An overview of marine fisheries in India during 2007

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Fisheries sector in India plays an important role in the country's economy and it supports the livelihood of millions of people. India is having 8,129 km of coastal length with 2.02 million sq. km of Exclusive Economic Zone (upto 200 m depth) and 0.452 million sq. km of continental shelf area. Total marine fish production in the year 2007 was about 2.89 million t in which mechanised sector contributed 68%, motorised sector 28% and non-mechanised sector 4%. An increase of 7% was noticed as compared to the all India landings of the year 2006.

An account of the percentage contribution of each maritime state towards different assemblages found in India, is given in Table 1.

Table 1. Percentage contribution of the maritime states towards different assemblages

State	Assemblage			
	Crustaceans	Demersals	Pelagics	Molluscs
West Bengal	6.94	8.39	8.44	1.00
Orissa	5.61	7.12	4.60	1.71
Andhra Pradesh	8.14	8.10	6.89	2.41
Tamil Nadu	8.53	17.38	15.50	11.64
Pondicherry	0.12	0.27	0.72	0.36
Kerala	12.60	12.01	27.76	23.11
Karnataka	8.23	8.33	11.39	9.70
Goa	0.35	1.58	5.13	0.19
Maharashtra	20.51	11.22	7.49	18.11
Gujarat	28.97	25.60	12.08	31.77

Kerala ranked first in fish production during 2007 with 21% contribution followed by Gujarat and Tamil Nadu contributing 19% and 15% respectively to the total landings. Considering the gearwise all India landings, in the mechanised sector, trawlnets contributed 41%, dolnets 9%, purseseines 7% and gillnets 6%. In the motorised sector, gillnets contributed 15%, ringseines 8% and all the gears in the non-motorised sector contributed 4%.

Major resources landed along the Indian coast are oilsardine (17%), penaeid prawns (7%), perches (6%), croakers (6%), carangids (5%), non-penaeid prawns (5%), ribbonfishes (5%), Bombayduck (4%), cephalopods (3%), seerfishes (2%) and pomfrets (2%). The distribution of Indian mackerel (*Rastrelliger kanagurta*) in different maritime states, along with the annual landings of the states is depicted in Fig. 1.

In the mechanised sector, units operated per day along the Indian coasts during 2007 were as follows: multiday trawlnets 1,364, single day trawlnets 1,948, gillnets 1,461 and dolnets 1,443. Purseseine operations per day maintained the same decorum as that of 2006 with 250 units. Trawlnet operations were more in Tamil Nadu with about 3.82 lakhs, followed by Kerala with 2.73 lakhs. The number of unit operation of gillnets was higher in Maharashtra with 2 lakhs and in Andhra Pradesh with 1.17 lakhs. Unit operations of dolnets in Maharashtra were

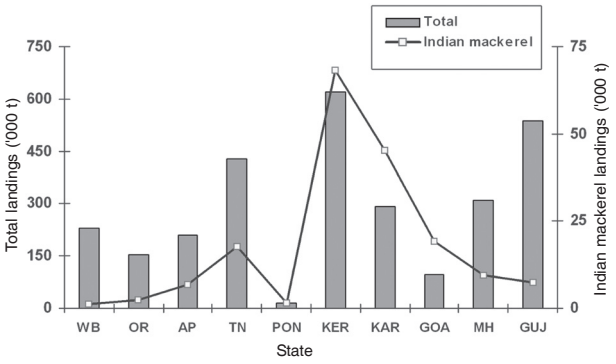

Fig. 1. State-wise landings of *Rastrelliger kanagurta* along with total annual landings of the states

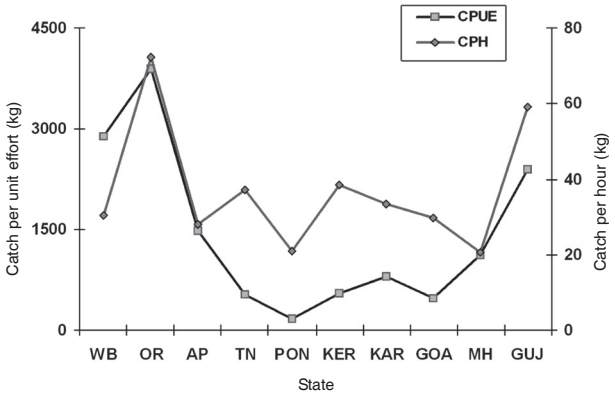

Fig. 2. Effort details of trawlnets operating along the coasts of different maritime states

3.18 lakhs and in Gujarat about 2.1 lakhs. In the motorised sector, the number of unit operations of gillnets in Tamil Nadu was 21.88 lakhs. Operations of motorised ringseine units in Kerala were about 1.66 lakhs and that of motorised hooks and lines in Tamil Nadu were about 2.94 lakhs. Artisanal units were more in operation in Tamil Nadu and Andhra Pradesh.

Considering the catch per unit effort (CPUE) of trawl landings in India, Orissa ranked first with 3,889 kg followed by West Bengal with 2,881 kg, Gujarat with 2,388 kg and Andhra Pradesh with 1,488 kg. Details of effort expended by trawlnets operating along the coasts of different maritime states, are given in Fig. 2.

An account of the contribution pattern of different maritime states of India during 2007 is presented.

West Bengal

West Bengal, the northern most maritime state in the east coast of India, is located between 21°38' - 27°10' N latitude and 85°38' - 89°38' E longitude, with a coastal length of 158 km. Here, marine fishing activity is limited to 70 m depth zone. Ban period on fishing in the state was from 15th April to 31st May during 2007. The state contributed 2.29 lakh t towards the total marine fish production of the country during 2007. In the mechanised sector, the production was 82%, while from the motorised sector, it was 15% and non-mechanised landings were only 3% of the total landings. Multiday operations of trawlers and gillnetters were regular phenomenon during the fishing season of July-February. Handtrawl operations were also seen in the multiday fishing scenario from 24 Parganas District. The main resources available during the period were hilsa shad (22%), Bombayduck (15%), other clupeids (10%), croakers (9%), non-penaeid prawns (7%), pomfrets (6%) and catfishes, anchovies and penaeid prawns (5% each). Percentage contribution of the major resources in different gears is given in Table 2.

Table 2. Percentage contribution of the major resources in different gears in West Bengal

Gears / Resources	Mechanised				Motorised			Non-motorised
	TN	GN	BN	HL	GN	BN	HL	
Hilsa shad	0	79	0	0	21	0	0	0
Bombayduck	3	27	36	0	21	12	0	1
Other clupeids	34	46	11	0	4	0	0	5
Croakers	52	16	21	1	1	3	0	6
Non-penaeid prawns	0	0	74	0	0	4	0	22
Pomfrets	21	71	1	0	7	0	0	0
Penaeid prawns	64	0	24	0	0	10	0	2
Catfishes	30	50	2	10	4	0	3	1
Anchovies	57	3	26	0	1	10	0	3
Ribbonfishes	33	31	25	0	4	6	0	1
Seerfishes	7	56	0	0	37	0	0	0

TN - Trawlnet, GN - Gillnet, BN - Bagnet, HL - Hooks and line.

