

## DEMERSAL FISHERY RESOURCES OFF NORTH KERALA, KARNATAKA AND KONKAN COASTS\*

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### ABSTRACT

An account on the demersal fishery resources off North Kerala, Karnataka and Konkan Coasts beyond 100 m depth belt, based on the results of survey conducted by vessels of Fishery Survey of India, is presented in this paper. The survey indicated the availability of under-exploited and un-exploited demersal fishery resources in considerable quantities in the deep water areas.

The important species present in the 100-200 m depth zone are nemipterids, lizardfish, priacanthids, decapterids and cephalopods. Nemipterids formed about 48% of the catch from this depth zone followed by lizardfish and priacanthids with 13% and 12% respectively. The deeper areas of 200-500 m zone is dominated by deep-sea prawns, lobster and fishes like *Centrolophus niger*, *Priacanthus* spp., *Chlorophthalmus* spp., etc. *C. niger* constituted about 69% of the catch of this depth zone. Variations have been noticed in the distribution and abundance of these varieties in respect of area, depth and season. The surveys have also revealed the existence of potential grounds for deep-sea prawns like *Aristeus* sp. and *Heterocarpus* sp. Potential grounds for deepsea lobster *Puerulus sewelli* was also located. The Kerala-Karnataka Coast yielded comparatively good catch rates in respect of most of the groups.

### INTRODUCTION

MARINE fish production in India is mainly from the inshore waters within 60 m depth. The present production (1987) is about 1.7 million tonnes of which the contribution from the deep sea is meagre. Lack of precise knowledge on the deep sea resources, limited expertise in the operation of deep sea vessels, high investment, fear of low return, etc. have delayed the development of deep sea fishing in India. Menon and Joseph (1969), Silas (1969), Joseph (1970) Mohammed and Suseelan (1973, 1974) Rao and George (1973) and Oommen (1980, 1985) have discussed the deep sea demersal resources of the southwest coast of India. The deeper areas along the

northwest coast of India were surveyed by M.T. *Murena* under Indo-Polish Industrial Fisheries Survey during 1977. Systematic demersal resources survey commenced in the area under study during 1983 by the Fishery Survey of India. The results of this survey were discussed earlier by Philip *et al.* (1984), Joseph (1986), Sivaprakasam (1986) and Sudarsan *et al.* (1987). An account of demersal fishery resources available beyond 100 m depth in the area between 11°00'N (and 18°00'N covering North Kerala, Karnataka and Konkan Coasts (Fig. 1) is presented in this paper.

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### PLAN OF THE SURVEY

The area of survey is divided into three regions for the purpose of comparative studies :

Lat. 10°N—15°N—North Kerala, Karnataka Coast.

15°N—16°N—Goa Coast

16°N—18°N—South Maharashtra Coast

The depthwise study was made dividing the area into two zones v/z. 100-200 m and 200-500 m. Approximately 30,000 sq. km area is available in this region. However, the entire area was not found suitable for the purpose of trawling due to the occurrence of extensive hard uneven grounds and underwater obstructions. Good grounds suitable for

