

COMMERCIAL TRAWL FISHERY OFF MADRAS COAST DURING 1980-'89 WITH A COMPARATIVE ACCOUNT OF THE CATCH TREND OF SHRIMP AND FISH TRAWLERS DURING 1989-'91

K. Satyanarayana Rao and P. K. Mahadevan Pillai

Madras Research Centre of CMFRI, Madras - 600 008

Introduction

The fishery resources off the Madras coast have been traditionally exploited by indigenous craft and gear. Introduction of commercial trawling two and half decades back and progressive expansion of the fishing fleet to exploit the ground fishes and prawns along the coast have resulted in considerable development of mechanised fisheries sector.

With the exception of a small number of seasonally operated Pablo-type drift gill netters, mechanised vessels operating along the Madras coast are trawlers which land their catches at Pudumanikuppam adjacent to the Madras Fisheries Harbour. The Fisheries Harbour constructed in 1983 at a cost of Rs. 12.6 crores with a jetty of 495 m length affords berthing facility to 50 trawlers. Due to socio-economic factors, at present all the trawlers engage catamarans for transporting their catch to Pudumanikuppam centre and the Fisheries Harbour is being utilised only for berthing the vessels.

Apart from the catch estimation of the mechanised vessels at Pudumanikuppam in the period 1981-'85 (*Mar. Fish., Infor. Serv., T & E Ser.*, No. 41 1982; 52 : 1983; 67 : 1986, *CMFRI Spl. Pub.* No. 34, 1987), no detailed information is available on the seasonal abundance of catches and related aspects of the fish landed at this centre. In the present study the composition of the commercial trawler landings at Pudumanikuppam, Madras during the period 1980-'89 has been studied with particular reference to the seasonal abundance of catch, catch per unit effort and seasonal fluctuations of major constituents of the catches. A comparative account of the catch trend of both shrimp and fish trawlers during the period 1989-'91 is presented indicating the seasonal variations in

the landings with particular reference to the fluctuations of the major groups contributing to the fishery.

The various fishing areas covered by the trawlers are indicated in Fig. 1. Besides the daily trips made by the shrimp and fish trawlers which regularly conduct fishing operations off Madras coast, a small number of shrimp trawlers make long trips and fish off Sriharikota and Nellore.

The trawlers operated from Madras base comprise of four different overall length groups, 9.5-10 m, 11 m, 12 m and 13 - 14 m (the conventional 32', 36', 40' and 45') with the horsepower varying between 90 and 120 (Fig. 2 & 3). The vessels of the overall length 9.5 - 10 m and 11 m exclusively operate fish trawls northeast off Madras in slightly deep waters of 30 - 40 m depth range adjacent to the rocky patches locally termed *madai* whereas the 12 m and a few 11 m vessels conduct daily trip shrimp trawling in the coastal waters off Madras in the depth zones of 15 - 30 m. Most of the trawler units of the higher length range 13 - 14 m with 120 HP engine are engaged in long trip shrimp trawling off Sriharikota and Nellore at depths of 15 - 30 m for a duration of 3 - 4 days (Fig. 4).

Trawl production

During the period 1980-'89, an annual average of 9,500 t of all fishes was landed by trawlers at Pudumanikuppam centre for an effort of 34,090 unit operations. Fig. 5 indicates the fluctuations in the catch, effort and catch per unit effort. A steady increase in the landings with increased effort over the years is evident from the catch per unit indices. From 1,416 t in 1980 a steep rise in production to 16,342 t has occurred in 1987 and there has been a further increase to 23,953 t in 1989. The average annual all fish