Demersal resources contributed 27% to the total landings followed by pelagics 60%, crustaceans 13% and contribution by molluscs was negligible. Main species which contributed to each category were as follows:

Hilsa shad	*Tenualosa ilisha*
Bombayduck	*Harpadon nehereus*
Croakers	*Otolithes* spp., *Johnius* spp., *Protonibea diacanthus*, *Otolithoides biauritus*, *Johnieops* spp. and *Nibea maculata*
Non-penaeid prawns	*Acetes* spp. and *Plesionika* spp.
Pomfrets	*Pampus argenteus*, *P. chinensis* and *Parastromateus niger*
Catfishes	*Arius thalassinus*, *A. tenuispinis*, *Osteogeneiosus militaris*, *Pangasius pangasius* and *Plotosus limbatus*
Anchovies	*Coilia dussumieri* and *Setipinna taty*
Penaeid prawns	*Solenocera hextii*, *Metapenaeopsis stridulans*, *Metapenaeus affinis*, *M. brevicornis*, *M. monoceros*, *M. dobsoni*, *Parapenaeopsis hardwickii*, *P. stylifera*, *Parapenaeus* spp., *Penaeus canaliculatus*, *P. indicus* and *P. monodon*
Clupeids	*Amblygaster leiogaster*, *Chirocentrus nudus*, *Stolephorus commersonii*, *S. indicus*, *Thryssa mystax*, *T. dussumieri*, *Ilisha megaloptera*, *Opisthopterus tardoore*, *Raconda russeliana*, *Escualosa thoracata*, *Dussumieria acuta* and *Anodontostoma chacunda*
Ribbonfishes	*Lepturacanthus savala* and *Trichiurus lepturus*
Seerfishes	*Scomberomorus guttatus.*

Among different types of gears operated, maximum contribution was by gillnets employed in both mechanised and motorised sectors. In the mechanised sector, gillnets contributed 40% and in the motorised sector, the contribution was 10% to the West Bengal landings. Mechanised trawlnets were doing multiday operation and they kept aloof from single day operations during 2007. Multiday operating trawlnets spent on an average, 67 h in fishing whereas the hand operating trawlnets operated during October - December were engaged in fishing for more than 110 h. Contribution of multiday trawlnets was 23%. Next important gear was the bagnet (Behundi jal). Mechanised bagnets contributed 18% towards the total landings of the state whereas the bagnets in the motorised sector contributed only 4% and the non-motorised bagnets contribution was 2%. Mechanised hooks and lines and shoreseines contributed 1% each. There were stray landings by stake nets also. March to June was the closed season for West Bengal fishery. Nearly 97% of the total landings occurred during the fishing season and the remaining 3% was landed during the closed season by the artisanal gears. Fig. 3 gives a picture of West Bengal landings along with the landings of the highly exploited hilsa shad during January - December 2007. More than 56 % of the total hilsa shad landings were during August 2007.

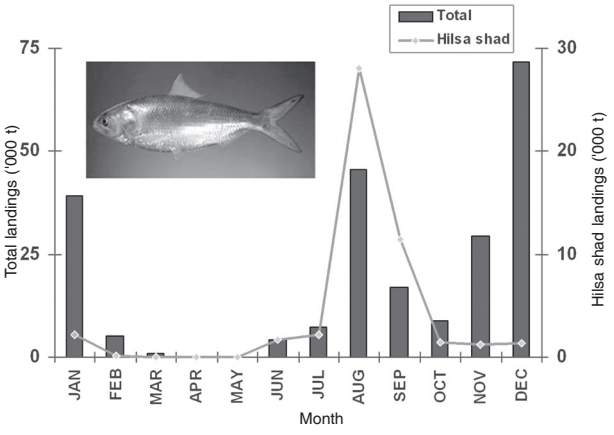

Fig. 3. Landings of hilsa shad and total landings of West Bengal during January - December 2007

Orissa

Orissa is located between 17° 48' - 22° 34' N latitude and 81°24' - 87°29' E longitude. Length of the coastline is 480 km. Coastal fisheries within 40 km from the shore have been the main focus of the fishing activity of the state. Commercial fishing gears are trawlnets and driftnets/gillnets. Traditional gears are hooks and lines and shoreseines. During 2007, marine fish landings in the state crossed 1.5 lakh t. The main gears operated were trawlnets, driftnets/gillnets, hooks

and lines, ringnets and bagnets. Major resources found in the fishery were croakers (14%), penaeid prawns (11%), ribbonfishes (9%), carangids (9%), sardines (8%), anchovies (6%), catfishes (4%), pomfrets (4%), silverbellies (3%), other clupeids (7%) and non-penaeid prawns (3%). Table 3 shows the percentage contribution of the major resources in different gears.

Table 3. Percentage contribution of the major resources in different gears in Orissa

Gears / Resources	Mechanised		Motorised				Non-motorised
	TN	GN	GN	HL	RN	BN	
Croakers	81	8	11	0	0	0	0
Penaeid prawns	94	0	5	0	0	0	1
Ribbonfishes	59	1	37	0	0	2	1
Carangids	44	16	28	7	1	0	4
Sardines	0	0	32	0	7	0	61
Anchovies	86	2	7	0	0	1	4
Other clupeids	38	11	47	0	0	0	4
Catfishes	56	15	9	19	0	0	1
Pomfrets	55	28	16	0	0	0	1
Silverbellies	48	1	3	0	0	0	48
Non-penaeid prawns	73	0	0	0	0	11	16

TN - Trawlnet, GN - Gillnet, HL - Hooks and line, RN - Ringnet, BN - Bagnet

The main gear of Orissa fishery was trawlnets. Except sardines, all resources were mainly caught by this gear. Sardines and silverbellies were caught by artisanal gears. The important resources found in driftnets/gillnets were pomfrets, carangids, catfishes and croakers. Different species which contributed to the important resources are given below:

Croakers — *Pennahia macrophthalmus*, *Johnius carutta*, *J. dussumieri*, *Otolithes cuvieri*, *O. ruber*, *Nibea maculata*, *Otolithoides biauritus* and *Protonibea diacanthus*

Penaeid prawns — *Solenocera crassicornis*, *Metapenaeus dobsoni*, *M. affinis*, *M. monoceros*, *Metapenaeopsis stridulans*, *Parapenaeopsis hardwickii*, *P. maxillipedo*, *P. sculptilis*, *P. stylifera*, *Penaeus indicus*, *P. merguiensis*, *P. monodon* and *P. penicillatus*

Ribbonfishes — *Trichiurus lepturus* and *Lepturacanthus savala*

Carangids — *Megalaspis cordyla*, *Selar crumenophthalmus*, *Scomberoides commersonianus*, *S. lysan*, *Alepes melanopterus*, *A. djeddaba*, *Caranx ignobilis*, *C. sem*, *Decapterus russelli*, *Alectis indicus*, *Carangoides armatus* and *Atropus atropus*

Sardines — *Sardinella fimbriata*, *S. gibbosa* and *S. longiceps*

Catfishes — *Arius dussumieri*, *A. caelatus, A. jella, A. platystomus, A. tenuispinis, A. thalassinus* and *Osteogeneiosus militaris*