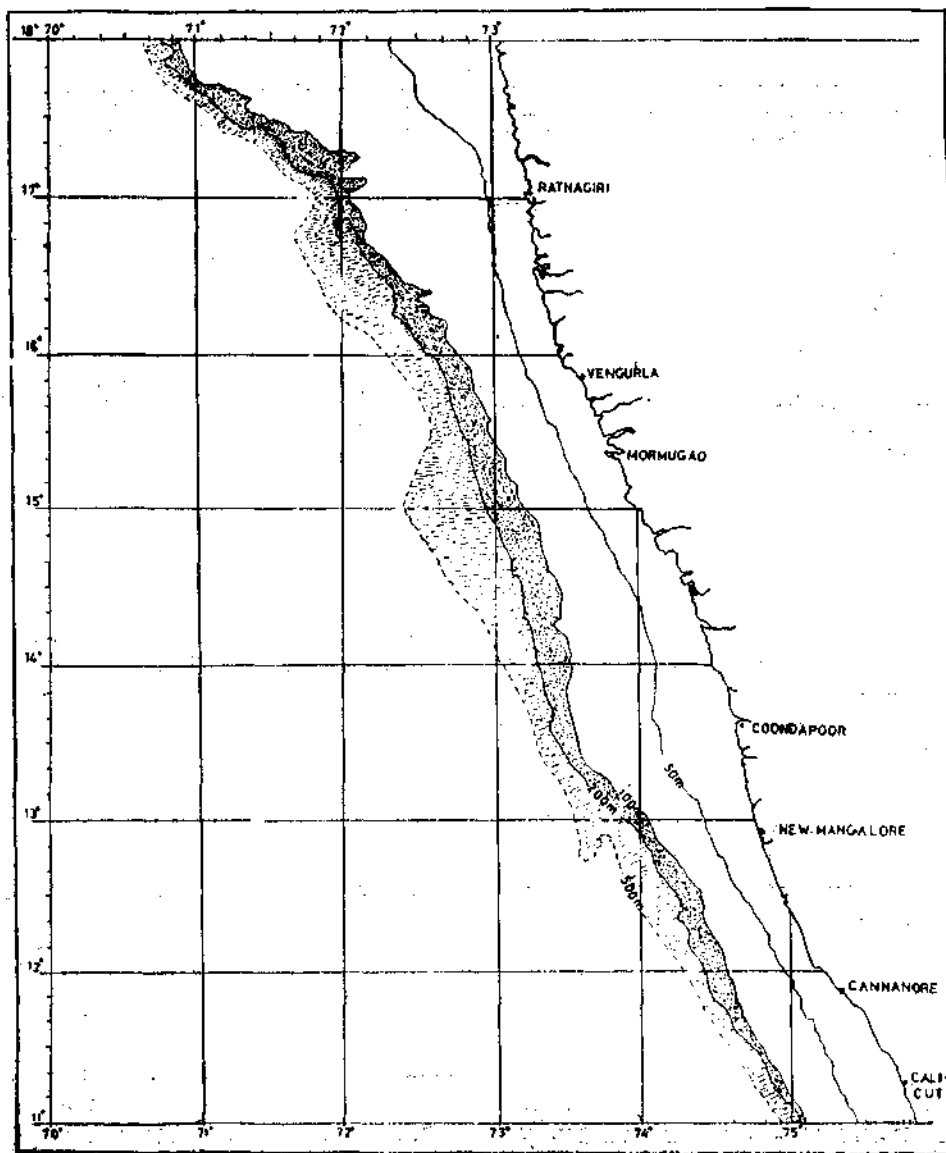


Fig. 1. Area of survey with different depth contours.

trawling are available in the depths off North Kerala-Karnataka Coast whereas such grounds are relatively less along the Goa and south Maharashtra Coasts.

#### CRAFT AND GEAR

Two vessels of 36.5 m length (*Matsya Vishwa* and *Matsya Shakti*) fitted with modern navigational and fish finding equipments were employed. They operated 27 m fish trawl and 45 m shrimp trawl with combination type steel otter boards, each weighing 850 kg. Both fish and shrimp trawls were operated in the two depth zones. Fish trawls were operated in the 100-200 m depth zone and shrimp trawl in the 200-500 m depth zone.

#### FISHING EFFORT

Altogether 2743 hours of actual fishing effort (trawling hours) were spent in this area during 1983-86. Trawling was made for an average duration of 2.5 hours at a speed of four knots.

The distribution of fishing effort in different regions and depth zones, and catch rate are

Region	Depth range(m)	Effort (hrs.)	Catch rate (kg/hr)
North Kerala-Karnataka	100-200	1505	146.3
	200-500	786	235.3
Goa	100-200	203	252.7
	200-500	28	271.1
South Maharashtra	100-200	208	97.8
	200-500	13	17.0

More fishing effort was put in the Kerala-Karnataka region between 11° and 15°N for 1983-1985. Survey off Goa and South Maharashtra Coasts was intensified from 1986 onwards.

#### RESOURCES

The resources recorded from the 100-200 m and 200-500 m depth zones of North Kerala-Karnataka, Goa and South Maharashtra Coasts are dealt separately as wide difference are noticed in the overall catch rates and the catch rates of different groups/species in different regions and depth zones.