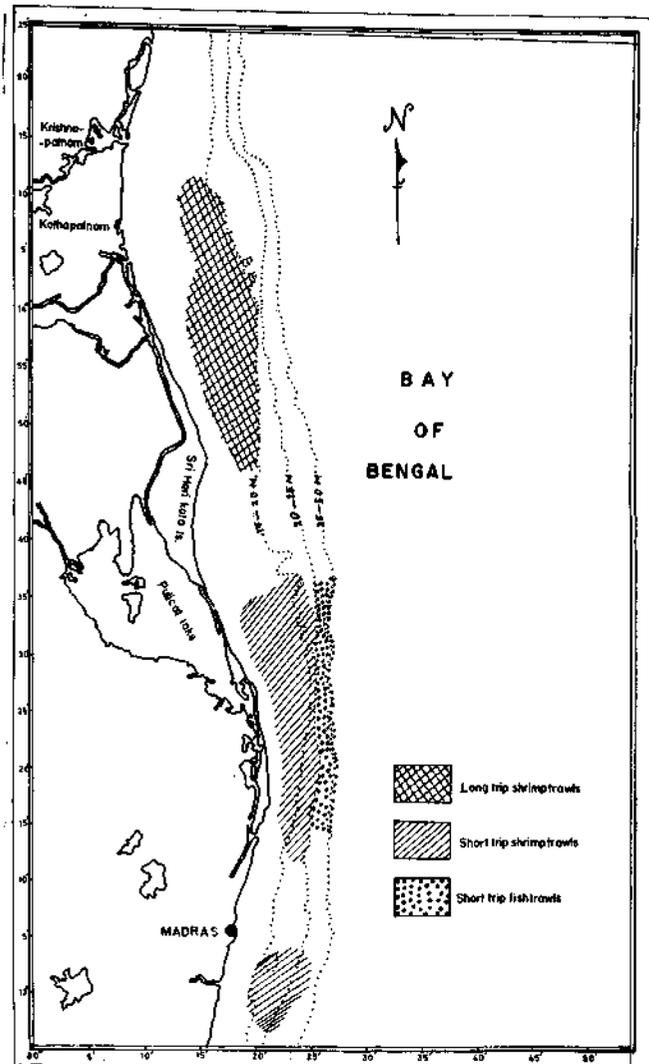


Fig. 1. Map showing the different areas where shrimp and fish trawlers based at Madras operated.



Fig. 2. Trawl catches being brought to Pudumanikuppam centre, Madras by catamarans from shrimp and fish trawlers.

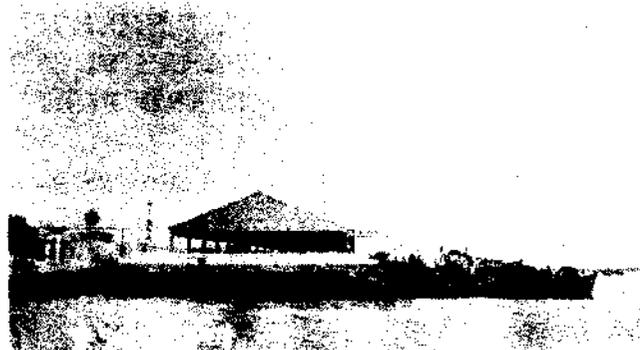


Fig. 3. A view of trawlers berthed at Madras Fisheries Harbour.

production during 1985-'89 was 14,162 t which is almost thrice that in the period 1980-'84 (4,796 t). The CPUE has doubled to 369 kg in 1987 compared to earlier years and has risen steadily with a maximum of 565 kg in 1989.

Analysis of pooled data on the quarterwise catch and effort during the period 1980-'89 with respective catch per unit effort (Fig. 6) reveals that in most quarters during the period increase in the unit operations yielded proportional increase of catch excepting the first quarter of 1987, when the effort was 36% of the year and the catch realised was 17%, with a decrease in the catch per unit effort. During the subsequent period viz., second quarter of 1987, with 6% reduction in unit operations than the previous quarter, 38% increase in the catch has been recorded. In the third and fourth quarters of 1989, when 35% and 29% of the total catch of the year was obtained maximum catch per unit effort of 767 kg and 627 kg respectively were recorded. The seasonal catch trend observed in



Fig. 4. One of the long trip shrimp trawlers (overall length 14 m.) berthed at Pudumanikuppam.

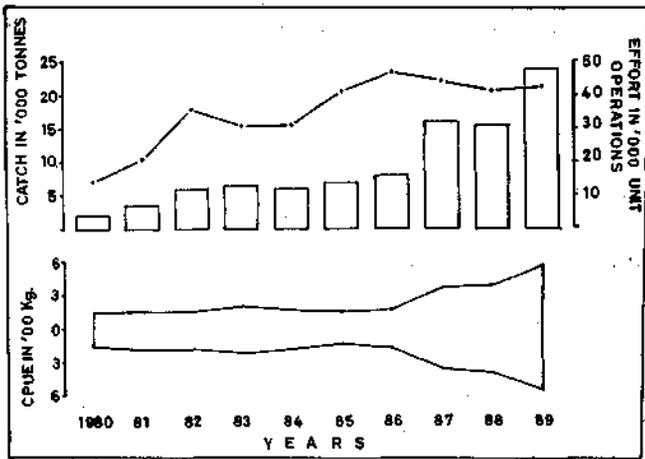


Fig. 5. All fish catch, effort and C.P.U.E. of the trawlers based at Madras during 1980-89.

the various quarters of the period suggests that the third quarter is most productive followed by fourth quarter along the coast. This is further confirmed by the trend of the estimated combined quarterwise catch and effort for the periods, 1980-'84 and 1985-'89 (Table 1).

