

Emerging Pattern of Exploitation of the Marine Fishery Resources of the Inshore Waters of India with Particular Reference to Low Energy Fishing

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The estimated marine fish landings in India witnessed an all time high record, during 1989 of 2.2 million tonnes. The landings during 1985-89 were around 1.8 million tonnes annually. A close scrutiny of the estimated landings for the period 1985-89, indicates that there has been a steady increase in the landings over the years. It has also been noticed that during this period, the contribution of the mechanised sector, including the motorised traditional craft, was also increasing and that of the non-mechanised sector did not show any trend. The motorisation of indigenous craft has also resulted in the increased catch in the mechanised sector apart from the contribution of trawlers. At present, motorisation has spread over all the maritime states in the West Coast and it is fast picking up in the East Coast also, except Andhra Pradesh and West Bengal where the pace is slow. In this background, an attempt is made in this paper to have an in-depth study on the various sectors that contribute to the total marine fish production and on the trends in the major groups of fishes. The effort expended in the mechanised and non-mechanised sector is assessed in the light of the energy requirements. Implications of mechanisation/motorisation and the changing pattern of marine fish production in the inshore areas of India have been brought out. The expenditure on energy consumption is assessed in the light of the revenue realised through the exploited resources both from the internal and external markets. The study also proposes various management measures that are necessary for proper exploitation of the available resources.

Marine fish production has registered an average annual growth rate of 9.8%. The unusual abundance of pelagic resources like oil sardine and mackerel in 1989 and a consistently increasing trend in the yield of carangids have been also responsible for this increased production. Introduction of trawling in early seventies gave a sudden upward push in the production and it got stabilized. The large scale introduction of purse-seiners in Karnataka and Goa brought with it socio-economic problems and this eventually made the extinction of erstwhile rampani in Karnataka, but by early eighties, the impact soon started fading away with the result the production became stagnant.

At the same time through various developmental plans, production started going up resulting in increase in all India production level by mid eighties. In south-

west region, particularly in Kerala, experiments were made fitting the country crafts with OB engines.

The promotional activities of 'Yamaha' engines in Alleppey district started yielding rich dividends and within short time it became popular in Kerala.

The fitting of OB engines facilitated quick propulsion and fishermen were able to go far beyond the conventional limits.

By 1986, the conventional boat seines were modified and made efficient by introducing rings and converting these nets to ring seines. This changed the entire trend in the fish production of Kerala.

Contribution by major gear

Marine fish production in India had been showing an increasing trend during 1985-89 with a minimum of 1.53 million t

Table 1. Major Group of marine fishery resources in India 1985-1989 (in tonnes)

Name of fish	1985	1986	Year 1987	1988	1989
Elasmobranchs	52804	51463	56410	51085	51124
Catfishes	44500	52933	44769	64216	49794
Oil sardines	120587	77849	100456	131067	278869
Stolephorus	54505	68806	51252	101168	71020
Bombayduck	112454	92227	73821	67392	120193
Perches	71813	93307	90022	92631	102722
Croakers	101078	105182	109870	100221	101154
Ribbonfishes	84403	95914	82484	68544	62256
Carangids	54703	135281	79963	126198	135606
Silverbellies	52725	71350	66750	63757	49337
Pomfrets	32974	30840	36930	43729	42876
Mackerel	61775	82092	78896	104349	290905
Seer fishes	34078	33501	31186	36479	39893
Tunnies	31261	33775	30161	30366	45230
Penaeid prawns	121958	138631	154483	153073	146621
Non-penaeid prawns	67084	71985	36303	49423	76369
Stomatopods	31191	48110	98614	68981	69276
Cephalopods	31642	42638	34299	38526	54487
Total	1534726	1693377	1662550	1803817	2230225

in 1985 and 2.23 million t (Table 1) in 1989 with an average annual landings of 1.8 million t. The landings by trawlers during the period showed an average of 696,000 t contributing to 39.3%. The landings by different type of gear are given in Table 2. The specieswise landing in hours, of each gear is elaborated. The production from drift/gillnet (mechanized) varied between 103,000 t and 130,000 t with an average annual landings of 119,000 t contributing to 6.8% of the total production. Landings by hooks and lines (IB & OB, rose from just 10,000 t of 1985 to 27,000 t in 1989. The production by dolnets (IB) fluctuated between 113,000 t of 1988 and 220,000 t of 1985 with an average annual landings of

