MARINE FISHERIES INFORMATION SERVICE

Technical and Extension Series

No. 29

JULY 1981

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

COCHIN, INDIA

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

THE MARINE FISHERIES INFORMATION SERVICE: Technical and Extension Series envisages the rapid dissemination of information on marine and brackish water fishery resources and allied data available with the Fishery Data Centre and the Research Divisions of the Institute, results of proven researches for transfer of technology to the fish farmers and industry and of other relevant information needed for Research and Development efforts in the marine fisheries sector.

Abbreviation – *Mar. Fish. Infor. Serv. T & E Ser., No.* 29: 1981

CONTENTS

Cover photo: Sakthikulangara mechanised vessel landing centre.

IMPACT OF MECHANISED FISHING ON THE SOCIO-ECONOMIC CONDITIONS OF THE FISHERMEN OF SAKTHIKULANGARA-NEENDAKARA, KERALA*

Introduction

In recent years Sakthikulangara–Neendakara area has gained considerable importance as a major centre of fishing industry in Kerala State. This has been brought about by the introduction of a large number of mechanised trawlers and consequent development of infrastructure facilities like ice factories, freezing cum cold storage plants and boat building yards. The villages of Sakthikulangara and Neendakara are situated 9 km north of Quilon on the banks of Ashtamudi channel which connects Ashtamudi lake with the sea. Mechanised boats were first introduced in this area in the mid fifties under the auspices of the Indo-Norwegian Project and over the years there has been a spectacular growth in the fishing activities of this area.

Studies on the socio economic conditions of the fishermen of this area with reference to housing, health and sanitary conditions, income levels of fishermen etc. were carried out by the Indo-Norwegian Project authorities during the fifties and sixties after the commencement of the project (H. Lid and A. Bassen, 1957, Indo-Norwegian Project in Travancore-Cochin, Report No. 3; Asari T.R.T. and M.D. Menon, 1963, A report on the assessment of the Indo-Norwegian Project on the socio economic conditions of the fishermen of the area). It is observed from these reports that in the fifties the standard of living of the fishermen of this area was very low, showing considerable improvement in the sixties consequent to the introduction of mechanisation in fishing.

Great strides have since been made in the socio-economic conditions of these fishermen and it was felt desirable to carry out a study of the same in order to assess the progress made in recent years so as to form a base for further planning of developmental programmes. Accordingly a survey was carried out in this area during March–May 1980 details of which are presented here.

*Prepared by R. Sathiadhas and G. Venkataraman, CMFRI, Cochin

Work programme

A preliminary investigation was conducted to identify the wards of the Sakthikulangara and Neendakara panchayats predominantly resided by fishermen and the type of data to be collected from the fishermen households. Based on this investigation, two types of schedules for data collection were prepared, one being household schedule and the other village schedule. The household schedule contained particulars relating to the family details of the fishermen such as size of the family, literacy, number of persons engaged in fishing and fishery related and other activities, number of crafts and gears possessed and their income. Information pertaining to the infrastructure facilities available in the area like cold storage cum freezing plants, ice plants, boat building cum repairing yards and peeling sheds was collected in the village schedule.

The definition of terminologies followed in the collection of data is given below:

1. *Fishermen household:* Any household wherein at least one member of the family is engaged either in fishing or fishery related activities has been considered as a fishermen household for the present study.

2. *Types of houses:*

a) Hut: A dwelling with thatched roof and having either a mud wall or an enclosure made of *thattis*.
b) Kutcha house: A dwelling with a thatched roof and brick wall.
c) Pucca house: A dwelling with tiled roof and brick wall.
d) Mansion: A dwelling having concrete roof.

3. *Educational status:*

a) Primary: Those who have passed 5th standard.
b) Middle: Those who have passed 8th standard.
c) Secondary: Those who have passed 10th standard.

