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THE PURSE SEINE FISHERY OF MANGALORE (KARNATAKA)*

Introduction

Karnataka State, with about 300 km of coastal line extending from Majali in the north to Talapady in the south contributes about 8.3% to the total marine fishery catch of the country. The average annual catch of this state for the five-year period 1970- 74 amounted to 96,217 tonnes which increased to 0.12 million t during the period of next five years (1975-79). The increase during the latter years was mainly attributed to the augmented fleet strength of trawlers and to the introduction of purse seiners from 1975 onwards. Undoubtedly, the rapid increase in the strength of purse seine fleet gave the necessary fillip to the marine fisheries, especially for the exploitation of hitherto underexploited resources like anchovies, horse-mackerel, cat fish etc., in addition to the other traditional pelagic fisheries viz., oil sardine and mackerel. The introduction of purse seine, though initially resented by the artisanal fishermen, neverthless, was rather smooth. As a result of this, once active landing centres of Dakshina Kannada for the indigenous gear have to bear the brunt of the change over in the age old traditional fishing method and wears the deserted look within a short time.

The famous shore-seine, *rampani* has become ineffective and obsolete, of late. To the rescue of fishermen who were wholly dependent on this gear, the schedule banks have come forward to extend credit facilities both on individual and co-operative basis for acquiring purse seine units.

The activities of purse seiners are restricted to Mangalore, Malpe, and Gangoli in Dakshina Kannada mainly due to the availability of some infrastructural facilities viz., berthing, transport of fish, ice plants, cold storages, oil, fresh water etc. An appraisal of the purse seine fishery at Mangalore has been made in this account based on the fish landings from 1979 to 1981.

Operation

The purse-seiners at Mangalore are of wooden hulls, by and large are of 43' in length, and a few of 38' also. A few of them have fibreglass hulls.

The net is of synthetic fibre and usually knotless. This is about 600 m in length with a height of 50 m, with a mesh size of 14-18 mm. About 40 brass rings are used for pursing the net.

Normally the purse seiners set out for fishing by the break of dawn. The strength of crew of a purse seiner varies from 20 to 25. This excludes crew (2-3) of a carrier boat which each purse seine unit employs for 2-3 months during the peak fishing season to cope up with the transport of fish from the fishing ground to the landing place. Incidentally, this peak period happens to be a lean one for trawlers which are then converted as carrier boats. Nearly 100 purse seiners operate from Mangalore.

Time taken to complete a haul varies from 1-3 hours depending upon the catch. As there is a severe competition amongst fishermen, at least 1-2 hauls are made to send fish catch in the morning by carrier boats as quickly as possible for better financial returns. On an average 3-4 hauls are made daily.

Depending upon the availability of fish, the boats return home usually by 6 pm, by the time the carrier boats having made 2-3 trips to unload the catch. It is not uncommon to see the fishing activities extending upto 10 pm in the Mangalore waters.

Many a time handling of large catches, particularly of cat fish, poses a problem. As a custom, purse seiners operating in the vicinity of a boat which has pursed such a catch, come to their aid. The cat fish, though fetches better returns, neverthless, damage the net to a great extent.

The operational area of purse seiners of Mangalore extends in the region between Kaup in the north (45 km) and Kasargod in the south (40 km), but are mostly active in the southern area because of a severe competition offered by the purse seine units operating from Malpe.

During September-January these units restrict their activities around 20 m deep waters since this period coincides with the abundance of shoaling fishes. However, from February onwards with thinning of shoals extend their activities beyond 30-40 m depth.

Fishermen are forbidden by the local authorities to go out for fishing from 1st June to 30th September since this period happens to be the active spawning period for commercially impor-

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tant fishes like oil sardine, mackerel, etc. On a few occasions, infringement of this restriction was made by some units and considerable quantities of oil sardine and mackerel in spawning condition were caught causing much concern to the conservationists of marine resources.

Fishery resources

By and large, oil sardine and mackerel constitute the major catches of purse seine (Photographs). The new resources exploited fairly on a large scale were cat fishes, anchovies and carangids (Fig. 1).

The estimated catch of important fishes for the years are given in Table 1. It may be seen that the catch in 1979 amounted to 27,197 t, showed a marginal increase in 1980 and the catches in 1981 increased by 35.6% over 1979. This was mainly due to the increase in effort and catch of oil sardine.

It is seen from Fig. 2, that during the post-monsoon period, expending about 55% of the annual effort, 80% of the annual catch is realised, in contrast to the premonsoon period (January -June) when about 45% of the effort was put to realise only about 20% of the annual catch.

