Diversity and exploitation status of Crustacean Fishery Resources in India

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India is blessed with long coastline of about 8118 km along the West Bengal, Orissa, Andhra Pradesh, Tamil Nadu and Pondicherry along the east coast; along Gujarat, Maharashtra, Goa, Karnataka, Kerala along the west coast. India has 2.02 million sq.km exclusive economic zone area and 0.53 million sq.km continental shelf area, a potential source for marine fisheries.The rich continental shelf area, a good habitat for demmersal fishes as well as crustaceans such has penaeid prawns , non-penaeid prawns, crabs, lobsters and stomatopods. Mechanised trawler is the main gear operated in the continental area targeting crustacean resources, Though trawl net is operated for penaeid prawn, non penaeid prawns, crabs and stomatopods will be formed as by catch because all these resources habituate in the same fishing ground.

Crustacean resources

Crustacean resources comprises with penaeid prawns, non-penaeid prawns, crabs, lobsters and stomatopods. Total landings of crustacean resources, group wise and contribution of crustacean resources to total marine fish landings during 1996-2014 are shown in table, 1.

Total annual marine fish landings of India ranged from 2.29 to 3.93 million t with mean at 2.92 million t. Annual total crustacean resources ranged from 3.52 lakh t to 5.32 lakh t with mean at 4.45 lakh t, and its contribution to total marine fish landings ranged from 12.6 % to 18.9 % with mean at 15.2 %. The landings of penaeid prawns ranged from 1.71 lakh t to 2.67 lakh t with mean at 2.07 lakh t. Landings of non-penaeids ranged from 1.04 lakh t to 2.13 lakh t with mean at 1.54 lakh t. The catches for lobsters ranged from 1,201 t to 2,787 t with mean at 1,860 t. Crab landings ranged from 27,538 t to 55,695 t with mean at 42,675 t. Stomatopod catches varied from 21,187 t to 92,611t with mean at 39,433 t. On an average penaeid prawns contributed 7.1%, non-penaeid prawns 5.3 %, crabs 1.5%, stomatopods 1.3 % and lobsters 0.1 % (Fig.1).

Trends in crustacean resource landings, group wise, are shown in fig.2. Increasing trend was observed in total crustacean resources during the 19 years period. Both penaeids and non – penaeids have shown increasing trends. A marginal increasing trend was observed in crab landings. Though lobster catches have shown decreasing trend, its contribution to total crustacean resources was very less (0.1%). Despite increasing trends exhibited by penaeids, non penaeids, crabs, stomatopods have shown decreasing trend because of competing in the same fishing ground with penaeids.

East Coast

State wise crustacean resources (t) and crustacean resources contribution from east coast to total crustacean landings of India are shown in table, 2.

The contribution of crustacean resources from the east coast is 27.0 % to total crustacean landings. Tamil Nadu contributed highest (8.3 %) followed by Andhra Pradesh (6.8 %), West Bengal (6.1%), Orissa (5.5%) and Pondicherry (0.3 %) (Fig. 3).

Tamil Nadu contributed 30.9 % to the total crustacean resources of the east coast, followed by Andhra Pradesh (25.0%), West Bengal (22.7%), Orissa (20.4%) and Pondicherry (1.1%). (Fig. 4).

West Coast

State wise crustacean resources (t) and crustacean resources contribution from west coast to total crustacean landings of India are shown in table, 3.

West coast contributed 72.9 % of total crustacean resources of India. Gujarat contributed high (28.3 %) followed by Maharastra (23.9 %), Kerala (13.2 %), Karnataka (6.3 %) and Goa (1.3 %) (Fig. 6).

Along the west coast Gujarat contributed high (38.9%), followed by Maharastra (33.7%), Keral (18.1%), Karnataka (8.6%) and Goa (1.7%) (Fig. 5).

Commercially important species

Commercially important of penaeids, non penaeids, crabs, lobsters, state wise, are shown in table, 4.