Pomfrets — *Parastromateus niger*, *Pampus argenteus* and *P. chinensis*

Silverbellies — *Leiognathus bindus*, *L. equulus*, *L. fasciatus*, *L. splendens* and *Secutor insidiator*

Non-penaeid prawns — *Acetes indicus* and *Nematopalaemon tenuipes*

Anchovies — *Setipinna taty*, *Coilia dussumieri*, *Stolephorus devisi*, *S. commersonii* and *S. punctifer*

Other clupeids — *Chirocentrus dorab*, *C. nudus*, *Thryssa mystax*, *T. dussumieri*, *Raconda russeliana*, *Pellona ditchela*, *Ilisha filigera*, *I. megaloptera*, *I. melastoma*, *Tenualosa toli*, *Escualosa thoracata*, *Dussumieria elopsoides*, *D. acuta*, *Anodontostoma chacunda* and *Megalops cyprinoides.*

Mechanised trawlnets contributed 62% of the total landings of the state. Multiday trawl catch was more than eight times of the catch delivered by the single day operating trawlnets. Even though the catch/unit of multiday trawlnets was 4,951 kg, their catch/hour contribution was only 67 kg. Single day trawlnet, on the other hand, ranked first with 236 kg of catch per hour. While the multiday trawlers spent more than 70 h in fishing, single day trawlers were engaged in fishing for only 6 h. Single day trawlers were found to be more efficient than multiday trawlers. Driftnets/gillnets in the mechanised sector and non-motorised sector contributed 6% each towards total catch and in the motorised sector, their contribution was 18%. The non-motorised sector comprising of hooks and lines, shoreseines, bagnets and ringnet contributed 9% towards Orissa landings. Hooks and lines in the motorised sector contributed 3% towards the total landings. Monthwise contribution of croakers with respect to the monthly total landings is depicted in Fig. 4.

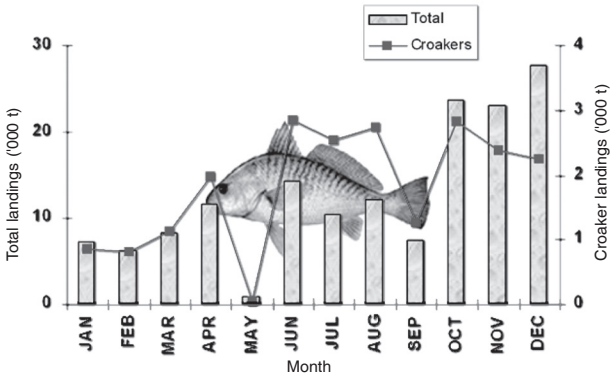

Fig. 4. Month-wise contribution of croakers with respect to monthly total landings in Orissa

June to February was the most productive season in Orissa. During 2007, mechanised sector contributed 68% of the total landings followed by motorised sector 23% and the remaining 9% was from traditional sector. During the fishing season, 86% of the total landings of the state was accrued. Regarding the districts of Orissa, Jagathsinghpur which included Paradeep Fishing Harbour, was the main contributor towards the state's annual landings. Ban on fishing was imposed from April 15 to May 31 by the state government for the first time at Paradeep Fishing Harbour during 2007.

Andhra Pradesh

Andhra Pradesh, having 974 km of coastal length is situated between 12°41' - 22° N latitude and 77° - 84°40' E longitude. Coastal districts of Andhra Pradesh - Srikakulam, Vijayanagaram, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Prakasam and Nellore - are also known as the northern sircars. The continental shelf area of Andhra Pradesh, forming 31,000 sq. km, is rich with many varieties of prawns, carangids, perches, croakers and elasmobranchs. During 2007, marine fish landing of Andhra Pradesh was 2.08 lakh t.

The main gears operated during the period were trawlnets, driftnets/gillnets, seinenets and hooks and lines. Their share towards the total landings of the state were trawlnet (46%), driftnet/gillnet (38%), seinenets (9%) and hooks and lines (7%). More than 80% of the trawl landings were by multiday operations. Catch per unit of multiday trawlnets were 1,776 kg and that of single day operations were 872 kg. Comparing the catch per hour of multiday (25 kg) and single day (50 kg) operations of trawlnets, it is felt that single day operations were more beneficial to the fisherfolk of Andhra Pradesh. Shoreseines in the motorised sector earned, on an average, 1,139 kg and their catch per hour was 185 kg. Percentage contribution of the major resources in different gears is summarised in Table 4.

Nearly 49% of the total landings were by the mechanised sector followed by motorised sector (30%) and the remaining 21% by the artisanal sector. The important species of the major resources available along Andhra coast were as follows:

Penaeid prawns	*Solenocera crassicornis*, *S. hextii*, *Aristaeomorpha woodmasoni*, *Aristeus semidentatus*, *Metapenaeopsis* spp., *Metapenaeus affinis*, *M. brevicornis*, *M. dobsoni*, *M. monoceros*, *Parapenaeopsis stylifera*, *Penaeus indicus*, *P. japonicus*, *P. merguiensis*, *P. monodon*, *P. semisulcatus* and *Trachypenaeus curvirostris*
Carangids	*Rachycentron canadum*, *Alepes* spp., *Alectis indicus*, *Atropus atropos*, *Carangoides* spp.,

Table 4. Percentage contribution of the major resources in different gears in Andhra Pradesh

Resources \ Gears	Mechanised			Motorised					Non-motorised
	TN	GN	HL	GN	HL	SS	PS	BS	
Penaeid prawns	85	3	0	3	0	0	2	0	7
Croakers	60	5	1	13	1	1	1	0	18
Stolephorus spp.	38	0	0	7	0	0	6	0	49
Sardines	12	0	0	5	0	10	27	1	45
Other clupeids	19	2	0	41	0	0	7	1	30
Carangids	54	3	1	13	2	0	3	0	24
Seerfishes	6	11	0	62	11	0	0	0	10
Ribbonfishes	72	1	0	9	0	1	0	0	17
Perches	68	2	0	18	4	1	0	0	7
Pomfrets	43	6	0	43	1	0	1	0	6
Elasmobranchs	24	7	6	35	25	0	0	0	3
Crabs	62	9	0	11	0	1	0	0	17

TN - Trawlnet, GN - Gillnet, HL - Hooks and line, SS - Shoreseine, PS - Purseseine, BS - Boatseine