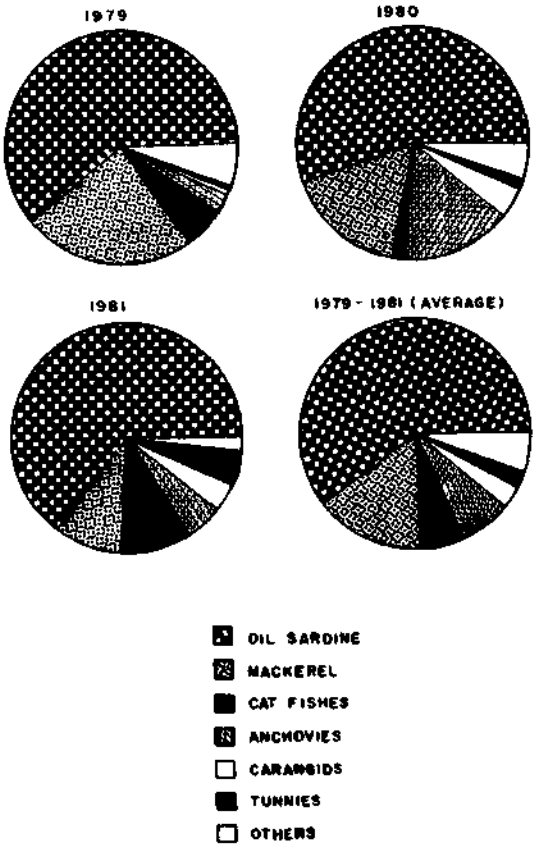


Fig. 1. Catch Composition of fish landed by purse seiners at Mangalore.

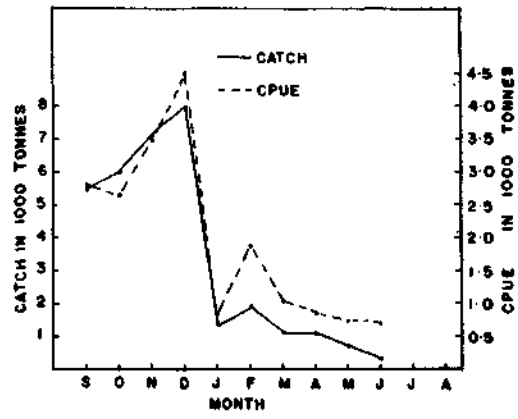


Fig. 2. Average catch and catch per unit effort in tonnes of purse seiners at Mangalore.

Oil sardine

The oil sardine formed the major pelagic fish component of purse seine landings. It is seen from Table 1 that the catch was around 16,000 t in 1979 as well as in 1980 with more or less equal effort expended in both the years, whereas it rose to 27,000 t in 1981, of course, with an increase in effort also. Generally, October-December forms the most productive quarter, with highest catch rate being recorded in December. About 79% of the oil sardine landings were made, during the post-monsoon season. Oil sardine constituted 61%, 55% and 64% of the total catch in 1979, 1980 and 1981 respectively. Since there are no facilities for canning, most of the catch, that could not be marketed in fresh condition, was utilized for oil extraction and manure.

Mackerel

This resource ranks second next to oil sardine in respect of yield. The success or failure of the purse seine fishery in this part of the coast largely depends upon the success or failure of this fishery. The average annual catch of mackerel in Karnataka for the five-year period 1975- 79 was 30,385 t. The Mangalore purse-seines contributed 16.7% to the total mackerel catch of the state in 1979.

During 1979, the catch of this fish amounted to 6,691 t, however, showed a decline of 27% in 1980. The 1981 season was no better since the catch decreased to as low as 3,960 t. It is interesting to note that the beginning of the fishing season, particularly September month recorded better catches of mackerel.

Table 1. *Fish landings of Purse-seines at Bunder, Mangalore (in tonnes)* 1979-81.

