

# **Marine Fisheries Research and Management**

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**2000**

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## Marine fisheries in Gujarat

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### ABSTRACT

*A brief account of marine fish landings in Gujarat during 1985-95 is given in this paper. Contribution of different gears along with the CPUE and the regionwise as well as groupwise details are also presented. The status and prospect of marine fisheries of the state is discussed with the aid of last 5 decades landing data.*

### Introduction

Marine fisheries is of great significance in Gujarat in view of its rich resources and increasing production scenario. The state has 1260 km coastline and about 165000 sq.km continental shelf area of which 64,800 sq.km falls in the depth range 0-50 m which can be exploited by traditional as well as mechanised craft. The state also has excellent estuarine potential. The state has an excellent scope for the marine fisheries development. It ranks in the 2nd place in regard to the contribution to the All India marine fish production. The total marine fish production in the state has fluctuated within 43740 and 533697 tonnes during 1950-1995 (Table 1). The increase in landing was mainly due to the improvement in the gear design, introduction of synthetic fibre in the gears, mechanisation and motorisation in the harvesting sector.

As a knowledge of the status of exploited stocks is essential to formulate suitable management strategies for their judicious exploitation the CMFR Institute has published the marine fish landings in Gujarat during the period 1975 to 1989 (CMFRI Special Publication No.38). In the present paper an

attempt is made to update the status of the exploited stocks with the help of time series of fish landings from 1985 to 1995.

Table 1. Marine fish landings (in tonnes) in Gujarat during 1950-95

Year	Total landings	Year	Total landings
1950	46825	1973	121963
1951	43739	1974	145309
1952	50651	1975	193775
1953	84914	1976	170294
1954	90931	1977	189638
1955	89691	1978	201929
1956	111247	1979	191312
1957	125111	1980	203494
1958	68648	1981	234510
1959	60479	1982	207204
1960	127982	1983	215332
1961	91442	1984	250590
1962	97827	1985	287715
1963	102040	1986	256245
1964	92881	1987	236935
1965	80590	1988	207363
1966	80339	1989	327264
1967	75633	1990	337677
1968	86585	1991	440594
1969	82248	1992	462735
1970	89027	1993	403078
1971	82159	1994	533697
1972	75846	1995	496436

**Materials and methods**

Data pertaining to catch and effort have been obtained by following the multistage random sampling method developed by C M F R I for the preparation of this status report.

**Marine fish landings during 1985-95**

The marine fish landings in Gujarat during 1985-95 ranged from 207363 tonnes (1988) to 533697 tonnes (1994). The landings declined in 1985-1988 period and thereafter showed an increasing trend. The average marine fish landing was 247064 tonnes in 85-88; whereas it was 417508 tonnes during 1989-95. This increase was mainly due to the increased landings of Bombay duck, *Coilia*, cephalopods, croakers, ribbon fishes, pomfrets, seerfishes, penaeid prawns and non-penaeid prawns.

**Pelagic and demersal resources:**

In the marine fish landings of Gujarat demersals dominated almost throughout the period except in 1989. Table 2 shows groupwise marine fish landings in Gujarat during 1985 to 1995. From the data it is evident that more than 50% of the landing in the state was contributed by demersal group of fishes except in 1989. The exceptionally high landings of Bombay duck in 1989 was responsible for increasing the contribution of pelagic fishes in that year (59%). There was an increasing trend in the contribution of demersal group of fishes from 1990 onwards. This is mainly due to increased trawler effort, which was mainly targeted towards prawns.

Table 2. Groupwise Marine fish landings (in tonnes) in Gujarat during 1985-'95 along with % contribution

Group/ Year	Pelagic	Demersal	Total
1985	127252	160463	287715
	44%	56%	
1986	125455	130790	256245
	49%	51%	
1987	114241	122694	236935
	48%	52%	
1988	94803	112560	207363
	46%	54%	
1989	176152	151112	327264
	59%	41%	
1990	158820	178857	337677
	47%	53%	

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1991	184441	256153	440594
	42%	58%	
1992	188129	274606	462735
	41%	59%	
1993	171328	231750	403078
	43%	57%	
1994	213840	319857	533697
	40%	60%	
1995	183345	313091	496436
	37%	63%	

**Major groups of fishes in the landing:**

In Table 3, contribution of major groups of marine fish landings in Gujarat is given; clupeids, Bombay duck, croakers, ribbon fishes, penaeid prawns and non-penaeid prawns were the main contributors.

**Clupeids:** The contribution of clupeids to the total landings varied from 8% in 1992 to 14% in 1985. The landings of this group varied from 25453 tonnes in 1988 to 48239 in 1991. Major share of the clupeids was constituted by *Coilia*. On an average more than 4% of the marine fish landings in this state was by this group.