	Caranx ignobilis, *C. sexfasciatus*, *C. sem*, *Megalaspis cordyla*, *Scomberoides commersonianus*, *S. lysan*, *S. tol*, *Selar boops*, *S. crumenophthalmus*, *Selaroides leptolepis*, *Seriolina nigrofasciata*, *Decapterus russelli*, *Mene maculata* and *Coryphaena hippurus*
Perches	*Argyrops spinifer*, *Priacanathus* spp., *Apogon* spp., *Ambassis* spp., *Lates calcarifer*, *Sillago sihama*, *Nemipterus japonicus* and *N. mesoprion*
Croakers	*Chrysochir aureus*, *Johnieops sina*, *Johnius belangerii*, *J. carutta*, *J. dussumieri*, *J. macropterus*, *Kathala axillaris*, *Nibea maculata*, *N. soldado*, *Otolithes ruber* and *Protonibea diacanthus*
Elasmobranchs	*Carcharhinus dussumieri*, *Rhizoprionodon acutus*, *Sphyrna zygaena*, *Rhina ancylostoma*, *Rhynchobatus djiddensis*, *Dasyatis microps*, *D. kuhlii*, *Gymnura* spp., *Himantura bleekeri*, *Aetobatus* spp., *Aetomylaeus* spp., *Rhinoptera* spp., *Mobula diabolus, Narcine timle* and *Torpedo marmorata*
Pomfrets	*Pampus argenteus*, *P. chinensis* and *Parastromateus niger*
Ribbonfishes	*Lepturacanthus savala* and *Trichiurus lepturus*
Other clupeids	*Anodontostoma chacunda*, *Dussumieria acuta*, *Escualosa thoracata*, *Tenualosa ilisha, Hilsa kelee*, *Ilisha* spp., *Opisthopterus tardoore*, *Pellona ditchela*, *Chirocentrus dorab*, *C. nudus*, *Chanos chanos* and *Raconda russeliana*
Seerfishes	*Scomberomorus commerson*, *S. guttatus* and *S. lineolatus*
Crabs	*Calappa lophos*, *Scylla serrata*, *Portunus pelagicus*, *P. sanguinolentus*, *Charybdis cruciata* and *Varuna litterata*
Sardines	*Sardinella longiceps, S. albella, S. fimbriata* and *S. gibbosa.*

Monthly landings of penaeid prawns along with the monthly total marine fish landings of Andhra Pradesh during 2007 is given in Fig. 5.

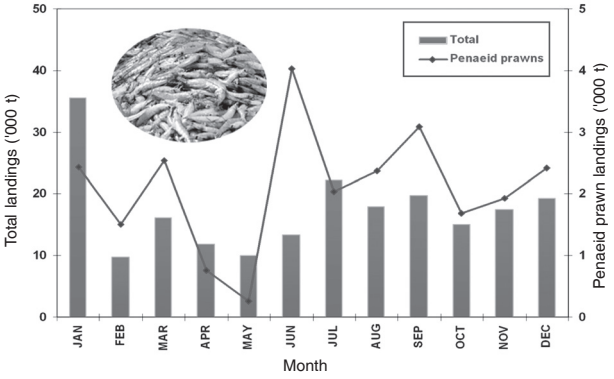

Fig. 5. Monthly landings of penaeid prawns along with the monthly total marine fish landings of Andhra Pradesh

July to January was the productive season of the Andhra fishery. More than 60% of the catch was landed during this period. Penaeid prawn landing was maximum during June with 4,034 t. Ban on motorised and mechanised fishing vessels of Andhra Pradesh was imposed by the state government during the period 15 April – 31 May in 2007.

Tamil Nadu

Situated between 8°5' - 13°35' N latitude and 76°15' - 80°20' E longitude, Tamil Nadu is the southern most maritime state of India. With 1,076 km coastline and 41,400 km^2 continental shelf, the state accounts for 13% of India's coastline and 9% of the continental shelf respectively. The state is bordered with the Bay of Bengal and Palk Bay in the east, the Gulf of Mannar in the south-east, the Indian Ocean in the south and the Arabian Sea in the south-west. Ban on fishing in the state was from 15 April to 31 May during 2007. In the mechanised sector, the production was about 50% while in motorised sector, it was about 45% of the total Tamil Nadu landings. In the traditional sector, it was only 5% of the total Tamil Nadu landings. July-September was the most productive season (30%) followed by October-December (27%). The lean period was from April to June (18%). The main resources available in Tamil Nadu were oilsardine (15%), other sardines (11%), silverbellies (11%), penaeid prawns (4%), Indian mackerel (4%), crabs (3%) and *Stolephorus* spp. (3%). Percentage contribution of the major resources in different gears is given in Table 5.

Demersal resources contributed 30% of the total landings followed by pelagics (59%), crustaceans (8%) and molluscs contributing only 3%. Main species contributing to each category were as follows:

Oilsardine	*Sardinella longiceps*
Silverbellies	*Gazza minuta*, *Leiognathus berbis*, *L. equulus*, *L. lineolatus*, *L. splendens*, *Secutor insidiator* and *S. ruconius*
Other sardines	*Sardinella albella*, *S. fimbriata*, *S. gibbosa*, *S. sirm* and *S. leiogaster*
Perches	*Psammoperca waigiensis*, *Cephalopholis sonnerati*, *Epinephelus merra*, *Terapon* spp., *Priacanthus* spp., *Sillago* spp., *S. sihama*, *Scolopsis* spp., *Lutjanus* spp. and *Nemipterus bipunctatus*
Other clupeids	*Tenualosa ilisha*, *Dussumieria acuta*, *Escualosa thoracata*, *Hilsa kelee*, *Pellona ditchela*, *Coilia dussumieri*, *Stolephorus bataviensis*, *S. macrops*, *Thryssa dussumieri* and *Chirocentrus dorab*
Indian mackerel	*Rastrelliger kanagurta*
Penaeid prawns	*Solenocera crassicornis*, *S. hextii*, *Aristeus semidentatus*, *Metapenaeopsis andamanensis*, *M. stridulans*, *Metapenaeus affinis*, *M. brevicornis*, *M. dobsoni*, *M. monoceros*, *Parapenaeopsis stylifera*, *P. uncta*, *Penaeus indicus*, *P. japonicus*,

Table 5. Percentage contribution of the major resources in different gears in Tamil Nadu

Gears / Resources	Mechanised				Motorised							Non-motorised
	TN	RS	HL	PS	GN	HL	PS	RS	BN	TN	Others	
Oilsardine	8	3	0	1	59	0	9	8	6	0	4	2
Silverbellies	90	0	0	0	8	0	1	0	0	0	0	1
Other sardines	21	0	0	0	62	0	6	1	0	1	0	9
Perches	62	0	2	0	15	15	0	0	0	1	0	5
Other clupeids	36	0	0	0	45	0	10	0	1	0	0	8
Indian mackerel	11	1	0	0	78	1	0	1	3	0	0	5
Penaeid prawns	79	0	0	0	16	0	0	0	0	1	0	4
Crabs	36	0	0	0	44	0	0	0	0	1	0	19
Stolephorus spp.	17	0	0	0	39	0	0	0	13	0	0	31

TN - Trawlnet, RS - Ringseine, HL - Hooks and line, PS - Purseseine, GN - Gillnet, BN - Bagnet, Others - Combined gears

	P. merguiensis, *P. monodon*, *P. semisulcatus* and *Trachypenaeus curvirostris*
Crabs	*Calappa lophos*, *Scylla serrata*, *Portunus* spp., *P. pelagicus*, *Charybdis cruciata* and *C. natator*
Stolephorus spp.	*Stolephorus bataviensis*, *S. commersonii*, *S. devisi* and *S. indicus.*

Fig. 6 gives a picture of the monthly total landings of Tamil Nadu along with the landings of silverbellies whose contribution was maximum with 6,591 t in November and minimum with 118 t in May 2007. The red toothed trigger fish namely *Odonus niger* occurred in large quantities at Tuticorin Fisheries Harbour, Madras Fisheries Harbour, Colachel, Rameswaram and Kanyakumari during 2007.