TABLE 1. Percentage of combined quarterwise catch and unit operations during the periods 1980-'84 and 1985-'89

Quarters	1980-'84		1985-'89		Total	
	Catch	Effort	Catch	Effort	Catch	Effort
I Quarter	22.1	25.0	19.4	27.2	20.1	26.3
II Quarter	21.7	22.0	22.2	21.9	22.1	22.0
III Quarter	31.7	27.3	33.1	25.2	32.7	26.0
IV Quarter	24.5	25.7	25.3	25.7	25.1	25.7

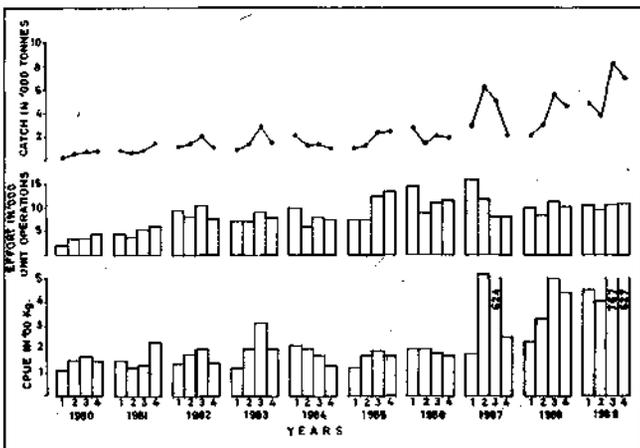


Fig. 6. Quarterwise all fish catch, effort and C.P.U.E. of trawlers during 1980-89.

In order to get a detailed picture, pooled catch and effort in different months of the two five year periods 1980-'84 and 1985-'89 have been studied (Fig. 7). Monthly catch and effort trend has been more or less similar and highest effort and catch have been recorded during 1985-'89. The maximum landings were obtained in the third quarter during both the periods with peak landings in August.

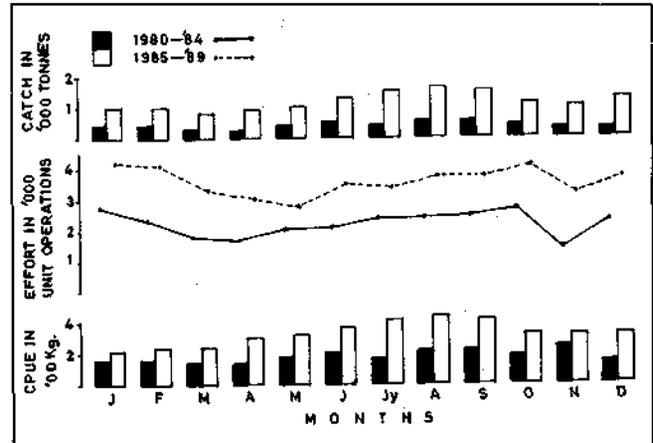


Fig. 7. Monthly fluctuations of catch, effort and C.P.U.E. of trawlers during 1980-'84 and 1985-'89.