166,000 t contributing to 9.4% of the total production. The landings by other mechanised units especially ring seines in Kerala showed an increasing trend from 134,000 t of 1985, to 419,000 t in 1989 accounting for 12.1% on an average of the total production. The contribution from non-mechanized units fluctuated between 351,000 t and 408,000 t with an average annual landings of 386,000 t forming 21.8%.

Oil Sardine

The major gear under mechanized sector which contributed to this production have been purse-seine and ring-seine, purse-seine contributing 47,000 t. About 74,000 t came from other OB units mainly boat

seines. Oil sardine, in small quantities have been found in drift gill net and in some cases trawl nets also. Traditional gear contributed about 20,000 t annually on an average.

Mackerel

About 52,000 t has been contributed by the purse seines and ring seine's contribution has been to the order of 18,000 t. Meagre quantities have been contributed by trawls and drift/gill net.

Stolephorus

The contribution of gear operated with out-board units has been 22,000 t (31%) of the average of 69,000 t. The ring seines and boat seines are the major gear in this category. Purse-seine and trawl net also contributed to 14% and 13% respectively of the average landings. It has been noticed that about 42% is from non-mechanised sector.

Carangids

Purse-seines contribution has been 24% and trawl net and gear of other mechanized group by 23% each. Drift gill net and hook and line under mechanized sector also recorded landings of carangids in small quantities.

Ribbon fishes

Trawl nets recorded 51% (40,000 t) of the average landings and drift/gill net with 6% each.

Seer fishes

Drift/gill net contributed 42% (15,000 t) of the average landings, motorized sector found about 13% of the catch. Trawl net landings has been to the tune of 2,8000 t (8%). There has been a landing of 29% in the non-mechanized sector mainly from drift/gill net.

Tunnies

Drift/set gill net in the mechanized and motorized sectors contributed 27% each.

13% of the landings were realised by the purse-seines.

Cat fishes

Trawl net, accounted for 31% of the cat fishes landings followed by drift/gill net, 23% (12,000 t). Purse-seine and hook and line 10% each.

Elasmobranchs

Trawl net's contribution was 20,000 t drift/gill net 12,000 t (23%), the hooks and lines 3700 t (7%).

Perches

6% (52,000 t) comes from trawl net. Non-mechanised sector contributed about 12,000 t of the landings.

Croakers

About two-thirds of landings was from trawl net and dol net operating in the northwest region also contributed 6% (7,000 t).

Silver bellies

Trawl net contributed 80% (49,000 t) of the landings; the contribution of other gears individually were meagre.

Pomfrets

About 20,000 t (54%) of the catch was from drift/gill net. Trawl net also contributed 4,000 t pomfrets.

Penaeid prawns

The trawl net contributed 88,000 t (62%) and dol net 12,000 t (8%) and boat seine, ring seine, wall net and stake net together brought 8% of the prawn landings.

Non-penaeid prawns

An estimated 72% of non-penaeid prawns has been contributed by dol net. Trawl net accounted for 17% of landings.

Cephalopods

85% of cephalopods come from trawl net alone.