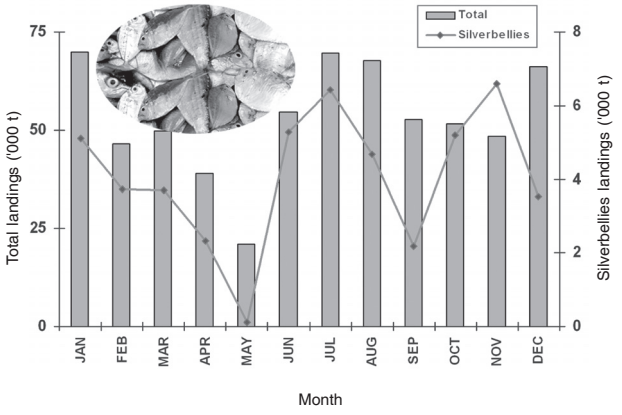

Fig. 6. Monthly total landings of Tamil Nadu along with the landings of silverbellies

Pondicherry

Pondicherry, the smallest maritime union territory of India has about 45 km coastline lying within 11°56' N latitude and 79° 53' E longitude. Fishery is an important occupation in the social scenario of Pondicherry. During 2007, Pondicherry contributed 14,271 t to the all India landings. Considering the sector-wise landings, motorised sector contributed 85% of the total landings followed by mechanised sector 13% and artisanal sector 2%. Seasonal contribution was more or less the same in 2007. Table 6 shows the percentage contribution of major resources in different gears.

The important species of the major resources available along Pondicherry were as follows:

Oilsardine	*Sardinella longiceps*
Indian mackerel	*Rastrelliger kanagurta*
Other sardines	*Sardinella gibbosa* and *S. sirm*
Carangids	*Rachycentron canadum*, *Atropus* spp., *Decapterus russelli*, *Selaroides* spp. and *Nemipterus* spp.
Seerfishes	*Scomberomorus commerson*, *S. guttatus* and *S.lineolatus*
Flyingfishes	*Exocoetus volitans*
Penaeid prawns	*Metapenaeopsis stridulans*, *Metapenaeus affinis*, *M. dobsoni*, *Penaeus indicus* and *P. monodon.*

Table 6. Percentage contribution of the major resources in different gears in Pondicherry

Gears / Resources	Mechanised	Motorised									Non-motorised
	TN	GN	HL	TN	PS	SS	DGN	RS	BN	Others	
Oilsardine	0	41	0	0	53	0	0	0	0	5	1
Indian mackerel	0	54	3	0	0	0	0	43	0	0	0
Other sardines	0	31	0	0	8	0	44	17	0	0	0
Carangids	6	26	56	0	0	0	2	1	9	0	0
Scomberomorus commerson	0	48	49	0	0	0	0	3	0	0	0
Flying fishes	0	0	0	0	0	0	100	0	0	0	0
Other clupeids	19	38	0	0	0	1	25	0	0	0	17
Silverbellies	58	28	0	0	0	0	12	0	0	0	2
Penaeid prawns	82	14	0	3	0	0	0	0	0	0	1

TN - Trawlnet, GN - Gillnet, HL - Hooks and line, PS - Purseseine, SS - Shoreseine, DGN - Driftnet/gillnet, RS - Ringseine BN - Bagnet, Others - Combined gears

Monthly landings of oilsardine along with the monthly total landings of the state is depicted in Fig. 7.

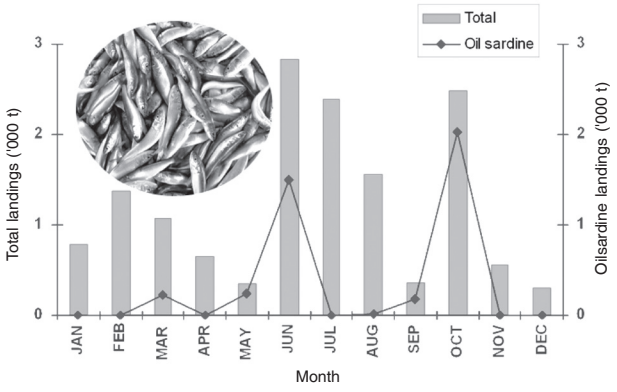

Fig. 7. Monthly landings of the oilsardine along with monthly total landings of Pondicherry

Maximum landing of oilsardine was during October 2007 and the minimum landing was during December 2007.

Kerala

Kerala, the southern most state in the west coast of India, is situated between 8° 18' - 12°48' N latitude and 74° 52' - 77° 22' E longitude. The sea bordering the state is rich with marine organisms. The state's contribution to all India marine fish landings was 21% during 2007. Different gears which contributed to this effect were trawlnets (25%), ringseines (16%) and combined gear operations of hooks and lines along with trawlnets and gillnets (3%) in the mechanised sector. In the motorised sector, ringseines contributed 33%, driftnets/gillnets 13%, boatseines 4% and hooks and lines 3%. Non-motorised sector as a whole contributed 2%. Different gears which operated in the artisanal sector were driftnets/gillnets, boatseines, shoreseines, hooks and lines and katchal (scoopnets). Major resources landed during 2007, were oilsardine (40%), mackerel (11%), penaeid prawns (7%), threadfin breams (5%), scads, *Stolephorus* spp., tunnies and cephalopods (4% each), soles (3%), croakers, ribbonfishes, seerfishes and other carangids (2% each).

Contribution of pelagics to the total landings of the state was 73% followed by demersals (14%), crustaceans (9%) and molluscs (4%) during 2007. Catch per unit effort of multiday trawlers during 2007 was 1,030 kg while it was 198 kg for single dayers. Catch per hour of multiday operations was 40 kg and the same for single day operations was 33 kg. Catch per unit effort of purseseines, hooks and lines, ringseines and other multigear combinations, crossed 2 t in the mechanised sector. In the motorised sector, ringseines were having maximum catch per unit effort (1,236 kg). Percentage contribution of the major resources in different gears is given in Table 7.

Major species which contributed to each category were as follows :

Oil sardine	*Sardinella longiceps*
Mackerel	*Rastrelliger kanagurta*
Penaeid prawns	*Metapenaeus dobsoni*, *M. monoceros*, *M. affinis*, *Solenocera hextii*, *S. choprai*, *Aristeus alcocki*, *Metapenaeopsis andamanensis*, *Parapenaeopsis stylifera*, *Penaeopsis jerry*, *Penaeus indicus*, *P. monodon*, *P. semisulcatus* and *Trachypenaeus curvirostris*

Table 7. Percentage contribution of the major resources in different gears in Kerala

Gears / Resources	Mechanised						Motorised					Non-motorised
	TN	PS	HL	RS	GN	Others	RS	GN	HL	BS	TN	
Oilsardine	1	0	0	20	0	0	62	12	0	3	0	2
Stolephorus spp.	23	0	0	1	0	0	46	1	0	27	0	2
Threadfin breams	79	0	0	0	0	21	0	0	0	0	0	0
Scads	33	0	0	1	0	5	26	3	8	21	2	1
Indian mackerel	2	1	0	42	0	0	32	19	2	0	0	2
Tunnies	0	0	1	30	1	12	0	24	32	0	0	0
Soles	60	0	0	0	0	0	0	32	0	0	6	2
Penaeid prawns	80	0	0	4	0	0	8	1	0	1	6	0
Cephalopods	86	0	0	0	0	3	0	0	4	7	0	0