Table, 1.Group wise crustacean landings (t) along the Indian Coast during 1996-2014.

year	Penaeids	Non penaeids	Lobsters	crabs	Stomatopods	Total crustaceans	Total fish landings	%
1996	187792	104462	2631	28908	72342	396135	**2380842**	16.6
1997	208542	153636	2787	44820	92611	502396	**2692409**	18.7
1998	214678	173950	2619	34152	72603	498002	**2635670**	18.9
1999	174384	147961	2094	27538	49918	401895	**2401706**	16.7
2000	204277	151515	2431	48253	46141	452617	**2652928**	17.1
2001	176448	145232	1389	29739	34944	387752	**2292703**	16.9
2002	203801	137714	2573	36049	48553	428690	**2589645**	16.6
2003	214780	137229	1233	41988	37341	432571	**2587095**	16.7

2004	171641	116231	1371	40900	32071	362214	**2538105**	14.3
2005	172099	121107	1201	37182	21187	352776	**2295490**	15.4
2006	172460	170787	1551	51067	30551	426416	**2710988**	15.7
2007	195599	138983	1523	40420	25163	401688	**2888461**	13.9
2008	213327	187173	1974	55695	30500	488669	**3207205**	15.2
2009	245159	168415	1872	47897	27379	490722	**3205453**	15.3
2010	260181	126997	1720	52243	30150	471291	**3346687**	14.1
2011	267932	187061	1761	50847	25250	532851	**3820207**	13.9
2012	252300	164951	1640	52473	27613	498977	**3937752**	12.7
2013	196942	213474	1410	44586	20650	477062	**3781868**	12.6
2014	205602	183405	1568	46061	24266	460902	**3592853**	12.8
Mean	207260	154225	1860	42675	39433	445454	2924109	15.2
%	7.1	5.3	0.1	1.5	1.3	15.2		

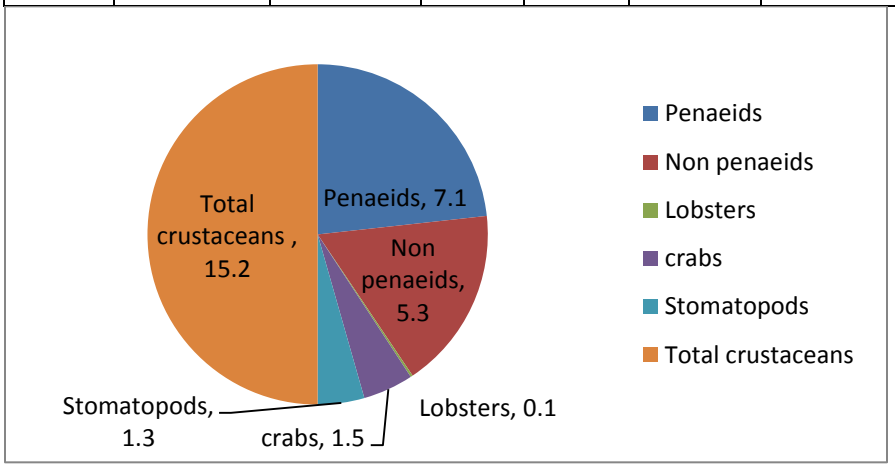

Fig.1. Mean contribution of crustacean resources, group wise, to total marine fish landings for the nineteen years period (1996-2014).