Among the three regions, the Goa region recorded higher catch rates from both the depth zones, with 253 kg from 100-200 m and 271 kg from 200-500 m. However, further monitoring is necessary as the fishing effort was only 20 hours in areas beyond 200 m to draw any definite conclusion. The North Kerala-Karnataka region stood second in abundance in both the depth zones. The South Maharashtra region showed low catch rates.

#### CATCH COMPOSITION

The percentage and catch rates of important groups/species from the three regions and two depth zones are shown in Fig. 2 and 3.

##### Depth zone 100 - 200 m

More varieties of fishes are observed along the North Kerala-Karnataka region. About 44% of the total catch was constituted by *Nemipterus* spp., *Priacanthus* sp. and lizardfish formed 18% and 12% respectively. Cephalopods formed about 6%, while elasmobranchs, barracuda, catfish, *Decapterus* sp., perches, *Psenes indicus* (driftfish) etc. formed 1 to 2%. Mackerel and sardine were also present in the trawl catches in small quantities. The swarming crab *Charybdis edwardsi* constituted about 8% of the catch.

Along the Goa Coast also nemipterids were the dominant group (50%) followed by priacanthids with 44% both together forming almost the entire catch in this depth zone. Lizardfish and perches formed about 2% each. All other varieties were caught in negligible quantities.