Month	Oil sardine	Mackerel	Catfishes	Anchovies	Carangids	Tunnies	Other clupeoids	Leiognathus	Prawns	Others	Total	C.p.u.e.*
1979												
January	487	375	—	88	—	—	113	—	—	30	1,093	0.80
February	1,211	310	—	7	—	—	37	—	—	—	1,565	1.53
March	1,058	433	3	81	1	—	60	—	—	—	1,636	1.55
April	1,319	298	—	2	6	—	90	7	—	—	1,722	1.61
May	51	161	—	3	27	7	164	22	—	—	435	0.73
June	353	399	—	—	5	32	6	6	—	—	801	2.47
July	No fishing											
August	" "											
September	766	2,845	143	—	25	3	85	95	—	84	4,046	2.16
October	3,855	1,249	115	157	188	7	27	216	—	68	5,682	2.45
November	4,621	621	258	333	—	—	81	—	—	—	5,914	2.92
December	2,876	—	1,023	60	6	63	45	—	—	30	4,103	3.08
Total	16,597	6,691	1,542	731	258	112	708	346	—	212	27,197	2.08
1980												
January	1,286	124	20	14	6	59	18	2	11	16	1,555	1.21
February	2,646	61	23	38	1	5	57	—	—	—	2,831	3.15
March	376	7	74	40	17	239	36	—	—	—	789	1.55
April	15	6	—	—	77	6	384	83	—	—	571	0.80
May	673	—	—	—	—	77	201	—	—	—	951	1.28
June	No fishing											
July	" "											
August	" "											
September	3,583	3,123	50	2	98	27	83	16	395	96	7,473	3.19
October	779	861	193	2,255	110	—	58	96	—	60	4,412	1.84
November	2,857	49	41	2,071	878	10	21	18	—	20	5,965	2.69
December	4,021	646	—	151	8	—	7	—	—	—	4,833	2.60
Total	16,235	4,877	401	4,571	1,196	423	865	215	406	192	29,380	2.27
1981												
January	1,133	260	12	3	18	26	—	—	—	3	1,455	0.65
February	1,237	14	—	12	9	3	—	—	4	10	1,289	1.22
March	223	377	159	50	9	163	—	2	—	4	987	0.58
April	588	132	69	26	70	45	7	5	28	55	1,025	0.49
May	17	4	—	—	1	—	—	—	—	17	39	0.03
June	55	201	—	—	3	—	—	—	—	—	259	0.87
July	No fishing											
August	" "											
September	1,621	1,700	—	745	550	177	—	—	—	—	4,793	3.00
October	2,244	1,130	2,551	99	655	1,142	—	—	—	6	7,827	3.88
November	7,770	142	—	950	297	368	—	—	—	—	9,527	5.18
December	12,327	—	1,199	437	23	37	125	—	—	920	15,068	6.50
Total	27,215	3,960	3,990	2,322	1,635	1,961	132	7	32	1,015	42,269	2.53

*C.p.u.e. = Catch per unit effort

Apart from local consumption in fresh condition, when the landings are heavy they are iced in trucks and sent to Bombay, Bangalore and interior places of Karnataka and Kerala.

Cat fishes

With the advent of purse-seines, this resource which remained underexploited by the indigenous gear, has assumed a significant importance. The dominant species which constitute the fishery are *Ariusdussumieri, A. thalassinus, A. serratus* and *A. tenuispinis*. The average annual cat fish catch in Karnataka for the period 1975-79 was 5,083 t, forming 4.5% of the total fish catch. However, the purse seines at Mangalore alone contributed 15.5% to the total cat fish catch in the state during 1979. The estimated catch of this species during 1979 amounted to 1,542 t, which showed a decrease of 74% in the subsequent year. Neverthless, the catches in 1981 was 3,990 t registering an increase of 159% over 1979. Incidentally during all the three years of observation, October was the month in which heavy landings were made.

It may be pointed out here that this resource

which holds promise for future, is indiscriminately exploited from the nursery grounds as was witnessed from the large scale fishing of *A. tenuispinis* with eggs in various stages of development in their mouth during September and October 1979 (*Mar. Fish. Infor. Serv. T & E Ser.*, No. 24, 1-9, 1980) causing incalculable loss, which could be gauged from the destruction of eggs estimated at weighing as much as 16 t. Similar indiscriminate fishing was repeated in 1981 also. It is feared that resorting to such destructive fishing may cause deleterious effect on this resource in the coming years.

As there is very limited market for consumption in fresh condition locally, cat fishes are sent in iced as well as sun-dried form to interior parts of Karnataka and also to Kerala and Tamil Nadu.

Anchovies

This resource, though detected earlier, remained elusive so far to the indigenous gears and has now come within the reach of purse seines. Locally known as Kollataru , the anchovies or white baits, represented by *Stolephorus devisi*, *S. buccaneeri* and *S. bataviensis* rank third in the catches. The average annual catch of this resource in the state for the five-year period 1975-79 was 480 t constituting a mere 0.4% in the total catch. However, this picture changed for better from 1979 onwards. During 1979 the seiners at Mangalore landed 731 t. In 1980 the catch reached an incredible figure of 4,571 t. On the contrary the catches in 1981 almost dropped by 50%.