Table 2. All India Gear-wise (Mechanised) catch (t) and effort

Gear/year		1985	1986	1987	1988	1989
Trawl net	Catch	557088	643881	752386	763673	762684
	Effort	1444	1629	1981	2112	1760
Purse seine	Catch	103098	132529	135836	178200	266323
	Effort	56	54	74	82	114
Drift Gill net	Catch	107848	103400	125783	130024	129574
	Effort	772	1002	1262	1525	1206
Hook & Line (M+OB)	Catch	9610	16679	14877	29121	27245
	Effort	162	133	144	288	269
Dol net	Catch	220230	198035	1240698	112850	176638
	effort	496	323	291	308	394
Other Mec. Gear	Catch	134193	180265	120644	220323	418599
	Effort	586	840	668	845	1494
Total		1132067	1274789	1273595	1434191	1801063
		74%	76%	77%	80%	82%
Non-Mech.	Catch	392295	404584	373303	351258	407535
		26%	24%	23%	20%	18%
Grand Total		1524362	1679373	1646898	1785449	2208598

Stomatopods

Almost the entire landings (98%) of stomatopods has been obtained through trawl net.

Table 2 indicates that the total landings of mechanized sector has been increasing during the period, the record catch during 1989, has been due to the remarkable land-

Table 3. Catch/unit (kg) of different craft (mechanised)

	Years				
	1985	1986	1987	1988	1989
Trawler	386	395	380	362	433
Purse-seiner	1839	2459	1828	2183	2518
Drift/gill netter	140	103	100	85	107
Hook & liner (Mech.+OB)	59	125	103	101	101
Dol netter	444	613	427	366	448
Craft with other gear	229	215	180	261	280

ings by the other mechanised gears, primarily due to the outboard engine craft operating ring seines.

The catch in kg per unit of different types of craft are given in Table 3.

The catch in kg/unit of craft fluctuated in all cases. In the case of gill netter and liner this was not marked, the high catch rate in 1989 by purse seiners indicates the abundance of pelagic fish.

Motorised craft and its impact in different maritime states

The landings is obtained through all types of gear operated namely, ring seine, boat-seine, drift/gillnet, hook and line, disco net etc. Of the total of 453000 t a substantial share (88%) is from Kerala, Gujarat state contributing 5.5% and Karnataka 2.3%. Motorization is fast spreading all along the

Table 4. *The landings of major resources by Ring Seine (in tonnes)*

Name of fish	year				Average
	1986	1987	1988	1989	
Elasmobranchs	—	—	5	127	33
Catfishes	274	758	691	1008	683
Oil sardine	2372	15477	30835	127779	44116
Stolephorus spp.	5846	3	3902	21652	7851
Perches	278	1119	688	898	745
Croakers	134	335	269	2326	766
Ribbonfishes	5	1	1	10	4
Carangids	11103	3245	12785	13544	10169
Silverbellies	4	39	183	713	235
Pomfrets	2	405	381	12	200
Mackerel	1015	2916	20651	61778	17272
Seer fishes	—	227	23	1397	412
Tunnies	12	256	236	5049	1388
Penaeid Prawns	168	2351	1271	14598	4597
Cephalopods	4	2	—	157	41
Others	1281	4424	9967	80666	24084
Total	22498	31558	81886	270903	101711
Effort (in units operations)	29100	80300	129900	323100	

west coast. However, along the east coast, 2.9% outboard unit's landings is from Tamil Nadu. Orissa and Pondicherry also contributed meagre quantities of fishery resources by these type of craft. There is no record of landings from OB units in West Bengal and Andhra Pradesh during the period under report, but, of late, there are indications of few units operating in these states. No doubt, motorization is picking up all along the coast.

Ring seines of Kerala coast

Introduction of ring seines in the Alleppey coast of Kerala in 1985 has been a new development. This gear is operated in the traditional boat seines ('thangu vala') craft. The length of the net ranges from 450 m to 750 m.

Table 4 gives the landing of major resources by ring seine of Kerala. Catch per unit of operation has increased from 773 kgs to 808 kgs indicating the availability of mainly pelagic resources such as oil sardine, stolephorus spp. and carangids. There has been a spurt in the landings of penaeid prawns also in 1989. The increase in effort from 29,000 in 1986 to 323,000 in 1989 has not resulted reduction in the catch per unit.

Discussion

Marine fish production in India has been around 1.6 million tonnes during mid eighties but registered a record catch of 2.23 million tonnes in 1989. This spectacular increase in the production has been primarily due to introduction of out board engines

to the traditional craft together with the innovation made in the gear, boat seine.