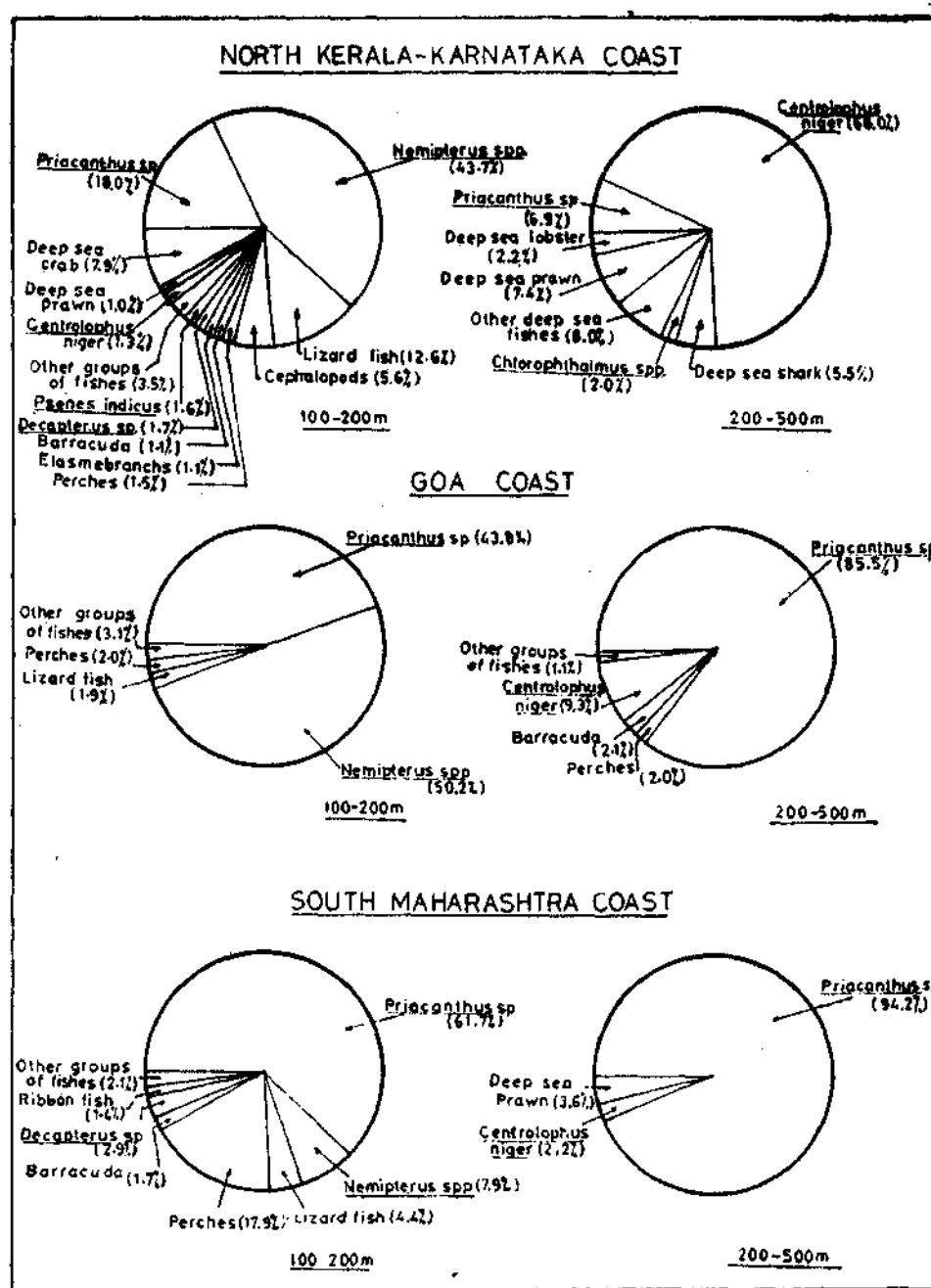


Fig. 2. Percentage composition of different groups/species from the two depth zones of different regions.