Anchovies are consumed in dried condition. Huge catches of anchovies have generated employment opportunities among the village folk in sun drying process.

Tuna

This resources which remained so far beyond the reach of the indigenous gear, has come now within the operational ambit of purse seiners. The little tunny *Euthynnus affinis*, the frigate tuna, *Auxis thazard*, and the bullet tuna, *A. rochei* are occasionally caught in considerable numbers, particularly in October. The catch of tunas at Mangalore in 1979 which was just 112 t forming 0.4% of the total catch showed a four-fold increase (423 t) in 1980 and reached a spectacular figure of 1,961 t in 1981. This clearly indicates the vast potential of this resource in our waters, which could be exploited for meeting the demands of our country.

Generally tunas are not relished by the local people. *E. affinis* and *A. thazard* are packed in ice and are sent particularly to Kerala where there is great demand for these fishes. Since *A. rochei* gets spoiled even before reaching the landing place they are utilized for making fish manure.

Carangids

This group is represented by the horse-mackerel, *Megalaspis cordyla* and also by *Caranx kalla* and *Decapterus* spp. More often the former species in small schools are caught with tuna shoals whereas the latter species are hauled up along with silver bellies, anchovies etc. The average catch of these species for 1979-81 amounted to 1,029 t, forming 3.1% of the total catch. October-December quarter appears to be more productive when about 70.2% of the catches were landed.

As there is no local market, particularly *M. cordyla*, they are sent to Tamil Nadu in iced condition from where they could fetch better financial returns.

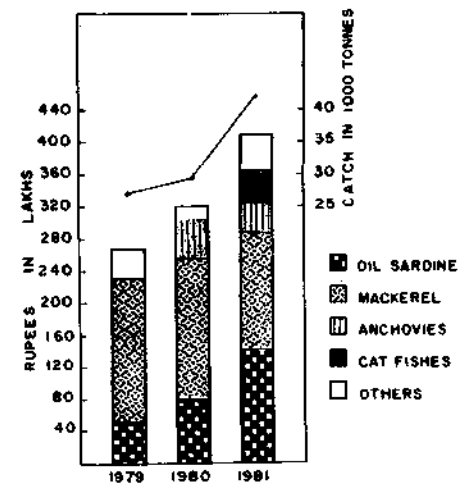
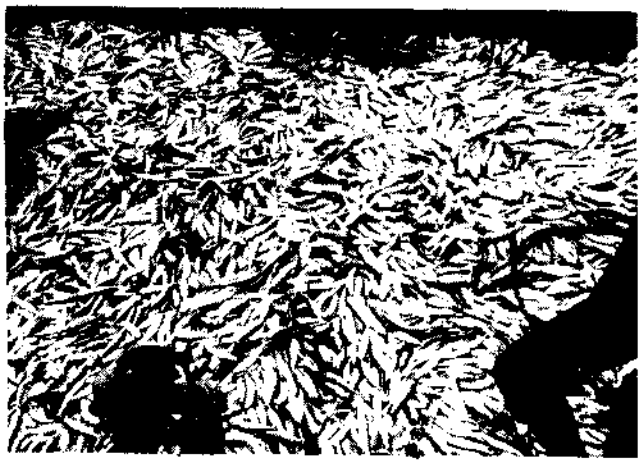


Fig. 3. Value of major groups of fishes and total fish catch landed by purse seiners at Mangalore.

Silver bellies

Leiognathus splendens, *L. bindus* and *Secutor insidiator* form incidental catches. The average annual landings for 1979-81 amounted to 190 t forming 0.6% of the purse seine catch. In 1979, the catch was as high as 346 t, however, dropping to 215 t in 1980 and in the subsequent year as low as 7 t. October appears to be the peak period when more than half (55%) of the annual catches were realised. Silver bellies in fresh condition do not find ready market and as such the catches are invariably used for sun-drying.



1. Oil sardine catch

2. Carrier boat filled with mackeret

3. Carrier boat with frigate tuna, *Auxis thazard*

4. Little tunny *Euthynnus affinis* and other catches

5. Cat fish catch at the landing centre

6. Black pomfret *Parastromateus niger*

Other clupeoids

This group comprises *Sardinella albella, S. fimbriata* and *S. gibbosa* and also *Kowala coval, Thryssa* spp. and the gizzard shad *Anadontostoma chacunda*. Their estimated catch in 1979 was 708 t. Landings in 1980 registered an increase of 18% over the previous year and witnessed a fall in the subsequent year. However, the average catch for 1979-81 was 570 t, contributing 2.3% to the purse seine catch. April-May appears to be the most productive period for this resource. Considerable portion of these catches are channelled for sun-drying.