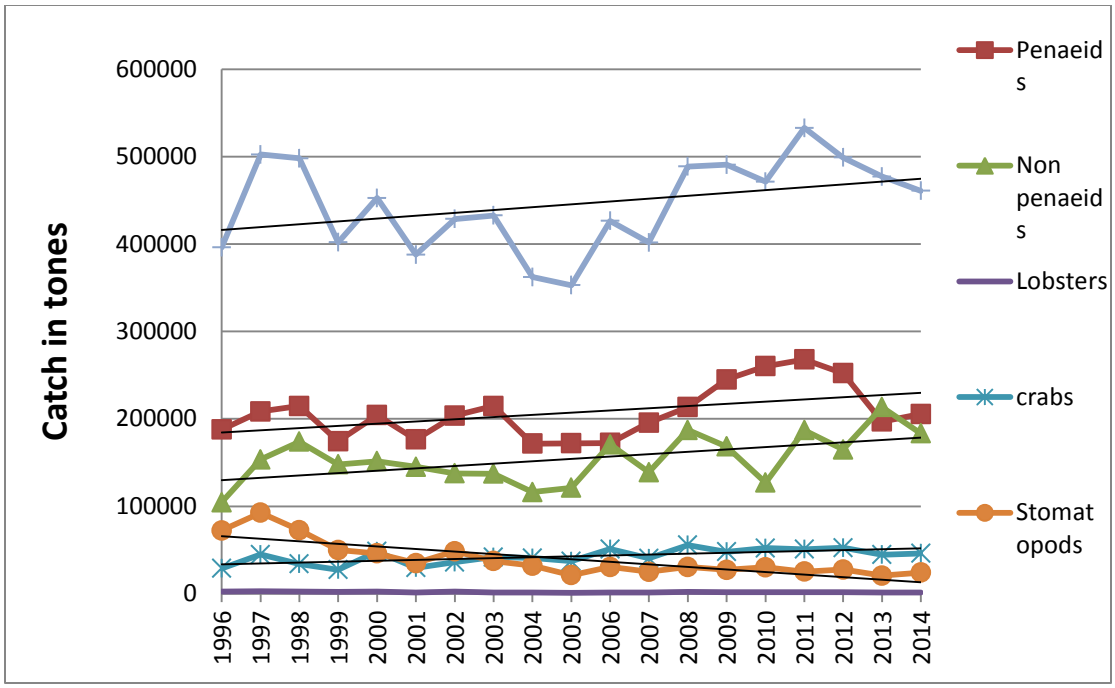

Fig.2. Group wise, trends in crustacean resource landings during 1996-2014.

Table, 2. State wise crustacean resources (t) and contribution of crustacean resources from east coast to total crustacean resources of India.

Year	west Bengal	Orissa	Andhra Pradesh	Tamil Nadu	Pondicherry	Total crustacean resources of east coast	Total crustacean resources of India	%
1996	7865	5494	22574	38588	556	75077	396135	19.0
1997	5163	5514	22257	40964	450	74348	502396	14.8
1998	12621	3569	26564	43435	1010	87199	498002	17.5
1999	8415	6742	35125	36133	507	86922	401895	21.6
2000	13212	12157	29340	38157	450	93316	452617	20.6
2001	22391	6809	21289	32808	485	83782	387752	21.6
2002	28719	7699	25072	40038	1000	102528	428690	23.9
2003	36104	8826	28382	34723	221	108256	432571	25.0
2004	23905	12587	26607	32395	704	96198	362214	26.6
2005	29646	17293	22158	27146	248	96491	352776	27.4
2006	28135	13094	30350	35775	1619	108973	426416	25.6
2007	28158	23077	33214	32078	500	117027	401688	29.1
2008	37703	29266	30656	35450	1441	134516	488669	27.5
2009	49191	54453	34001	37127	1861	176633	490722	36.0

2010	47952	73225	36922	35358	932	194389	471291	41.2
2011	68645	79111	33877	36840	581	219054	532851	41.1
2012	25854	68092	40726	41865	2653	179190	498977	35.9
2013	27820	17987	36973	43400	5355	131535	477062	27.6
2014	16050	20039	35421	43697	4007	119214	460902	25.9
Mean %to total crustacean resources of east coast	22.7	20.4	25.0	30.9	1.1			
Mean % to total crustacean resources of India	6.1	5.5	6.8	8.3	0.3	27.0		

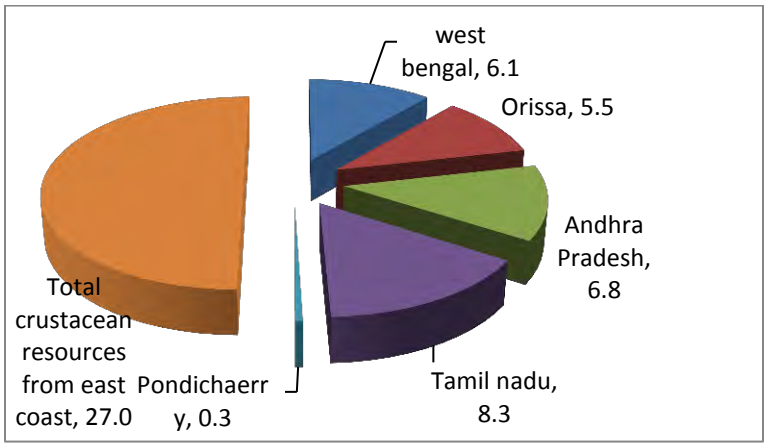

Fig. 3. Mean state wise contribution (%) of crustacean resources to total crustacean landings of India for the period 1996-2014 along the east coast.