Seasonal fluctuations of different groups

Of the various groups which contributed to the trawler fishery, fifteen major ones have been selected to study the seasonal fluctuations during the five year periods, 1980-'84 and 1985-'89. The percentage composition of the different groups in various seasons expressed as percentages in total landings are indicated in Fig. 8. The predominant groups (Fig. 9 & 10) comprised of the sharks, *Charchartus* spp., *Rhizoprionodon* sp., Skates, *Rhinobatus* spp., rays, *Dasyatis* spp., *Aetobatus* spp., *Rhinoptera* spp; threadfin breams, *Nemipterus* spp., silverbellies, *Leiognathus* spp., *Secutor* spp., ribbonfishes, *Trichiurus lepturus*; carangids, *Decapterus russelli*, *Selaroides leptolepis*, *Caranx* spp., goatfishes, *Upeneus* spp., lizard fishes, *Saurida* spp., croakers, *Johnius* spp., *Otolithus* spp., Silverbiddies, *Pentaprion* sp., barracudas, *Sphyraena* spp., white-baits, *Stolephorus* spp., penaeid prawns, *Penaeus indicus*, *P. semisulcatus*, *Metapenaeus dobsoni*, *Metapenaeopsis* sp. *Parapenaeopsis* sp., crabs, *Portunus* spp., cephalopods, *Sepia* spp. and *Loligo* sp. The groups termed 'others' includes mostly the incidental and seasonal landings of bullseye,

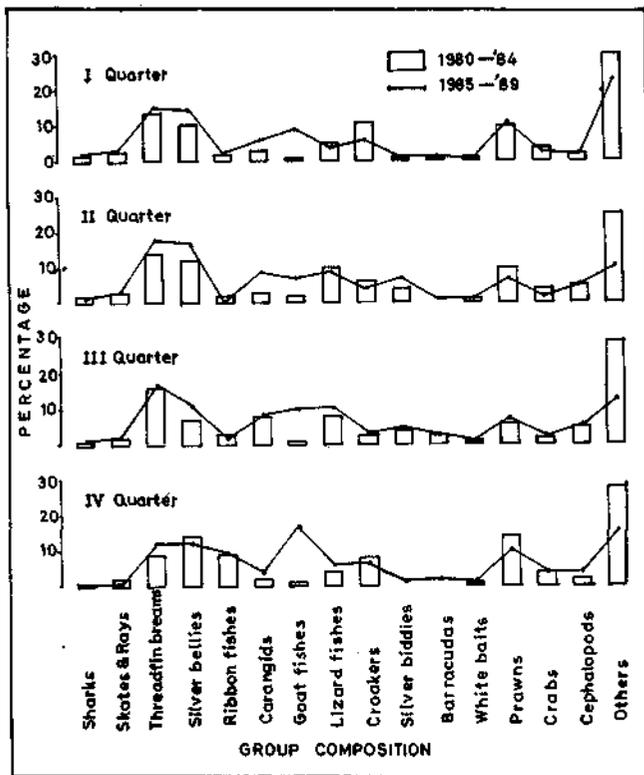


Fig. 8. Percentage contribution of different groups in trawl catches during 1980-'84 and 1985-'89.

Priacanthus hamrur; rainbow sardine, *Dussumieria* sp.; flatfishes, *Cynoglossus* spp. and *Psettodes erumei*; Indian whittings *Sillago sihama*, drift-fishes *Ariomma indicus* and the mojarras, *Gerres* spp. besides the miscellaneous trash fishes. The study revealed that some groups exhibit distinct seasonal trend during both the periods, 1980-'84 and 1985-'89.



Fig. 9. A part of fish trawl catch.



Fig. 10. A portion of the catch of a short trip shrimp trawl.

The threadfin bream catches are high in the first three quarters and lower in the fourth quarter. The best ribbonfish landings are obtained in the fourth quarter. Silverbellies were common in the first three quarters and less in the last quarter. The carangids exhibit high percentage indices during the second and third quarters. This was mainly due to the heavy landings of the scad, *Decapterus russelli* which formed nearly 70% of the carangids caught by fish trawls. Goatfishes were not prominent in trawl catches during 1980-'84 but in the subsequent five year period, they were caught in large quantities with a maximum of 17% in the fourth quarter. Lizardfish catches were maximum in second and third quarters. The percentage contribution of prawns is highest in fourth quarter followed by first and second quarters. Recent observations indicated that the bullseye (*Priacanthus hamrur*) and the drift-fish (*Ariomma indicus*) comprised nearly 13-19% and 4% respectively in the fish trawl catches.

Comparative catch trend of shrimp and fish trawls

The all fish catches of the daily trip fish and shrimp trawlers and long trip shrimp trawlers during the period October 1989 to June 1991 have been analysed and the seasonal trend of the catches of these different trawler units are given in Fig. 11. There have been no remarkable fluctuations in the effort over the quarters in the case of long trip shrimp trawlers during 1989-'90 but an increase in effort in 1991 has resulted in a higher catch as seen from the catch per unit effort. On an average 10 - 12 units landed per day. These trawlers have been estimated to have landed 23% of the total trawl production during the first half of 1991.