**Bombay Duck:** During the period 1985-95, more than 14% of the marine fish landing in Gujarat was by Bombay duck varying from 14% in 1985 to 27% in 1989. Of late, its contribution showed a declining trend. The maximum landing was noticed during the fourth quarter.

**Croakers:** More than 11% of marine fish landings in Gujarat was by croakers. Its contribution varied from 11% in 1989 to 20% in 1994. The maximum landing was noticed during the fourth quarter followed by first quarter.

**Penaeid prawns:** Penaeid prawns formed more than 4% of marine fish landings in Gujarat, its contribution varied from 4.4% in 1985 to 7.6% in 1988. The maximum landing of 39000 tonnes was observed during 1994. Invariably the landings were high during the fourth quarter.

Table 3. Major groups of marine fish landings (in tonnes) in GUJARAT during 1985-95

Year/gr	Elasmo	Catfish	Clupeids	B.duck	Perches	Croakers	Ribbonf	Carangid	Pomfrets	Seerfish	Tunnies	Mullets	P.prawns	N.Prawn	Crabs	Cephalopo	Others	Total
1985	13722	10876	40424	40831	10422	35794	18672	3529	12403	6634	9122	3261	12636	7132	9452	4551	48254	287715
%	4.8	3.8	14.1	14.2	3.6	12.4	6.5	1.2	4.3	2.3	3.2	1.1	4.4	2.5	3.3	1.6	16.7	
1986	9829	11430	30549	47889	9641	29650	29293	3710	10639	6045	1808	2139	14382	9961	4560	6828	27892	256245
%	3.8	4.5	11.9	18.7	3.8	11.6	11.4	1.4	4.1	2.4	0.7	0.8	5.6	3.9	1.8	2.7	10.9	
1987	10117	9618	30458	42151	5835	27327	19156	3672	9060	5682	3713	3017	16094	6813	4433	6791	32998	236935
%	4.3	4.1	12.8	17.8	2.4	11.5	8.1	1.5	3.8	2.4	1.6	1.3	6.8	2.9	1.9	2.9	13.9	
1988	11321	9497	25453	35192	5359	24004	15277	3474	10651	3616	1418	5366	15808	7940	3973	2860	26154	207363
%	5.5	4.6	12.3	16.9	2.6	11.6	7.4	1.7	5.1	1.7	0.7	2.6	7.6	3.8	1.9	1.4	12.6	
1989	9862	9373	33448	89546	6911	34602	24393	4594	9414	6218	2690	7550	14645	32538	3445	7343	30692	327264
%	3	2.9	10.2	27.4	2.1	10.6	7.4	1.4	2.9	1.9	0.8	2.3	4.5	9.9	1.1	2.2	9.4	
1990	14189	11976	35652	78355	6853	40118	25157	3902	6723	4011	3425	2745	19867	40151	7960	5449	31144	337677

Year/gr	Elasmo	Catfish	Clupeids	B.duck	Perches	Croakers	Ribbonf	Carangid	Pomfrets	Seerfish	Tunnies	Mullets	P.prawns	N.Prawn	Crabs	Cephalopo	Others	Total
%	4.2	3.55	10.56	23.2	2.03	11.88	7.45	1.16	1.99	1.19	1.01	0.81	5.89	11.89	2.36	1.61	9.22	
1991	16528	10942	48239	77027	9361	70874	29513	6617	10015	7384	5800	3012	26376	51876	7469	13270	46291	440594
%	3.75	2.48	10.95	17.48	2.12	16.09	6.7	1.5	2.27	1.68	1.32	0.68	6	11.77	1.7	3.01	10.51	
1992	19037	11836	37840	82335	9226	85531	43146	4672	9431	8016	3400	2321	29980	53884	5434	13406	43240	462735
%	4.11	2.57	8.18	17.79	2	18.49	9.32	1.01	2.04	1.73	0.73	0.5	6.48	11.64	1.17	2.9	9.34	
1993	24052	12938	35618	61154	12289	70392	39515	5515	10922	12071	9504	1944	20151	36529	2383	14530	33571	403078
%	5.98	3.21	8.84	15.17	3.05	17.46	9.8	1.37	2.71	2.99	2.36	0.48	5	9.06	0.59	3.6	8.33	
1994	18890	14541	43938	86398	17448	104777	44884	10722	9322	12305	6695	2298	39063	50223	7077	24930	40186	533697
%	3.54	2.72	8.23	16.19	3.27	19.63	8.41	2.01	1.75	2.31	1.25	0.43	7.32	9.41	1.33	4.67	7.53	
1995	27147	13649	40247	60273	17674	86480	34122	11273	9315	17910	9794	2909	34533	53251	10273	17311	50275	496436
%	5.47	2.75	8.1	12.14	3.56	17.42	6.87	2.27	1.88	3.6	1.97	0.59	6.96	10.73	2.07	3.49	10.13	

**Non-penaeid prawns:** Contribution of non-penaeid prawns to the marine fish landings in Gujarat varied from 2.5% in 1985 to 11.9% in 1990. A maximum landing of 53884 tonnes was observed during 1992. The IV and I quarter yielded good catches.

