 1.0	(27.8) 115.0*	414.0	
Plan (Annual) 1979-80	(3.9) 19.0	—	(16.6) 80.7	(22.3)* 108.0	(4.02) 19.5	—	(1.03) 5.0	(9.9) 48.0	(9.3) 45.0	(2.5) 12.0	—	(4.5) 22.0	(15.6) 75.78	(3.7) 18.0	—	(1.03) 5.0	(5.6) 27.0*	485.0	- Tank fisheries
Plan VI 1980-85	(4.3) 120.0	(0.45) 12.56	(12.1) 339.0	(22.0) 616.0	(3.6) 100.0	(2.7) 75.0	(1.8) 50.0	(7.5) 210.0	—	(4.75) 133.0	—	—	—	—	(29.0) 813.0	—	(11.8) 331.4	2800.0	- Inland fisheries project
Plan VII 1985-90	(3.75) 300.0	—	(10.0) 800.0	(31.6)* 2527.5	(8.8) 705.0	(0.25) 20.0	(2.9) 235.0	(1.75) 140.0	(0.3) 25.0	(3.06) 245.0	—	—	(5.4) 435.0	—	(11.0) 1687.5	—	(11.0) 800.0	8000.0	- Inland fisheries development, (Includes schemes for funding brackishwater)

Note: 1 lakh = 100,000

## Appendix 11.2

### WEST BENGAL DEVELOPMENT BUDGET FOR FISHERIES: 7TH FIVE-YEAR PLAN (85.90)

	Value lakhs Rs	Share of Total
1. Direction and Administration	270	0.07
2. Extension and Training' — <b>Total</b>	530	0.14
. Scheduled Castes	55	0.01
. Other groups	475	0.12
3. Inland Fisheries — <b>Total</b>	2,082	0.54
* State Scheme	1,152	0.30
* World Bank Scheme	910	0.24
4. Estuarine/Brackishwater Fisheries	50	0.01
5. Marine Fisheries — <b>Total</b>	430	0.11
* Minor harbour and fish landing centre	201	0.05
* Studies, surveys for mechanization of craft	99	0.03
. Schemes for nets, craft and gear	25	0.01
* Subsidies for craft and gear	95	0.02
. Shore complex at Roychowk	10	0.00
6. Processing and marketing <sup>2</sup>	100	0.03
7. Assistance to Public Sector participation in share capital of SFDC <sup>3</sup>	65	0.02
8. Fisheries Welfare Scheme	172	0.04
9. Fisheries Coops: share capital, loans, grants — <b>Total</b>	<b>134</b>	0.03
* For Scheduled Castes	79	0.02
* Other groups	55	0.01
10. Other expenditure	30	0.01
<b>Grand total for Fisheries</b>	<b>3.843</b>	

<sup>1</sup> Mainly for inland fisheries

<sup>2</sup> Terminal market development

<sup>3</sup> State Fisheries Development Corporation

Note. One lakh = 100,000

Source: DOF/f

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42. Report of the Twelfth Meeting of the Advisory Committee. Bhubaneshwar, India, 15-18 January 1988. Madras, India, April 1988.
43. Report of the Thirteenth Meeting of the Advisory Committee. Penang, Malaysia, 26-29 January 1989. Madras, India, April 1989.
44. Report of the Fourteenth Meeting of the Advisory Committee. Medan, Indonesia, 22-25 January 1990. Madras, India. April 1990.

**Working Papers(BOBP/WPI)**

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51. Hauling Devices for Beachlanding Craft. A. Overa, P. A. Hemminghyth. Madras, India, August 1986
52. Experimental Culture of Seaweeds (*Gracilaria* Sp.) in Penang, Malaysia. (Based on a report by Maxwell Doty and Jack Fisher). Madras, India, August 1987.
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55. Study of Income, Indebtedness and Savings among Fisherfolk of Orissa, India T. Mammo Madras, India, December 1987.

56. Fishing Trials with Beachlanding Craft at Uppada, Andhra Pradesh, India. L. Nyberg Madras, India, June 1987.
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*Manuals and Guides (BOBPIMAGI...)*

1. Towards Shared Learning: Nonformal Adult Education for Marine Fisherfolk Trainers' Manual. Madras, India, June 1985.
2. Towards Shared Learning. Non-formal Adult Education for Marine Fisherfolk Animators' Guide. Madras, India, June 1985.
3. Fishery Statistics on the Microcomputer: A BASIC Version of Hasselblad's NORMSEP Program. D. Pauly. N. David, J. Hertel-Wulff Colombo, Sri Lanka, June 1986.
4. Separating Mixtures of Normal Distributions: Basic programs for Bhattacharya's Method and Their Application for Fish Population Analysis. H. Goonetilleke, K. Sivasubramaniam. Madras, India, November 1987.
- 5 Bay of Bengal Fisheries Information System (BOBFINS). User's Manual. Madras, India, September 1987

*Miscellaneous Papers (BOBPIMSI...)*

2. Consultation on Social Feasibility of Coastal Aquaculture. Madras, India, 26 November - 1 December 1984. Madras, India, November 1985.
3. Studies on Mesh Selectivity and Performance The New Fish-cum-Prawn Trawl at Pesalai, Sri Lanka M. S. M Siddeek Madras, India, September 1986.
- 4 Motorization of Dinghy Boats in Kasafal, Orissa S Johansen and O. Gulbrandsen Madras, India, November 1986.

*Information Documents (BOBPIINFI...)*

6. Marine Small-Scale Fisheries of Sri Lanka: A General Description Madras, India, November 1984.
7. Marine Small-Scale Fisheries of Orissa. A General Description Madras, India, December 1984.
8. Marine Small-Scale Fisheries of Bangladesh: A General Description Madras, India. September 1985.
9. Food and Nutrition Status of Small-Scale Fisherfolk in India's East Coast States A Desk Review and Resource Investigation V. Bhavani. Madras, India, April 1986
10. Bibliography on Gracilaria — Production and Utilization in the Bay of Bengal Madras, India, August 1990
11. Marine Fisheries of West Bengal — an Introduction

*Newsletters [Bay of Bengal News]:*

Quarterly