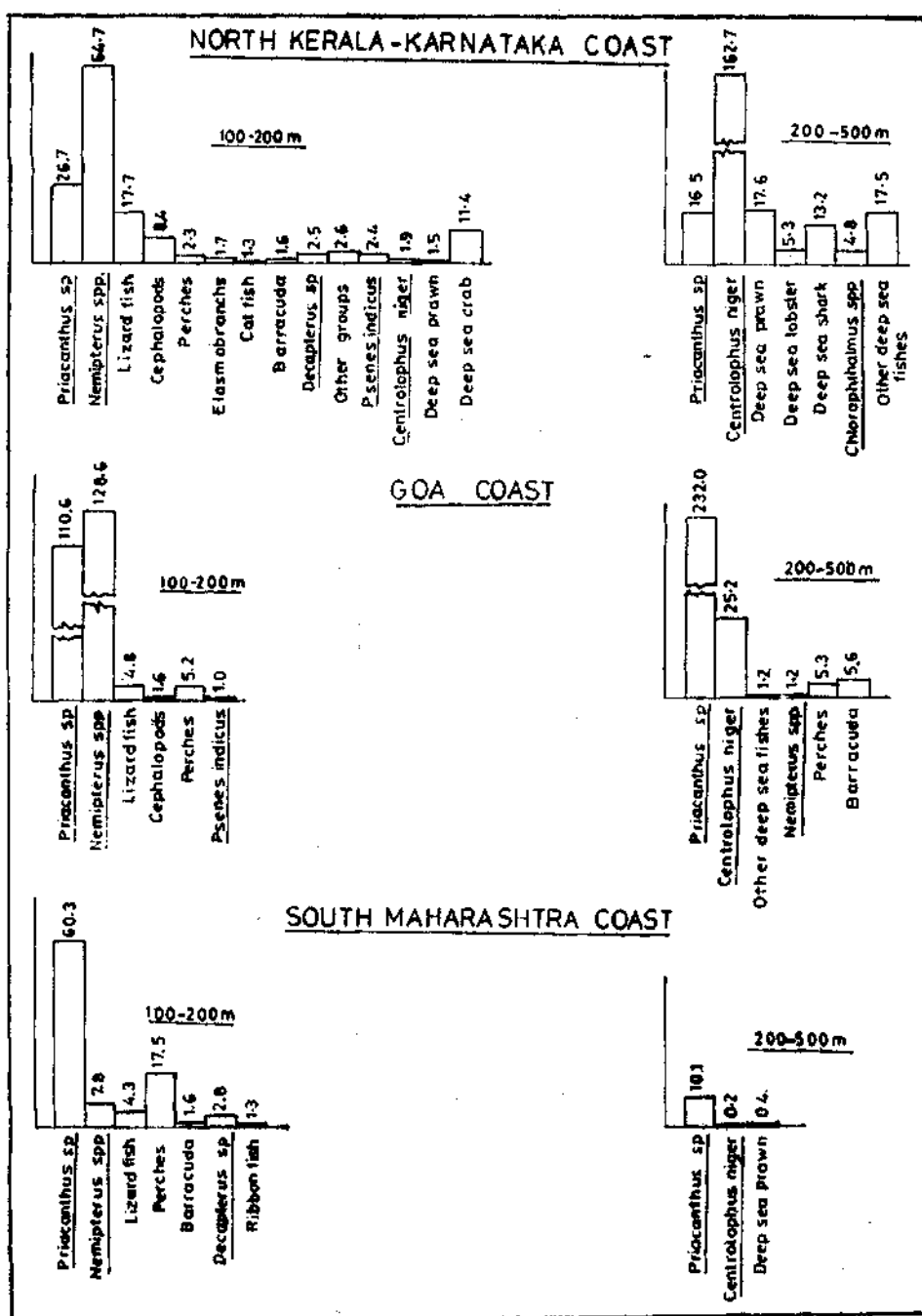


Fig. 3. Catch rates of important groups/species from the two depth zones of different regions.

*Priacanthus hamrur* was the predominant species along the South Maharashtra Coast constituting 62% of the total catch and perches contributed 18%. *Nemipterus* spp. which was abundant in the other two regions formed only 8% of the catch. Barracuda, *Decapterus* sp. and ribbonfish recorded slightly high catch rates than the Kerala-Karnataka region.

#### Depth zone 200-500 m

Along the North Kerala-Karnataka Coast *Centrolophus niger* (Black-ruff) was the predominant species which formed 69% of the catch. *Priacanthus* sp. and deep sea prawns registered about 7% each. *Chlorophthalmus* spp. and deep sea sharks were the other dominant varieties. Deep sea lobster *Puerulus sewelli* formed about 2% of the catch. Lizardfish, perches, elasmobranchs, barracuda and cephalopods were present in negligible quantities during some parts of the year.

*Priacanthus* sp. formed about 85% of the catch from the areas off Goa. *C. niger*, the predominant deep sea fish along North Kerala-Karnataka Coast recorded only 9% in this region. Catch rates of perches were slightly higher as compared to the southern region.

Along the South Maharashtra Coast, only very little fishing has been carried out in depths beyond 200 m and the catch was very poor, comprising mainly of *Priacanthus* sp. (94%) with *C. niger* and deep sea prawns in negligible quantities. Most part of the deeper areas in this region is unsuitable for trawling due to trenches and uneven grounds.

#### SEASONAL FLUCTUATION

##### Depth zone 100-200 m

Table 1 gives the monthly catch rates recorded from the 100-200 m depth zone off North Kerala-Karnataka region. March and April recorded the highest catch rates. In general, the

TABLE 1. Monthwise distribution of effort, catch per effort of important groups/species of fishes from 100-200 m depth zone of North Kerala-Karnataka Coast

Month	Effort (hrs)	Total catch (kg/hr)	Groups/species (Kg/hour)														
			<i>Priacanthus</i> sp.	<i>Nemipterus</i> spp.	Lizard fish	Cephalopods	Perches	Catfish	Barracuda	<i>Decapoda</i> spp.	Carangids	Elasmobranchs	<i>Centrolophus</i> sp.	Deep sea prawns	Deep sea crab	<i>Pseudosquilla</i>	Others
Jan.	137.00	193.9	27.0	96.7	43.7	0.4	1.7	1.4	3.4	4.3	2.3	2.3	0.4	0.4	5.1	—	4.8
Feb.	195.45	154.5	6.5	71.7	30.6	0.4	0.7	0.4	3.8	6.2	0.2	4.0	0.1	0.02	26.2	0.8	2.9
Mar.	276.40	218.5	16.1	102.7	20.1	15.1	0.3	1.0	3.0	2.5	2.9	1.8	0.8	0.2	39.2	11.1	1.8
Apr.	85.25	215.7	10.6	172.4	24.8	0.6	—	—	0.5	0.9	0.7	1.2	—	0.06	4.0	—	—
May	40.55	162.2	21.3	114.0	20.4	0.6	0.5	—	0.6	—	1.8	—	—	0.05	—	0.3	2.7
June	104.30	114.5	22.8	56.3	11.5	0.9	0.4	—	—	—	0.6	—	19.1	—	—	—	—
July	47.45	25.2	17.1	1.0	2.5	0.6	1.0	—	—	0.1	—	0.7	0.3	1.8	—	—	—
Aug.	112.55	37.8	25.5	1.1	1.4	1.7	1.6	0.4	0.4	—	—	—	4.8	0.02	0.5	0.2	0.1
Sept.	123.05	135.8	44.1	31.4	14.9	35.4	2.7	—	0.2	—	—	—	0.1	5.0	—	0.3	1.6
Oct.	95.45	137.3	76.2	12.8	4.7	27.4	8.3	—	0.3	—	—	0.9	—	0.3	—	—	0.4
Nov.	141.10	113.0	39.3	32.7	7.8	3.9	5.5	6.0	1.4	7.9	0.06	1.4	0.7	—	1.2	1.4	3.7
Dec.	141.00	109.9	5.8	51.9	10.1	3.1	5.8	4.0	0.2	1.2	0.4	3.4	—	10.0	—	—	14.1