**Gearwise landings:**

Gearwise marine fish landings in Gujarat during 1985 to 1995 is given in Table 4 along with catch per unit effort and their percentage contribution to the total landings. The contribution of mechanised and non-mechanised gears towards the total marine fish landings in Gujarat during the period 1985 to 1995 is given in Table 5. On an average, out of 445703 tonnes of marine fish landings in Gujarat, 369904 tonnes (83%) were by mechanised gears and remaining by non-mechanised gears. The mechanised gears include multi day long trip trawlers, single day trawlers, long trip gill netters, single day gill netters, dol netters, out-board gears and long liners. Marine fish landings by trawlers varied from 87,400 tonnes (1988) to 269632 tonnes (1994) and the CPUE from 1067 kg (1988) to 2002 kg (1991). Another interesting observation was that from 1990 onwards trawlers started operating long trips. Trawlers longer than 15 m OAL are invariably deployed for multiday fish in the depth range 40 to 80 metres. Most of the small trawlers (12 to 14 m OAL) operate in the depth range 40 to 50 m. Long trip trawlers fish continuously for 3 to 4 days whereas the short trip trawlers return the same day after fishing. Catch per unit effort of long trip trawlers vary from 3658 kg in 1993 to 5476 kg in 1991 which shows that CPUE of long trips was more than double that of short trips.

The landings by mechanised gill net, drift gill net showed declining trend from 56648 tonnes (1985) to 13189 tonnes during 1990 and the percentage contribution of this gear to the total marine fish landings too dwindled from 19.7% (1985) to 3% in 1992. Similarly the long trip gill net operations also yielded only 6094 tonnes in 1990 and 3097 tonnes in 1993 with catch per unit effort varying from 706 kg in 1993 to 1283 kg in 1990.



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**Table 4. Gearwise marine fish landings (in tonnes) in Gujarat during 1985-95**

Gear/year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Catch						27098	120575	125768	92187	158713	176809
LMTN c/u						3696	5476	4833	3658	4035	4019
%						8.0	27.0	27.0	23.0	30.0	35.0
Catch	132888	104305	114929	87419	117697	123451	99167	113735	95034	110919	78279
MTN c/u	1474	1191	1186	1067	1254	1393	1130	1131	928	943	808
%	46.2	40.7	48.5	42.1	36.0	36.0	23.0	25.0	23.0	20.0	16.0
Catch						694	1470	1439	3097	2982	8596
LMGN c/u						1283	918	1201	706	740	508
%						0.0	0.0	0.0	1.0	1.0	2.0
Catch	56648	39032	38960	28975	34568	12495	14929	13203	15328	16312	13958
MGN c/u	190	122	137	120	115	160	171	144	163	199	176
%	19.7	15.2	16.4	14.0	10.5	4.0	4.0	3.0	4.0	3.0	3.0
Catch	37410	69443	37174	31243	89027	83523	89726	98282	79183	106783	79183
DOL NET c/u	217	857	355	264	395	609	700	695	515	636	463
%	13.0	27.1	15.7	15.1	27.2	25.0	20.0	21.0	20.0	20.0	16.0
Catch	564	257	703	777	1189	3229	2876	3617	10543	3428	11096
MECH.H&L c/u	98	84	266	210	120	247	816	1068	2606	1213	1396
%	0.2	0.1	0.3	0.4	0.4	1.0	1.0	1.0	2.0	1.0	2.0
Catch						15634	35090	35534	43796	45311	46351
OBGN c/u						87	109	118	135	113	130
%						5.0	8.0	7.0	11.0	8.0	9.0
Catch	60205	43208	45169	58949	84783	71553	76761	71157	63910	89249	82164
NON MECH c/u	103	95	101	86	143	301	169	186	292	697	714
%	20.9	16.9	19.1	28.4	25.9	21.0	17.0	16.0	16.0	17.0	17.0
<b>TOTAL</b> Catch	<b>287715</b>	<b>256245</b>	<b>236935</b>	<b>207363</b>	<b>327264</b>	<b>337677</b>	<b>440594</b>	<b>462735</b>	<b>403078</b>	<b>533697</b>	<b>496436</b>

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Another innovative fishing by out-board gill net started operations since 1990 has produced promising results with landing varying from 15634 tonnes in 1990 to 45311 tonnes in 1994. This gear was in fact sharing the resources which were earlier exploited by the mechanised gill nets. Perhaps this may be one of the reasons for dwindling production by mechanised gill net. The percentage contribution of the out-board gill net to the total marine fish landings of Gujarat varied from 5% in 1990 to 11% in 1993. It may be of interest to note that of late this gear also venture for long voyage trips.