From a mere 6.8% of the total landings by purse seine of 1985, it has attained 13.0% (286,000 t) of the landings in 1989. Drift/set gill net contribution was 7.1% (108,000 t) in 1985 and 5.9% (130,000 t) in 1989, indicating fishery has not improved.

Hooks & line fishery made a slight improvement. The landings to this gear was 10,000 t in 1985 (0.6% of total catch) and recorded highest landings of 29,000 t (1.6%) in 1988. However, during 1989, it recorded 1.2% (27,000 t).

Landings of mechanised, dol net operated along the north west region (Maharashtra & Gujarat) has been showing declining trend over these years. From a landings of 220,000 t (14.4%) in 1985 to 8.0% (177,000 t) in 1989.

The landings of other mechanised gears showed a steep increase in terms of production as well as effort input. These are units coming under the motorised sector and the gear mainly in use are ring seines (Kerala), boat seines and drift/set gill net. The landings of 134,000 t (8.8%) in 1985 has sharply increased to 180,000 t (14%) in 1986 and 220,000 t (12.3%) in 1988 and a record estimate of 419,000 t (18.9%) in 1989, resulted in the record production of 2.23 million tonnes during 1989.

Thus under mechanised sector, over the years there has been remarkable improvements in production. This increase has been resulted primarily due to motorised boats, especially along the west coast and in particular, Kerala coast. Along the east coast also, steadily, motorisation is spreading, but at a low pace.

The landings from the non-mechanised sector has been steadily decreasing over these years. This gradual but steady decline

has been due to the motorisation of traditional craft in this sector.

The pelagic groups form on an average 53% of the catch and mostly these groups have been obtained through purse-seiners and motorised craft.

With the motorisation of country craft, using outboard engines, the landings of non-mechanised is steadily decreasing. The advantages from motorisation of craft by fitting outboard engines are many. It replaces human labour for propulsion of the craft; reduces time to reach fishing ground and to shore. And the most important advantage is that these units go beyond the conventional grounds for diversified fishing, thus widening to operational area and making it possible to tap additional resources.

The mesh size of 'ring seine' is reduced year after year thereby destroying the juveniles of many resources. Strict enforcement of mesh regulation is a precondition for the extension of ring seines to other areas of the Indian coast. Caution has to be exercised in putting more effort in trawlers and purse-seiners in view of the stagnating nature of catch per unit of those units.

In order to obtain, a higher annual production, normally contribution of pelagic groups must be more. A two fold strategy has to be evolved to harvest the increased production, one in which increase the 'catch by weight' (eg. oil sardine, mackerel) and second 'catch by value' (eg. shrimp, cuttle fish) and a proper balance maintained for exploiting these two types of resources.

Constraints

The conflict among the operators of different types of craft namely, those operating purely mechanised craft, outboard engine

craft and purely traditional boats sometimes forms a hindrance in fishing.

Some states have promulgated laws in respect of sharing of resources by delineating the areas of fishing, for each sector separately.

Investments in the fisheries section in 1980's were mostly confined to developing the infrastructure for export of marine products. The resources available for domestic consumption were not targetted for intensive exploitation. However the motorization of the country craft has, to a large extent, been effective in exploiting non conventional areas and thereby increasing the availability of resources for domestic consumption. It has, nonetheless, made an attempt for exploiting resources even for exports as could be seen by the production

of penaeid prawns from this type of units specifically by ring seines in Kerala. Comparing the economic performance of different fishing units with inboard and outboard engines (K.K.P. Panickar, oral communication) it is seen the revenue realised per rupee on fuel is Rs.7 in respect of ring seine while it is Rs.10 for boat seine with 7 HP, Rs.8.60 for gill net with 7 HP and Rs.8.30 for hook and line (canoes). Eventhough the unit realisation is small, since the employment opportunities are vast and the gross turnover is tremendous, the ring seine stands economically most viable.

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