TN - Trawlnet, PS - Purseseine, HL - Hooks and line, RS - Ringseine, GN - Gillnet, BS - Boatseine
Others - combined gears

Threadfin breams	*Nemipterus japonicus* and *N. mesoprion*
Scads	*Decapterus russelli* and *D. macrosoma*
Stolephorus spp.	*Stolephorus commersonnii*, *S. punctifer* and *S. devisi*
Tunnies	*Euthynnus affinis*, *Auxis rochei*, *A. thazard*, *Katsuwonus pelamis*, *Sarda orientalis*, *Thunnus albacares* and *T. tonggol*
Cephalopods	*Sepia aculeata*, *S. pharaonis*, *Sepiella inermis*, *Loligo duvaucelli* and *Octopus* spp.
Soles	*Cynoglossus macrostomus*, *C. bilineatus* and *Synaptura commersoniana*
Croakers	*Johnieops* spp., *Johnius* spp., *Nibea maculata* and *Otolithes* spp.
Ribbonfishes	*Lepturacanthus savala* and *Trichiurus lepturus*
Seerfishes	*Scomberomorus commerson* and *S. guttatus*
Other carangids	*Alectis ciliaris, A. indicus, Alepes djeddaba, A. mate, A. melanopterus, A. para, Atropus atropos, Carangoides malabaricus, Caranx ignobilis, Megalaspis cordyla, Elagatis bipinnulata, Scomberoides commersonianus*, *S. lysan*, *Selar crumenophthalmus*, *Seriolina nigrofasciata* and *Trachinotus blochii.*

The monthly oilsardine landings along with the monthly total landings of the state during 2007, is shown in Fig. 8.

Oilsardines exploitation was heavy during July-November period, the peak of which was in October 2007 with 44,692 t. Ban on mechanised fishing vessels was in force from 15 June to 31 July. In order to observe complete fishing ban, all the main harbours were closed during this period in 2007.

Karnataka

Karnataka, lying on the west coast, which is having a prominent place in the fisheries map of India, plays an important role for the development of the

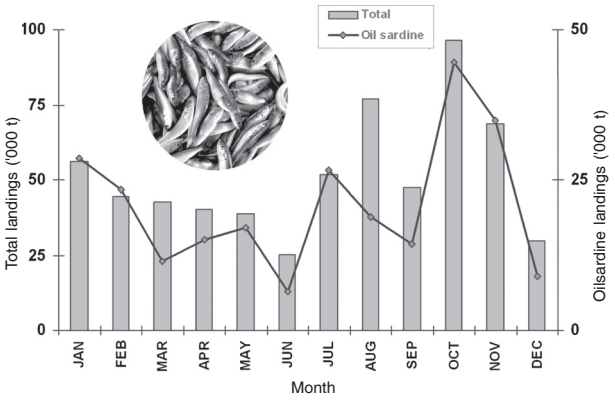

Fig. 8. Monthly oilsardine landings along with the monthly total landings of Kerala

fishery sector of the country. The state is confined roughly within 11°.5' N to 18°.5' N and 74° E to 78°.5' E. The state contributed to one tenth of the total fish production of the country with 2.92 lakh t during 2007. Mechanised sector contributed 79%, motorised sector 19% and non-mechanised sector 2%.

Trawlnets and purseseines were the major gears contributing to fishery of Karnataka. Besides single day trawls, multiday trawls were operated especially in Mangalore and Malpe fishing harbours. In other harbours *viz*., Bhatkal Bunder, Ganguli Bunder, Kasarkode, Tadri and Karwar, mostly single day trawlers were operated. Trawl landings during 2007 accounted 44% and purseseines 34% of the total landings of the state. In the motorised sector ringseine contributed 10% and gillnets 9% of the total landings.

The main resources landed in the Karnataka coast were oilsardine (33%), Indian mackerel (15%), threadfin breams (7%), stomatopods (6%), ribbonfishes (5%), penaeid prawns (5%), and cephalopods (4%). Percentage contribution of the major resources in different gears is shown in Table 8.

Contribution of group-wise assemblages to the marine fish landings of the state were: pelagics 64%, demersals 21%, crustaceans 12% and molluscs 3%.

Main species which contributed to each category are as follows:

Oilsardine	*Sardinella longiceps*
Indian mackerel	*Rastrelliger kanagurta*
Threadfin breams	*Nemipeterus bipunctatus*, *N. mesoprion* and *N. japonicus*
Stomatopods	*Oratosquilla nepa*

Table 8. Percentage contribution of the major resources in different gears in Karnataka

Resources \ Gears	Mechanised		Motorised				Non-motorised
	TN	PS	GN	RS	SS	TN	
Oilsardine	2	73	3	19	0	0	3
Indian mackerel	5	49	27	16	0	0	3
Threadfin breams	99	0	1	0	0	0	0
Stomatopods	99	1	0	0	0	0	0
Other clupeids	35	36	11	13	1	0	4
Ribbonfishes	96	1	1	2	0	0	0
Penaeid prawns	75	1	19	3	0	1	1
Cephalopods	100	0	0	0	0	0	0

TN - Trawlnet, PS - Purseseine, GN - Gillnet, RS - Ringseine, SS - Shoreseine

Other clupeids — *Thryssa* spp., *Stolephorus waitei*, *Sardinella fimbriata*, *S. albella*, *S. gibbosa*, *S. brachysoma*, *S. melanura*, *Amblygaster leiogaster*, *Opisthopterus tardoore*, *Hilsa Kelee* and *Tenualosa* spp.

Ribbonfishes — *Trichiurus lepturus* and *Lepturacanthus savala*

Penaeid prawns — *Penaeus indicus*, *Parapenaeopsis stylifera, Metapenaeus dobsoni, M. monoceros*, *M. affinis* and *Solenocera choprai*

Cephalopods — *Sepia* spp., *Loligo duvaucelli* and *Octopus* spp.

In Karnataka, the fishing season starts from September and ends with May and during this period nearly 94% of the landings were accounted in 2007. State government imposed the fishing ban from 10th June to 15th August for mechanised and outboard engine operated crafts. In 2007, landings were high (39%) during October-December followed by January-December (34%). Monthly oilsardine and total fish landings in Karnataka during 2007 is shown in Fig. 9.