Table 5. Mechanized and Non-mechanized landings in Gujarat

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Mechanized											
landings	227510	213037	191766	148414	242481	266124	363833	391578	339168	444448	414272
Percentage	79.00	83.00	81.00	72.00	74.00	78.81	82.58	84.62	84.14	83.28	83.45
Non-mechanized											
Landings	60205	43208	45169	58949	84783	71553	76761	71157	63910	89249	82164
Percentage	21.00	17.00	19.00	28.00	26.00	21.19	17.42	15.38	15.86	16.72	16.55
Total	287715	256245	236935	207363	327264	337677	440594	462735	403078	533697	496436

Another important mechanised gear operating in Gujarat is dol net. The dol net catch varied from 31243 tonnes in 1988 to 106783 tonnes in 1994. The percentage contribution of dol net to the total landings of the state varied from 13% in 1985 to 27% in 1989. Dol net landings showed an increasing trend and the CPUE varied from 217 kg in 1985 to 700 kg in 1991.

The contribution of non-mechanised gears like gill net, dol net, stake net, cast net and hooks & lines towards the marine fish landings of Gujarat varied from 28% in 1988 to 16% in 1993. It shows a declining trend from 1990 onwards. The reason for this declining trend may be due to the encouragement given by the state government to convert the traditional crafts into motorised units. The landing by the traditional sector varied from 43000t (1986) to 89000t (1994).

The maritime state of Gujarat consists of four regions namely Kutch,

Jamnagar coast, Saurashtra coast and South Gujarat coast. The maximum amount of marine fishes were landed in Saurashtra region (On an average 341765 tonnes) followed by Kutch (54105 tonnes) (Table 6). During the period 1985 to 1995 the marine fish landings in Saurashtra coast varied from 134100 tonnes in 1988 to 417800 in 1994. A maximum of 81% contribution of this region was observed during 1992. On an average South Gujarat contributed only 4% to the marine fish landings of the state.

**Saurashtra :** Except in 1986 in all other years more than 50% of marine fish landings in Saurashtra coast was contributed by trawl net. A maximum of 263800 tonnes of marine fishes were landed by this gear in 1994. Maximum CPUE was observed in the year 1991 (2059 kg). Long voyage trawl net (LMTN) was introduced in this region during 1990. The production by these units rose up to 176800 tonnes in 1995 and the CPUE ranged from 3658 kg in 1993 to 5476 kg in 1991. More than 94% of the marine fish landings in this region was contributed by mechanised gears. In fact, during 1990 to 1995 more than 98% was contributed by mechanised gears. Over the years in this region the contribution of non-mechanised gears was diminishing at a faster rate. It was observed that more than 50% of the marine fish landings in this region was contributed by demersal fishes. The landings of demersals varied from 79119 in 1988 to 258120 tonnes in 1994 whereas in pelagics the range was from 54985 in 1988 to 159743 tonnes in 1994. An increasing trend of production was noticed for both the groups over the years.

**Kutch :** It was observed that during 1985 to 1989 more than 50% of the marine fish landings in Kutch region was contributed by pelagics and this trend was reversed during 1990-95 when demersals accounted for more than 50% of the marine fish landings in this region. Both mechanised and non-mechanised gears were in operation in this region. Small type of gill nets, dol nets and hooks & lines were the mechanised gears operated here and gill nets, bag nets, stake nets, drag nets and cast nets were the non-mechanised gears. Contribution of mechanised gears to the total landings in this region varied from 5170 tonnes in 1986 to 27701 tonnes in 1989 (43% to 88%). The contribution of non-mechanised gears showed declining trend over the years. Of late mechanised dol net was the major gear in this region. During 1990 to 1995 more than 64% of the marine fish landing was accounted by dol nets.