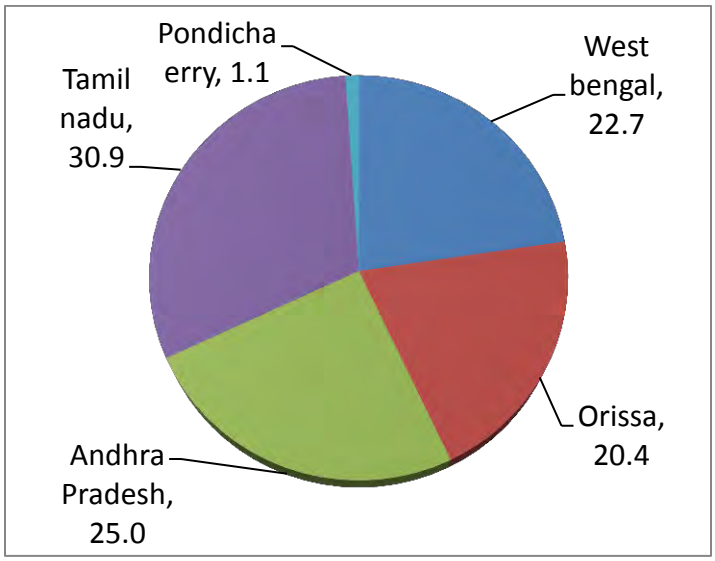

Fig.4. State wise contribution (%) to the total crustacean resources of the east coast.

Table, 3. State wise crustacean resources (t) and crustacean resources contribution from west coast to total crustacean landings of India.

Year	Kerala	Karnataka	Goa	Maharashtra	Gujarat	Total crustacean resources of west coast	Total crustacean resources of India	%
1996	59087	22742	9840	118836	110553	321058	396135	81.0
1997	91347	32820	11925	141990	149966	428048	502396	85.2
1998	74739	19832	7617	149978	158637	410803	498002	82.5
1999	63075	23150	2573	93253	132922	314973	401895	78.4
2000	84361	21429	4705	102145	146661	359301	452617	79.4
2001	64065	23659	4998	110012	101236	303970	387752	78.4
2002	64773	43996	9222	121965	86206	326162	428690	76.1
2003	64044	26836	10478	138291	84666	324315	432571	75.0
2004	50588	23161	5919	108166	78182	266016	362214	73.4
2005	45658	35580	2684	87964	84399	256285	352776	72.6
2006	57758	28539	2904	94227	134015	317443	426416	74.4
2007	52539	33905	1405	84451	112361	284661	401688	70.9
2008	56412	25634	5687	122282	144138	354153	488669	72.5
2009	55450	27331	2761	107546	121001	314089	490722	64.0
2010	44024	32839	4383	62462	132318	276026	471291	58.6
2011	44859	27323	4094	73113	160170	309559	532851	58.1
2012	51534	29052	3995	85262	149977	319820	498977	64.1
2013	39723	23132	3363	121709	153291	341218	477062	71.5
2014	50980	29258	8376	95075	156288	339977	460902	73.8
Mean %to total crustacean resources of west coast	18.1	8.6	1.7	32.7	38.9			
Mean % to total crustacean resources of India	13.2	6.3	1.3	23.9	28.3	72.9		