premonsoon period can be considered the best fishing season. July and August recorded the lowest catch rates. Among the important groups, nemipterids recorded highest catch rates during March to May period and lizardfish during January to May. Priacanthids were abundant in September, October and

November. Deep sea prawns recorded high catch rate during December (10 kg/hr) and September (5 kg/hr).

Along the Goa region relatively good catch rates (Table 2) were recorded during the postmonsoon season. Exceptionally high catch

TABLE 2. *Monthwise distribution of effort and catch per effort of important groups/species of fishes from 100-200 m depth zone of Goa Coast during 1983-86*

Month	Effort (hrs)	All fish (Kg/hr)	Groups/species (Kg/hour)						
			Priacanthus sp.	Nemipterus spp.	Lizardfish	Cephalopods	Perches	Barracuda	Others
Jan.	26.45	121.3	10.7	97.7	1.6	3.0	4.9	2.1	1.1
Feb.	4.00	296.3	—	291.3	—	—	—	5.0	—
Mar.	—	—	—	—	—	—	—	—	—
Apr.	38.15	148.2	13.0	101.0	19.5	—	3.1	0.3	11.3
May	23.55	106.9	7.8	92.0	6.3	—	—	—	0.8
June	5.00	16.2	16.0	—	—	—	—	—	0.2
July	10.45	26.5	24.2	—	—	2.3	—	—	—
Aug.	30.15	210.7	195.6	11.2	0.5	3.1	0.1	—	—
Sep.	24.30	193.6	158.2	—	—	—	31.2	—	0.2
Oct.	2.45	1278.2	1272.7	—	—	—	5.5	—	—
Nov.	22.00	334.0	328.2	—	—	5.7	0.1	—	—
Dec.	14.45	1103.7	41.7	1054.6	2.0	0.3	0.6	3.4	0.3

TABLE 3. *Monthwise distribution of effort and catch per effort of important groups/species of fishes from 100-200 m depth zone of South Maharashtra Coast during 1983-86*

Month	Effort (hrs)	All fish (Kg/hr)	Groups/species (Kg/hour)								
			Priacanthus sp.	Nemipterus spp.	Lizardfish	Perches	Cephalopods	Ribbon fish	Barracuda	Decapterus sp.	Others
Jan.	10.35	35.0	4.7	7.1	2.4	6.1	1.9	1.9	—	—	1.0
Feb.	—	—	—	—	—	—	—	—	—	—	—
Mar.	2.20	122.3	—	—	—	36.5	—	—	85.8	—	—
Apr.	44.15	24.2	1.7	2.2	13.3	2.0	—	—	—	3.3	1.2
May	17.20	47.0	1.8	8.7	1.0	4.7	—	2.3	5.8	22.2	0.6
June	—	—	—	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—	—	—	—
Aug.	16.40	32.0	26.1	—	—	4.9	—	0.9	—	—	—
Sep.	53.00	74.2	56.1	4.3	5.1	3.6	0.2	—	0.2	1.0	3.8
Oct.	28.40	194.6	176.4	—	—	16.6	0.4	—	0.2	—	0.9
Nov.	17.05	285.8	137.0	—	—	148.0	—	—	0.8	—	—
Dec.	18.15	164.7	87.7	57.6	—	2.5	0.2	10.1	0.6	0.3	36