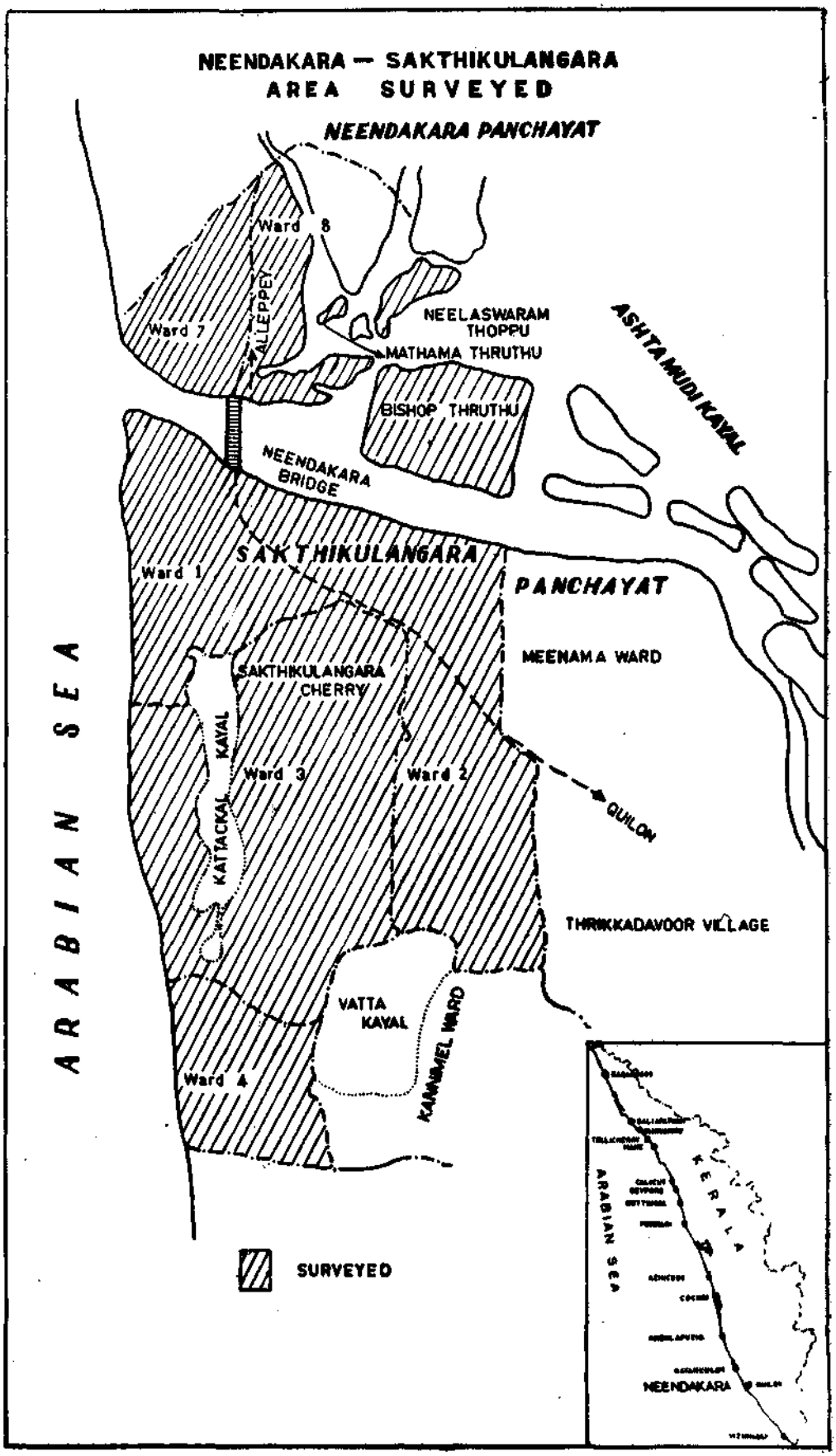


Fig. 1. Map showing the areas included in the socio-economic survey.

d) Higher secondary and above: Those who have passed secondary and taken to higher courses.

4. *Major occupation:* Occupation which brings more than 50% of the households' income.

5. *Work force:* Persons available for employment excluding children below 12 years, those above 60 years and students.

6. *Fishery related activities:* Those who are engaged in activities like fish trading, net making/repairing, curing and processing and boat building/repairing come under this category.

Out of the 12 wards included in the Sakthikulangara panchayat, 4 wards and out of the 8 wards in Neendakara panchayat, 2 wards were selected for conducting the socio-economic survey as these wards are predominantly occupied by fishermen and constituted Sakthikulangara and Neendakara villages respectively (Fig. 1).