**Marine Fisheries Research and Management****Table 6. Region-wise fish landings in Gujarat during 1985-1995 (in tonnes)**

	South Gujarat		Saurashtra		Jamnagar		Kutch		Off-shor	Total	
		%		%		%		%	%		
1985	12329	4.3	214423	74.5	23079	8.0	37776	13.1	108	0.1	287715
1986	8261	3.2	196319	76.6	18941	7.4	32694	12.8	30	-	256245
1987	10769	4.5	166817	70.4	27827	11.8	31487	13.3	35	-	236935
1988	19181	9.2	134104	64.7	13055	6.3	41023	19.8	0	-	207363
1989	50503	15.4	206957	63.3	17496	5.3	52308	16.0	0	-	327264
1990	12702	3.8	239091	70.8	25027	7.4	60857	18.0	0	-	337677
1991	16950	3.8	341000	77.4	17913	4.1	64731	14.7	0	-	440594
1992	18548	4.0	373207	80.7	10335	2.2	60645	13.1	0	-	462735
1993	23660	5.9	313268	77.7	9400	2.3	56752	14.1	0	-	403080
1994	19054	3.6	417854	78.3	15147	2.8	81643	15.3	0	-	533698
1995	18981	3.8	366172	73.8	37936	7.6	73347	14.8	0	-	496436

**South Gujarat :** Pelagics were the major fishes landed in South Gujarat region; their contribution ranged from 54% (1985) to 92% (1989). This may be due to the absence of trawlers in the region. A maximum of 46511 tonnes of pelagics landed here in 1989. Mechanised gears like trawl net, gill net and hooks & lines and non-mechanised gears like gill net, bag net, stake net and cast net were the major gears for exploiting the marine fishery resources in this region. More than 70% of the marine fish landings was contributed by mechanised gears. Contribution of trawl net varied from 36% in 1985 to 64% in 1987 and a maximum catch of 19138 tonnes was noticed in 1995. Gill nets maximum contribution of 15427 tonnes was in the same year and it was only 2630 tonnes in case of non-mechanised gears.

**Jamnagar :** More than 57% of the marine fish landings in Jamnagar coast was accounted by demersal fishes. The contribution of demersals in this region varied from 6970 tonnes (1992) to 21686 tonnes (1995) and in the case of pelagics it ranged between 2383 tonnes (1993) and 16250 tonnes (1995).

**Veraval :** Veraval centre landed about one third of the total marine fish production of the state. This centre is meant exclusively for mechanised fishing. Out of the 2000 mechanised trawlers operating in Gujarat, more than 700 units fish in Veraval area alone. More than 86% of landings in Veraval were accounted by the trawlers. Trawl landings in Veraval were accounted by the trawlers. Trawl landings in Veraval range between 40000 (1987) and 119000 (1994). The CPUE of this gear showed an increasing trend. In this centre trawlers started operating for long voyage from 1990 onwards. Now major share of trawl landings is accounted by multi day trawlers. Contribution of mechanised gill netters in Veraval landings decreased over the years, out-board gill netters and long liners were also operating from this centre though their contribution is not substantial. More than 60% of the marine fish landings in Veraval was accounted by demersals. The contribution of pelagics showed a declining trend over the years due to concentration of trawlers in this centre.

### **Conclusion**

The marine fish production in Gujarat varied from 207363 tonnes in 1988 to 533697 tonnes in 1994. The increase in landings was mainly due to the improvement in craft/gear design, introduction of voyage trips, powering the craft for fishing and mobility and the introduction of synthetic fibre in the gear making. The major groups of fishes responsible for this increase in landings were Bombay duck, *coltia*, cephalopods, croakers, ribbon fishes, pomfrets, seerfishes, penaeid and non-penaeid prawns.

Landings of pelagics were less when compared to demersals. This may be due to the absence of purse seine and ring seine operation in this state. It is worth trying to introduce ring seine in this state in a limited manner, for the exploitation of shoaling pelagics.

The major share of the marine fish landings in Gujarat was accounted by trawlers. Multi day larger trawler operations gained importance recently and their CPUE was found to be more when compared to short trip trawlers. Maximum landing is noticed during fourth quarters and there is no trawling during monsoon.

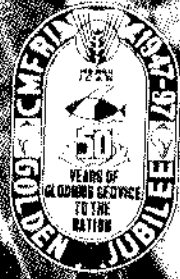
Mechanised gill net landing showed a declining trend. Long trip gill

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nets started operation since 1990. During April-May large sharks were landed by long liners. Dol net landings showed an increasing trend over the years. Of late, the contribution of non-mechanised gears showed declining trend.

The maximum marine fish landing was noticed in Saurashtra region of the state and Veraval is the major landing centre. One third of marine fish landings in Gujarat is accounted by this centre. This predominantly trawl landing centre, landed demersals to the tune of 60% of the marine fish landings.



# WORLD RESOURCES