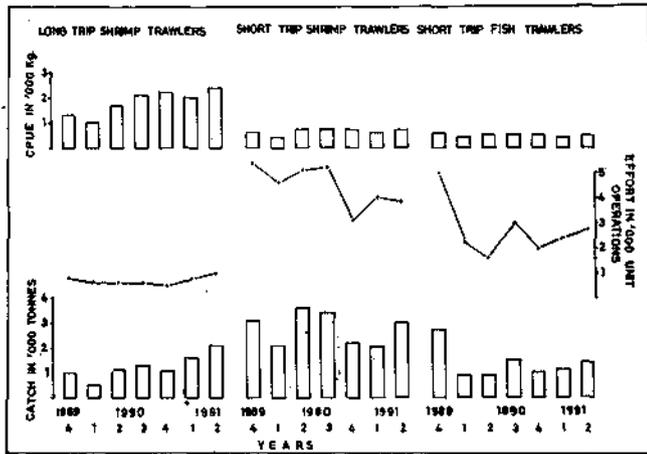


Fig. 11. All fish catch, effort and C.P.U.E. of long trip shrimp trawlers, short trip shrimp trawlers and short trip fish trawlers during 1989-91.

With the operation of an average of 30 - 35 units per day and comprising 57% of the total trawlers, the short trip shrimp trawlers realised nearly 52% of the total landings during the period. Maximum catch and effort were recorded in the second and third quarters of 1990 followed by a steep decline in the fourth quarter without decrease in the catch per unit effort.

An average of 28 - 35 fish trawl units landed per day during the period and accounted for 25% of the total catch landed recording highest effort and catch in the fourth quarter of 1989. In spite of sharp fluctuations in effort noticed during some quarters, well defined changes were not observed in catch or catch per unit effort.

Groupwise landings in different type of trawls

Maximum catches of elasmobranchs including sharks, skates and rays (Fig. 12) were obtained in long trip shrimp trawls which accounted for 69% of trawl production during the period October 1989 - June 1991, followed by short trip shrimp trawls in which 30% were caught (Table 2). 53% of the threadfin bream production were fished in short trip shrimp trawls while fish trawls and long trip shrimp trawls netted 26% and 21% respectively. The bulk of silverbelly production (64%) was obtained in short trip shrimp trawls and only limited quantities in the other two types of trawls. Silverbellies are a predominant component of short trip shrimp trawls contributing 66% but are represented in much smaller proportion in the other two types of gears.

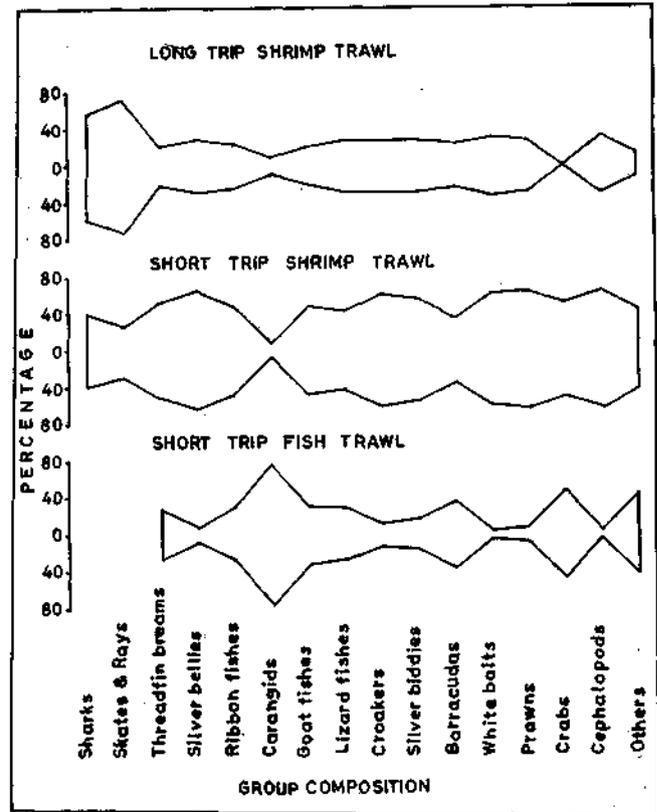


Fig. 12. Percentages of groupwise landings of three different types of trawlers during 1989-91.