Prawns

Prawns form one of the incidental catches of purse-seines particularly soon after the commencement of the fishing season in September. The species represented were *Metapenaeus dobsoni, Parapenaeopsis stylifera, M. monoceros, M. affinis* and *Penaeus indicus* in the order of abundance. During September 1980 their catch amounted to 406 t, but, fell precipitously to a mere 32 t during the next year.

Pomfrets

Occasionally, the black pomfret *Parastromateus niger* was landed during 1979 amounting to 36 t whereas in the subsequent two years their catches remained rather insignificant.

Miscellaneous fishes

This group consists of fishes which are incidentally caught when the net is paid out for shoaling species. Common species are the Sciaenid *(Otolithus ruber), Dussumieria* sp. *Belone, Chorinemus* sp. *Therapon* sp., sharks, rays and cephalopods. The last quarter appears to register better catches of miscellaneous fishes. The average annual catch for the three year period was 544 t, forming 1.6% of the purse seine catch.

7. Cat fish eggs being disposed

Economics

Based on the auction rates prevalent at the landing centre, the total value of fish landed works out to an average of Rs 3.48 crores an year, ranging from Rs 2.7 to 4.1 crores during the 3 years 1979 to 1981. The average return per boat per operating day is estimated at Rs 2,440. Mackerel fetched the highest value, the annual average for the years under consideration being Rs 1.7 crores. This formed about 48% of the annual total income. Cat fishes earned Rs 0.63 crores in 1979. An all time record earnings of Rs 44.6 lakhs by anchovies was recorded in 1980 as against 7.0 and 38.6 lakhs realised in 1979 and 1981 respectively. The sales proceeds of carangids varied from Rs 1.8 to 1.5 lakhs. The earning of tuna showed a gradual increase from Rs 1.6 lakhs in 1979 to 16.3 lakhs in 1981. The year 1980 was most productive for prawns when their sales touched Rs 28.4 lakhs as compared to just Rs 3 lakhs in the previous year.

8. Truck load of cat fish for transportation

As mentioned earlier, September-November forms a lean period for trawlers and as such they are used as carrier boats. They are hired on contract basis either daily or monthly. In the former case it is about Rs 300/- excluding food and fuel, and in the latter Rs 6,000 per month.

Earnings of crew

The expenditure on the requirement of daily food of the crew is met from the common fund of a purse seine unit. As yet there is no practice of engaging crew members on fixed wages either

daily or monthly basis. However, as a sort of incentive to the crew, a system has been evolved wherein 25% of the day's income would be equally shared by all. During the season, a fisherman earns approximately Rs 4,000 to 9,000.

As most boats are financed by banks, they have to repay the capital as well as interest accrued thereon which works out about Rs 12,000 per month, irrespective of catch or monsoon when the boats are idle.

An analysis of the annual income and expenditure based on the average catch per boat is given below:

1.	Annual return based on average catch per boat	Rs 5,61,200
2.	Expenditure	
	a) Food @ Rs 150 × 230 days	Rs 34,500
	b) Diesel 230 days × 200 litres	Rs 1,48,120
	c) Wages - 25% of annual income	Rs 1,40,300
	d) Carrier boat hiring charges	Rs 30,000
	e) Repayment of loan	Rs 1,44,000
	f) Incidental expenditure (Repairs, spare parts etc.)	Rs 10,000
	Total	Rs 5,06,920

Thus, the minimum amount that a purse seine unit has to earn works out to about Rs 5 lakhs per year as the break-even point.

General remarks

In view of the increasing operations of purse seiners and consequent additional exploitation of the various resources from limited areas, a close monitoring the situation is very essential in order to manage the fishery properly and attain stability of production and economic returns. In this connection one of the important points for consideration is avoiding heavy pressure on critical stages such as juveniles, spawning stocks etc. of some of the resources like oil sardines, mackerels, horse mackerel and cat fishes. More often it is noticed that indiscriminate fishing using the purse seines results in wasteful utilisation of the resources and in some cases even destruction of future resources. The particular method of fishery being in the initial stages it would be advisable that the authorities concerned view the matters relating to the purse seine fishery with the proper management perspective.