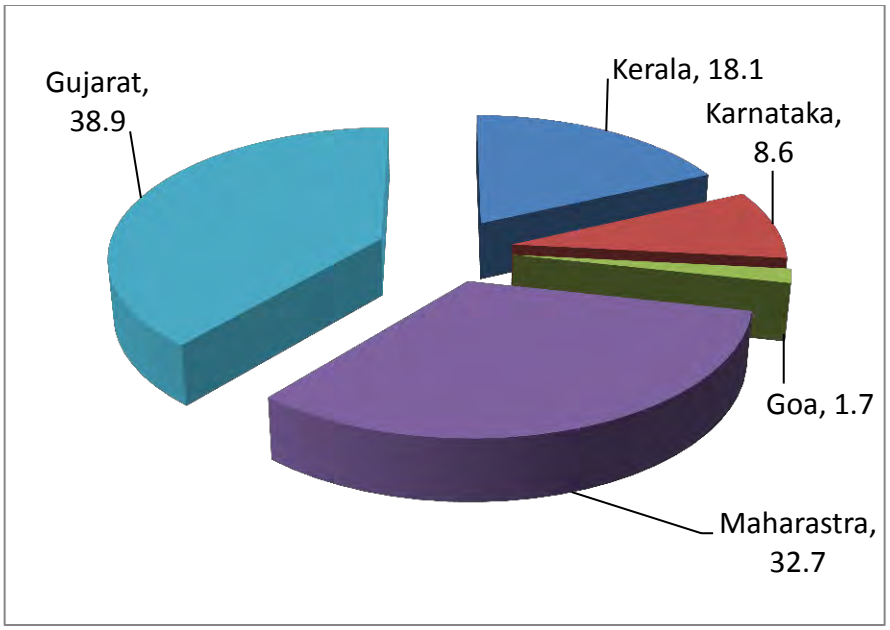

Fig.5. State wise contribution (%) to the total crustacean resources of the west coast.

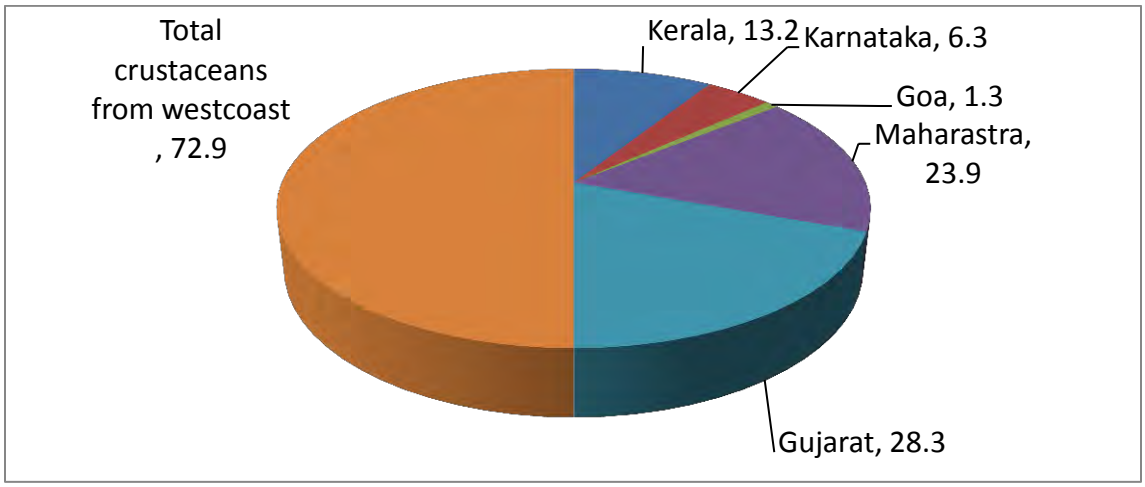

Fig.6. Mean state wise contribution (%) of crustacean resources to total crustacean landings of India for the period 1996-2014 along the west coast.

Table 4. commercially important species of penaeids, non-penaeids ,crabs, lobsters and stomatopods.