rates during October and December are due to the abundance of two groups viz. Priacanthids and nemipterids. This, however, cannot be considered a true picture of the resource since the effort put in these months was limited. June-July was the lean period as in the case of other regions. Priacanthids were available throughout the year except February with peak season during August to November. *Nemipterus* spp. were totally absent during June and July and September to November. They were predominant during the period i.e. December to February. Lizardfish and perches showed comparatively high catch rates during April and September respectively.

In the South Maharashtra region the overall catch rates were high during October-December period (Table 3). Low catch rates were noticed from April to September. No fishing was conducted during June and July. Priacanthids were abundant during postmonsoon period. Good catch rates of perches were recorded in March and November. Nemipterids and lizardfish were present only occasionally. Catfish, carangids, elasmobranchs, etc. were present in one or two months of the year.

#### Depth zone 200-500 m

Table 4 shows the monthwise catch rates of important groups from the areas beyond 200 m along the North Kerala-Karnataka Coast. It is seen that the overall catch rates were high during January and February. No remarkable fluctuations are seen in the monthly catch rates except during the months of July, August and December.

*Priacanthus* sp., *C. niger*, deep sea prawns and deep sea shark were found throughout the year. Priacanthids were abundant during May and July, *C. niger* during January-February and September-October. The catch rates of deep sea prawns were more during September and November, while deep sea lobster, deep sea shark and *Chlorophthalmus* spp. were

TABLE 4. Monthwise distribution of effort and catch per effort of important groups/species of fish from 200-500 m depth zone of the North Kerala-Karnataka Coast

Month	Effort (hrs)	All fish (Kg/hr)	Groups/species (Kg/hr)														
			<i>Priacanthus</i> sp.	<i>C. niger</i>	Deep sea prawn	Deep sea lobster	Deep sea shark	Deep sea eye	Deep sea crab	Other deep sea fishes	Elasmobranchs	Perches	<i>Nemipterus</i> spp.	Lizard fish	Cephalopods	Elacate	Ribbon-fish
Jan.	71.05	325.1	5.0	291.0	21.1	1.0	0.3	—	—	4.7	—	—	—	—	—	1.0	
Feb.	111.45	470.4	0.9	331.6	19.9	14.7	36.3	18.3	—	45.7	—	—	—	—	4.0	—	
Mar.	140.25	214.2	5.2	104.7	17.3	7.0	26.6	8.6	—	43.8	0.1	—	0.3	—	0.4	—	
Apr.	55.00	186.9	19.7	150.4	7.4	7.0	2.4	—	—	—	—	—	—	—	—	0.1	
May	45.40	159.4	46.7	94.8	5.0	5.9	—	—	0.4	5.5	—	—	—	—	—	0.04	
June	29.25	68.2	1.0	20.4	6.8	2.7	20.4	—	—	16.1	—	—	—	—	—	0.7	
July	15.50	65.4	47.4	1.3	10.7	—	4.2	—	—	1.6	—	—	—	—	—	—	
Aug.	49.55	32.0	2.3	12.7	8.0	1.3	5.1	—	—	0.2	—	2.2	—	—	—	—	
Sep.	100.30	266.9	3.9	206.0	38.9	5.4	3.5	3.2	—	5.8	—	—	—	—	0.1	—	
Oct.	68.15	199.3	3.0	175.8	10.1	1.6	2.0	3.0	—	2.7	0.1	—	—	—	0.5	—	
Nov.	60.15	221.4	45.6	122.8	28.0	—	13.3	—	0.4	9.8	—	—	—	—	1.3	0.2	
Dec.	37.55	85.4	11.3	55.1	3.0	1.1	7.9	—	—	3.3	—	—	—	—	—	—	



abundant during February-March. Lizardfish, elasmobranchs, eel, catfish, barracuda, etc. were found in the catch in negligible quantities occasionally.