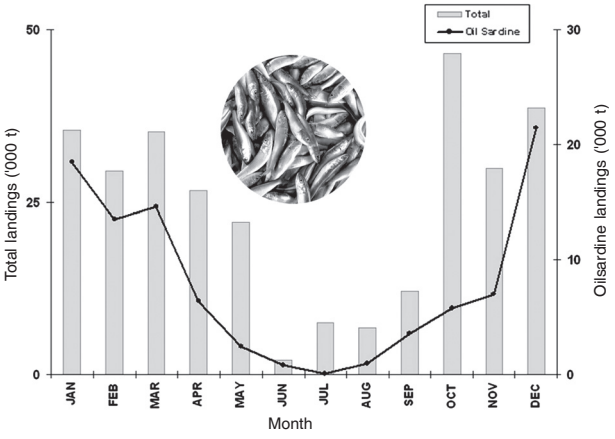

Fig. 9. Monthly oilsardine landings and total fish landings in Karnataka during 2007

Goa

Goa, having a coastal length of 104 km, is located on the western coast of the Indian Peninsula between the northern latitudes 15°48' - 14°53' and eastern longitudes 74°20' - 73°40'. The state has a moderate temperature showing negligible variations during different seasons. South-west monsoon brings rain in Goa between June and September.

Goa contributed 3% to the total fish production of the country with 97,000 t during 2007. Mechanised sector contributed 90%, motorised sector 8% and non-mechanised sector 2%. Trawlnets, purseseines and gillnets were the major gears operated in Goa. Single day trawlers and multiday trawlers were operated in the major fishing centres. The contribution from purseseines was remarkable with about 75,000 t. Trawl landings during 2007 accounted for 13% and purseseine 77% of the total landings of the state. In the motorised sector, gillnet contributed 8% of the total landings.

The main resources landed in Goa coast were oilsardine (49%), Indian mackerel (20%), carangids (6%), *Auxis* spp., perches, catfishes and other sardines (3% each). Percentage contribution of the major resources in different gears was as shown in Table 9.

Group-wise assemblages of marine fish landings of the state were: pelagics 86%, demersals 12%, crustaceans 2% and molluscs less than 1%. Main species contributed to each category were as follows:

Oilsardine — *Sardinella longiceps*

Indian mackerel — *Rastrelliger kanagurta*

Carangids — *Megalaspis cordyla*, *Decapterus russelli*, *Scomberoides*

Table 9. Percentage contributiion of the major resources in different gears in Goa

Resources \ Gears	Mechanised			Motorised	Non-Motorised
	TN	PS	GN	GN	
Oilsardine	1	96	0	0	3
Indian mackerel	0	72	1	26	1
Carangids	29	66	2	3	0
Auxis spp.	0	95	0	5	0
Perches	90	4	1	1	4
Catfishes	3	92	0	5	0
Other sardines	1	99	0	0	0

TN - Trawlnet, PS - Purseseine, GN - Gillnet

	commersonianus, *S. lysan*, *S. tala* and *S. tol*
Auxis spp.	*Auxis rochei* and *A. thazard*
Catfishes	*Arius* spp. and *Osteogeneiosus militaris*
Perches	*Nemipterus japonicus*, *N. mesoprion* and *Epinephelus diacanthus*
Other sardines	*Sardinella albella*, *S. brachysoma*, *S. dayi*, *S. fimbriata*, *S. gibbosa*, *S. melanura*, *Amblygaster clupeoides*, *A. leiogaster.*

In Goa, fishing season starts from September and ends in May and during this period nearly 96% of the total landings were accounted. Fishing ban for trawl and other mechanised as well as outboard engine fitted crafts were observed from 10th June to 15th August. Fish landings were on the higher side during the period October - March, 2007.

Monthly oilsardine landings and the total landings in Goa during 2007 are shown in Fig. 10.

The maximum landings of oilsardine were during February 2007 and the lean period was June-July.

Maharashtra

Maharashtra with a coastal length of 720 km is located between 15° 52' - 21° 34' N latitude and 72° 56' - 80°30' E longitude. The state ranks fourth among the maritime states of India in respect of marine fish landings. Fishing takes place almost throughout the year. As in the west coast, ban on trawl fishing is imposed from 10th June to 15th August (monsoon season) in Maharashtra. Trawl fishing

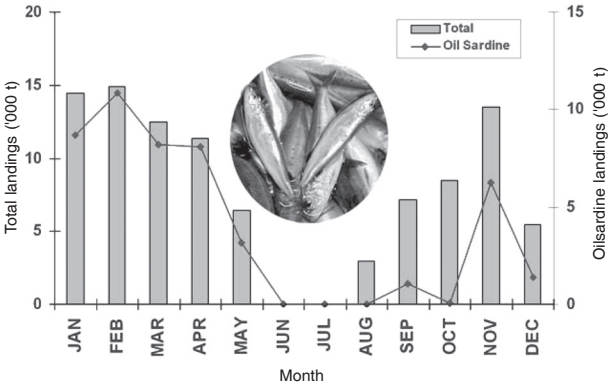

Fig. 10. Monthly oilsardine landings and total landings in Goa during 2007

would come to a halt during this period. The contribution of Maharashtra towards the total marine fish production of the entire Indian coast during 2007 was 11%. Mechanised sector of this region was having a share of 96% of the total landings while motorised sector put its share at 1%. The rest of 3% was the contribution from non-mechanised sector. Multiday operations of trawlers and gillnetters was a regular phenomenon in 2007. Landings of handtrawl operations were also recorded. Total marine fish production of Maharashtra region were dominated by penaeid prawns (14%), non-panaeid prawns (12%), oilsardine (9%), Bombayduck (9%), croakers (9%), perches (5%), ribbonfishes (4%) and cephalapods (4%). Table 10 gives the percentage contribution of the major resources in different gears.

Pelagic resources have dominated the total landings with a contribution of 40%, followed by crustaceans with 28%, demersal resources with 26% and molluscs with a contribution of 6%. Main species which contributed to each category are listed below:

Penaeid prawns	*Parapenaeopsis stylifera*, *P. sculptilis*, *Metapenaeus affinis*, *M. dobsoni*, *M. kutchensis*, *M. brevicornis*, *M. monoceros*, *Metapenaeoposis andamanensis*, *M. stridulans* and *Penaeus merguiensis*
Non-panaeid prawns	*Acetes indicus* and *Nematopalaemon tenuipes*
Bombayduck	*Harpadon nehereus*
Croakers	*Otolithoides biauritus*, *Johnius* spp., *Johnieops* spp., *Protonibea diacanthus* and *Otolithes cuvieri*

Table 10. Percentage contribution of the major resources in different gears in Maharashtra

Gears / Resources	Mechanised						Motorised	Non-motorised
	TN	DOL	GN	PS	BN	HL	GN	
Penaeid prawns	88	10	1	0	0	0	0	1
Non-penaeid prawns	9	85	3	0	3	0	0	0
Croakers	65	26	8	0	0	0	1	0
Bombayduck	23	76	1	0	0	0	0	0
Ribbon fishes	88	9	3	0	0	0	0	0
Cephalopods	99	1	0	0	0	0	0	0
Threadfin breams	100	0	0	0	0	0	0	0
Catfishes	27	4	69	0	0	0	0	0
Sharks	42	11	33	13	1	0	0	0
Coilia spp.	44	43	12	0	1	0	0	0
Indian mackerel	13	1	19	38	0	0	24	5

TN - Trawlnet, DOL - Dolnet, GN - Gillnet, PS - Purseseine, BN - Bagnet, HL - Hooks and lines

Perches	*Nemipterus japonicus*
Ribbonfishes	*Trichiurus lepturus*
Cephalapods	*Loligo duvaucelii, Sepia pharaonis* and *S. aculeata*
Catfishes	*Arius dussumieri*
Sharks	*Carcharhinus* spp. and *Scoliodon* spp.
Coilia spp.	*Coilia dussumieri*
Mackerel	*Rastrelliger kanagurta*

Major share to the landings, among the gears was of multiday trawls contributing to 41% of the total landings. Mechanised dolnets with a contribution of 34% came next to multiday trawl. The share of mechanised gillnets was 10%. Contribution of single day trawl was at 6% while in the case of purseseines, it was 4%. October-December period was found to be more productive than others seasons.