State	Penaeids	Non-penaeids	Crabs	Lobsters
Gujarat	1. *Penaeus semisulcatus* 2.*Fenneropenaeus merguiensis* 3.*Metapenaeus affinis* 4. *M. monoceros* 5. *M. kutchensis* 6. *Parapenaeopsis stylifera* 7. *P. hardwickii* 8. *P. sculptilis* 9.*Metapenaeopsis stridulans* 10. *Solenocera crassicornis*	1. *Acetes* spp 2. *N. tenuipes* 3. *E. ensirostris*	1.*Portunus sanguinolentus* 2. *C. feriatus*	1. *P. polyphagus*
Maharashtra	1. *Fenneropenaeus indicus* 2. *Metapenaeus affinis* 3. *M.monoceros* 4. *M. dobsoni* 5.*Parapenaeopsis stylifera* 7. *Solenocera crassicornis* 8. *S. choprai*	1. *Acetes* spp 2. *N. tenuipes* 3. *Exhippolysmata ensirostris*	1. *C. feriatus* 2. *P. sanguinolentus* 3. *P. pelagicus*	1. *P. polyphagus*
Karnataka	1. *Fenneropenaeus indicus* 2. *Penaeus monodon* 3. *P. canaliculatus* 1. *M. dobsoni* 2. *M. monoceros* 3. *M. affinis* 4. *P. stylifera* 5. *S. choprai*		1. *C. feriatus* 2. *P. sanguinolentus* 3. *P. pelagicus*	
Kerala	1. *M. monoceros* 2. *M. affinis* 3. *M. dobsoni* 4.*F.indicus* 5. *P. stylifera* 6. *S. choprai* 7. *Metapenaeopsis andamanensis* 8.*Aristeus alcocki*	1. *Plesionika spinipes* 2. *Heterocarpus gibbossus* 3. *H. woodmasoni*	1. *P. pelagicus* 2. *P. sanguinolentus* 3. *C. feriatus* 4. *C. lucifera* 5. *Podopthalmus vigil* 6. *Scylla serrata*	1. *Thenus unimaculatus* 2. *P. homarus*

Table,4 continuation				
Tamil Nadu	1.*Penaeus semisulcatus* 2.*Fenneropenaeus indicus* 3. *P. latisulcatus* 4. *Metapenaeus dobsoni* 5. *M. moyebi* 6.*Parapenaeopsis maxillipedo* 7. *P. uncta* *7. Metapenaeopsis stridulans* 8. *Solenocera hextii* 9. *Aristeus alcocki* 10. *Parapenaeus fissuroides* 11. *Parapenaeus investigatoris* 11. *Penaeopsis jerry* 12. *M. andamanensis* 13. *Solenocera alphonso*	1. *Plesionika spinipes* 2. *Heterocarpus gibbossus* 3. *H. woodmasoni*	1. *P. pelagicus* 2. *P. sanguinolentus* 3. *C. feriatus* 4. *C. natator* 5. *C. smithi* 6. *C. annulata* 7. *C.lucifera* 8. *C. helleri* 9. *Podopthalmus vigil* 10. *P. gladiator* 11. *P. hannii*	1. *P. homarus* 2. *P. ornatus* 3. *P. polyphagus* 4. *P. versicolor* 5. *P. ornatus* 6. *P. peniciilatus* 7.*Thenus unimaculatus*
Andhra Pradesh	1.*Metapenaeus monoceros* 2. *M. dobsoni* 3. *M. brevicornis* 4. *M. affinis* 5. *M. lysianassa* 6.*Penaeusindicus* 7. *P. monodon* *8. F. merguiensis* *9. P. japonicus* 10. *P. semisulctus* 11. *Metapeaeopsis stridulans* 12. *M. barbata* 13. *M. mogiensis* 14. *Solenocera crassicornis* 15. *S. melantho* 16. *Parapenaeopsis stylifera* 17. *P. hardwickii* 18. *P. uncta* 19. *P. maxillipedo*	1. *Acete*s spp 2. *N. tenuipe*s 3. *E. ensirostris*	1.*P. pelagicus* 2. *P. sanguinolentus* 3. *C. feriatus* 4. *Scylla serrata* 5. *S. olivacea*	1. *Thenus unimaculatus*

		Table ,4 continuation		
	20. *P. coromondalica* 21.*Trachypenaeus curvirostris* 22. *T.granulosus* 23. *T.sedili* 24. *Parapenaeus longipes*			
Orissa	1. *Metapenaeusdobsoni* 2. *M. monoceros* 3. *M. affinis* 4. *F. merguiensis* 5. *P. monodon* 6. *F.indicus* 7. *P. stylifera* 8. *P. hardwicki* 9. *M. lysianasa* 10.*Solenocera spp.* 11. *M. burkenroadi*		1.*P. pelagicus* 2. *P. sanguinolentus* 3. *C. feriatus* 4. *Scylla serrata* 5. *S. olivacea*	
West Bengal	1. *Metapenaeus dobsoni* 2. *M. monoceros* 3. *M. affinis* 4. *M. lysianasa* 5. *F. penicillatus* 6. *F. merguiensis* 7. *P. monodon* 8. *P. stylifera* 9. *P. hardwicki* *10*. *Solenocera* spp. 11. *M. burkenroadi*			