Along the Goa Coast, no regular fishing was conducted in the deeper waters. Only six months data are available which are shown in Table 5. It may be seen that out of six months fished, the month of October recorded a catch rate of 726 kg/hr where *Priacanthus* sp. was the predominant group.

The fishing effort put in the areas beyond 200 m off South Maharashtra Coast is insufficient to discuss the seasonal fluctuation of deep sea resources of the region.

etc. are already exploited from the inshore waters. These groups/species provide scope for further exploitation from the outer continental shelf.

*Priacanthus* spp. (Bull's eye) is one of the resources which is not commercially exploited and utilised in India. Till recently they were being discarded a trash fish. Now they are occasionally brought to the shore by trawlers. The fish is being used in fresh and dried conditions. The annual landing data of priacanthids is not so far estimated since they are not treated separately for the purpose of fishery statistics. Appa Rao (1984) reported an average annual landing of 2,35,673 kg of *Priacanthus* sp. by the trawlers operating

TABLE 5. Monthwise distribution of effort and catch per effort of important groups/species of fishes from 200-500 m depth zone of the Goa Coast

Month	Effort (hrs)	All fish (kg/hr)	Groups/species (Kg/hr)							
			<i>Priacanthus</i> sp.	<i>C. niger</i>	Deep sea prawn	Cephalopods	Perches	Barra-cuda	<i>Nemipterus</i>	Other spp. deep sea fishes
Jan.	—	—	—	—	—	—	—	—	—	—
Feb.	—	—	—	—	—	—	—	—	—	—
Mar.	—	—	—	—	—	—	—	—	—	—
Apr.	5.00	32.4	28.0	—	0.4	2.0	—	—	—	2.0
May	2.35	22.5	19.4	—	3.1	—	—	—	—	—
June	—	—	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—	—	—
Aug.	2.00	—	—	—	—	—	—	—	—	—
Sep.	7.30	3.1	0.3	—	—	—	—	—	—	—
Oct.	10.00	726.0	622.5	70.0	—	—	14.7	15.5	3.0	0.3
Nov.	—	—	—	—	—	—	—	—	—	—
Dec.	0.40	20.0	30.0	—	—	—	—	—	—	—

#### DISCUSSION

The present exploratory surveys conducted for demersal resources along the continental shelf and slope off North Kerala, Karnataka, and Konkan Coasts have revealed the availability of some potential demersal fishery resources. Some of them like nemipterids, lizardfish perches, cephalopods, *Decapterus* sp.,

from Visakhapatnam during 1980-82. Referring the Fishery Statistical Report for the South China Sea, Joseph (1986) reported that about 33,000 tonnes of *Priacanthus* spp. landed by Thailand and Hong Kong from the South China Sea, which indicates that this fish has good demand in the region. Fishes like *C. niger*, *Chlorophthalmus* spp., deep sea sharks, etc. which are abundant in some of the regions

are restricted to the areas deeper than 200 m. These varieties are not being landed now by the commercial trawlers. Among these *C. niger* is found in huge concentrations along the north Kerala-Karnataka Coast. Deep sea prawns *Heterocarpus* spp., *Aristeus* spp., *Parapandalus* sp., *Plesionika* spp. and *Metapenaeopsis* sp. are suitable for commercial exploitation. Among them *Heterocarpus* spp. and *Aristeus* spp. are fairly large in size. They are abundant in the areas above 150 m depth of North Kerala-Karnataka region. The deep sea lobster *Puerulus sewelli* is also noticed beyond 200 m depth of this region.

Sudarsan *et al.* (1987) has estimated a standing stock of about 25,000 tonnes and

15,000 tonnes of demersal resources from the 100-200 m and 200-500 m depth zones respectively from area lying between 12°—15°N. Nemipterids, lizardfish, catfish and carangids contribute substantially to the stock from the 100-200 m depth belt, while the stock from 200-500 m depth zone is constituted by the unexploited species like *Priacanthus* spp., *C. niger*, deep sea prawns, lobster, etc. One of the constraints of deep sea fishing is the non-availability of good markets for these unconventional varieties. Concerted efforts are to be made to popularise these varieties by developing suitable fish products out of them so as to make deep sea fishing economically viable.

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