TABLE 2. Groupwise production of different trawlers during October 1989 to June 1991 (in tonnes)

Groups	Long trip shrimp trawlers	Short trip shrimp trawlers	Short trip fish trawlers	Total
Sharks	33	23	2	58
Skates & Rays	283	115	-	398
Threadfin breams	1,100	2,853	1,396	5,349
Silverbellies	1,611	4,058	436	6,105
Ribbonfishes	770	1,538	838	3,146
Carangids	221	236	1,606	2,063
Goatfishes	1,107	2,738	1,761	5,606
Lizardfishes	571	942	660	2,173
Croakers	458	986	182	1,626
Silverbiddies	391	729	218	1,338
Barracudas	181	264	280	725
Whitebaits	50	99	8	157
Prawns	589	1,364	230	2,183
Crabs	7	392	355	754
Cephalopods	857	1,719	89	2,665
Others	534	1,671	1,636	3,841
Total	8,763	19,727	9,697	38,187
Number of unit operations	4,475	31,409	19,185	55,069

The best catches of ribbonfishes were obtained in short trip shrimp trawls (49%) and the other two gears accounted for 24-27%. Goatfish and lizardfish catches show a similar trend. Carangids are a predominant group in short trip fish trawls in which they form as much as 78%. In the other two gears they form only 6-8%. 60% of croakers and white bait production is accounted for by short trip shrimp trawls. 64% of prawn production (Fig. 13) is obtained in short trip shrimp trawls and the long trip shrimp trawls are next in importance catching 28%. Only 8%



Fig. 13. Prawn catches landed by short trip shrimp trawlers.

of prawns are landed in the fish trawls. 52% of the crab catches are got by short trip shrimp trawls and 48% by fish trawls. Considerable quantities of crabs are caught in long trip shrimp trawls but they are not brought ashore due to lack of space in fish holds and the less price they fetch. 80% of the crabs caught in fish trawls consists of the swarming crab, *Charybdis (Goniohellenus) smithii* which appears in large quantities in some months. In the total trawl production, the catches of short trip shrimp trawls formed 52%, those of short trip fish trawls 25% and long trip shrimp trawls 23%. The short trip shrimp trawls are the main gear in which squids and cuttle fishes are obtained (64%) and the long trip shrimp trawls are second best gear for this group (34%) while fish trawls net only insignificant quantities (2%).

Remarks

The existence of trawling grounds off Madras coast has been indicated in the early period of the present century by exploratory trawling surveys conducted by the Department of

Fisheries of the then Madras Presidency. However, commercial trawling was started in the Madras area only in the late 1960's and trawling became an active mode of exploitation from 1970s.

The all fish production of trawlers based at Madras amounted to 1,416 t in 1980. The 1980s are a period when the trawl fishery progressed remarkably attaining peak production of 23,953 t in 1989 and all fish production of trawlers based at Madras landed 17% of the total trawl production of Tamil Nadu. 75% of the total production of trawlers based at Madras during 1980-'89 was obtained in 1985-'89 with an effort of 62% in the period. The three fold rise in the annual all fish production observed in 1985-'89 as compared to the previous five year period is due to the starting of the long trip shrimp trawling operations off Sriharikota-Nellore coast which resulted in higher catches and catch rates.

The highest quantity of prawns (64%) is caught in short trip shrimp trawlers from depths of 15-30 m. The next best prawn catches are obtained in long trip shrimp trawl (28%) from same depth. The commercially important fishes like threadfin breams, ribbonfishes, goatfishes, barracudas, silverbellies and whitebaits are caught in maximum quantities in short trip shrimp trawls. These fishes are obtained in lesser quantities in the other trawls. Seasonal abundance of the resources show that the best catches were got in the third quarter followed by fourth quarter during the period 1980-'89.

The catch rate of long trip shrimp trawls operated off Sriharikota-Nellore coast are markedly higher than that of short trip shrimp trawl operated off Madras coast and adjacent areas. This is due to the greater effort expended by the long trip shrimp trawlers which are of high horsepower and have 1 tonne capacity cold storage fish hold.

The results obtained in the present study indicate that there is good scope for stepping up production of demersal fish and shell fish resources off Madras and adjacent coasts by increasing the number of units operated from the present level. The rising trend of annual production in the period 1985-'89 and the steady catch per unit effort lend support to this view.