From Fig. 11, it can be seen that the maximum penaeid prawn landings was in September with 9,659 t but total landings of the state was maximum during October 2007 with 45,939 t.

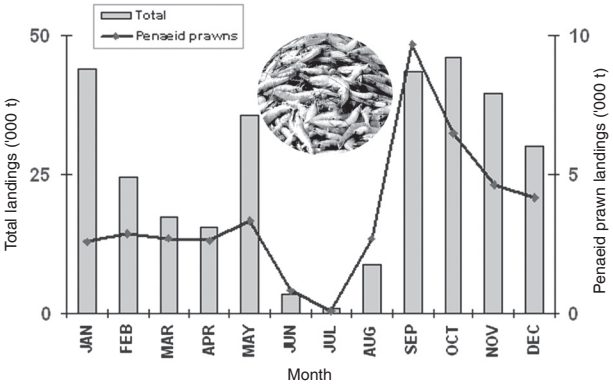

Fig. 11. Monthly penaeid prawn landings along with monthly total landings in Maharashtra

Gujarat

Gujarat, the northern most maritime state of India, is having 1,600 km coastline and 2.4 lakh km EEZ lying within 20°32' - 25° 25' N latitude and 68°32' - 76° 70' E longitude. There are five major harbours and three dolnet operating centres and four zones in Gujarat. During 2007, the marine fish landings of Gujarat was estimated to be 5.38 lakh t. Contributing 18.63% to all India landings, Gujarat occupied the second position among the ten maritime states of India. The mechanised sector contributed 88% of the total landings of Gujarat, whereas the motorised sector contributed 11% and the artisanal sector registered only 1%. Different gears contributing to the fishery in the mechanised sector were multiday trawlnets (45%), single day trawlnets (8%), dolnets (30%), gillnets (4%) and hooks and lines contributing less than 1% to the total landings. In motorised sector, gillnets contributed 11%, hooks and lines 1% and contribution of dolnets was nominal. Artisanal gears operated only in the Jamnagar coast and it contributed only 1% to the total landings. The catch per unit of multiday trawlers was 3,804 kg and catch per hour was 60 kg whereas for single day trawlers, CPU and CPH were 783 kg and 53 kg respectively. The major resources landed during 2007 were non-penaeid prawns (13%), croakers (12%), ribbonfishes (10%), Bombayduck (8%), cephalopods (6%), clupeids (6%), penaeid prawns (5%), catfishes (5%), threadfin breams (4%), other perches (4%) and carangids (4%). The percentage distribution of major resources in different gears is given in Table 11.

Table 11. Percentage contribution of the major resources in different gears in Gujarat

Gears / Resources	Mechanised			Motorised			Non-motorised
	TN	DOL	GN	GN	HL	DOL	
Non-penaeid prawns	37	63	0	0	0	0	0
Croakers	42	40	4	13	1	0	0
Ribbonfishes	87	8	0	5	0	0	0
Bombayduck	3	94	0	1	0	2	0
Cephalopods	99	1	0	0	0	0	0
Clupeids	39	32	9	17	0	0	3
Penaeid prawns	55	42	0	0	0	0	3
Catfishes	31	38	11	18	1	0	1
Threadfin breams	100	0	0	0	0	0	0
Other perches	95	0	2	2	0	0	1
Carangids	45	1	8	44	1	0	1

TN - Trawlnet, DOL - Dolnet, GN - Gillnet, HL - Hooks and lines

Pelagic resources contributed 37% to the total landings followed by demersal resources (35%) and crustaceans (22%). Contribution of molluscs was only 6%.

During 2007, fishing ban for trawlers and other mechanised vessels as well as outboard engine fitted crafts, was observed from 10th June to 15th August.

Considering the three dolnet operating centres namely Jafrabad, Rajapara and Nawabander, 62% of the Bombayduck landings and 60% of the non-penaeid landings were from these centres. The major species included in each group were as follows:

Non-penaeid prawns	*Acetes* spp., *A. indicus*, *Nematopalaemon tenuipes* and *Exhippolysmata ensirostris*
Croakers	*Johnius* spp., *Otolithes* spp., *Otolithoides biauritus* and *Protonibea diacanthus*
Ribbonfishes	*Eupleurogrammus* spp., *Lepturacanthus savala* and *Trichiurus* spp.
Bombayduck	*Harpadon nehereus*
Cephalopods	*Sepia elliptica*, *S. pharaonis*, *Sepiella* spp., *Loligo* spp. and *Octopus* spp.
Clupeids	*Tenualosa* spp., *T. ilisha*, *T. toli, Ilisha megaloptera, Sardinella* spp., *Coilia dussumieri, Thryssa mystax* and *Chirocentrus dorab*
Penaeid prawns	*Solenocera crassicornis*, *Metapenaus affinis*, *M. kutchensis*, *M. monoceros*, *Parapenaeopsis* spp., *P. stylifera*, *P. hardwickii* and *P. sculptilis*
Catfishes	*Arius* spp., *Osteogeneiosus* spp. and *O. militaris*
Threadfin breams	*Nemipterus* spp.
Other perches	*Epinephelus* spp., *Priacanthus* spp., *Lethrinus* spp., *Pomadasys* spp., *P. kaakan* and *Argyrops spinifer*
Carangids	*Caranx* spp., *Decapterus russelli*, *Megalaspis cordyla*, *Scomberoides commersonianus*, *S. lysan* and *Coryphaena hippurus*

Fig. 12 shows that the maximum landings of croakers was recorded in October 2007 (25,400 t) and the fishing period was from September to May.

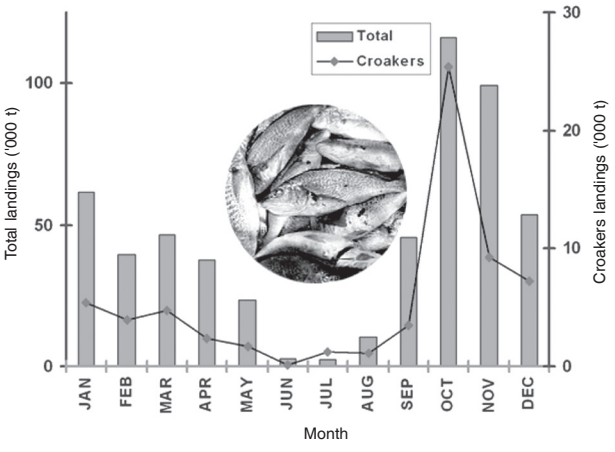

Fig. 12. Monthly croaker landings along with total marine fish landings in Gujarat during 2007