Two persons were engaged for conducting door to door enumeration of the fishermen households on a whole time basis for a period of two months from 3-3-1980 to 2-5-1980. The scientific staff of the Central Marine Fisheries Research Institute associated with this work camped there during this period and personally supervised the work of the enumerators. They also conducted spot checking to ensure the accuracy of the data collected.

Details of socio-economic survey

a) Population

The total number of households in the 4 wards of Sakthikulangara and 2 wards of Neendakara comes to 2,698 of which 1,638 are fishermen households. The total population is 14,499, the fishermen alone being 9,116, forming 63 per cent.

The total number of households in Sakthikulangara comes to 2,103 whereas in Neendakara it is 595. The total population of Sakthikulangara is 11,038 and in Neendakara 3,461, the fishermen population alone being 6,551 in the former and 2,565 in the latter. The maximum number of fishermen population in Sakthikulangara is in D ward and in Neendakara in 7th ward.

It is seen from the analysis of sexwise distribution of the population in the area (Table 2) that the males outnumbered the females, there being 912 females in Sakthikulangara and 963 females in Neendakara for 1000 males. Adults falling in the age group of over 18 constitute 52 per cent whereas children coming below the age of 12 constitute 32 per cent of the population of both the places together, the rest falling in the category of 12–18 years.

Table 1. *Household and population details in Sakthikulangara and Neendakara*

Ward	Total		Fishermen alone	
	No. of households	Population	No. of households	Population
Sakthikulangara –A	415	2,308	357	1,986
Sakthikulangara –B	630	3,044	202	1,032
Sakthikulangara –C	434	2,357	208	1,162
Sakthikulangara –D	624	3,329	442	2,371
Neendakara–7th	340	1,925	252	1,468
Neendakara–8th	255	1,536	177	1,097

b) Size of family

There is no striking difference in the average size of the fishermen and non-fishermen households (6 persons in the former as against 5 in the latter). The size of the fishermen families under different categories in both the areas, is presented in Table 3.

It is interesting to note that 54 per cent of the total households in Sakthikulangara have a family size of 1 to 5 whereas in Neendakara only 48 per cent of the households come under this category. However the percentage of households coming under the category of 6 to 10 members are more or less equal in both the places. But those coming under the category of 10 and above are significantly higher in Neendakara (5 per cent) as compared to Sakthikulangara (1 per cent). This can be due to the joint family system being more in vogue in the former than in the latter.

Table 2. *Agewise and Sexwise distribution of the population*

Age group	Sakthikulangara			Neendakara			Total		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Below 12	1,776	1,721	3,497	583	579	1,162	2,359	2,300	4,659
12–18	910	892	1,802	283	288	571	1,193	1,180	2,373
Above 18	3,088	2,651	5,739	897	831	1,728	3,985	3,482	7,467
Total	5,774	5,264	11,038	1,763	1,698	3,461	7,537	6,962	14,499

Table 3. *Size of family of fishermen households*

No. of members	No. of households	
	Sakthikulangara	Neendakara
1–5	655	205
6–10	539	201
Above 10	15	23
Total	1,209	429

c) Housing

Huts and Kutcha houses comprise 80% of the dwellings in Neendakara whereas they form 49 per cent in Sakthikulangara (Fig. 2). These huts have very little dwelling space and most of them are ill ventilated. Pucca houses and mansions are found to be more in Sakthikulangara (51 per cent) as compared to Neendakara (20 per cent). Some of the islands forming part of Neendakara area lack electricity and potable water facilities.

d) Literacy

Table 4 gives particulars regarding educational status of the people of the two villages. A majority of the population both in Sakthikulangara (76 per cent) and Neendakara (83 per cent) are literates.

A significant feature noted is that illiterates comprise 24 per cent in Sakthikulangara whereas the same constitute only 17 per cent in Neendakara. However among the literates, 34 per cent come under higher secondary and above in Sakthikulangara in contrast to 28 per cent in Neendakara. This is probably due to the parents of Sakthikulangara being comparatively in a better position to afford higher education for their children than that of Neendakara.

e) Occupational pattern

In Table 5 are given the details regarding the different categories of occupation connected with fishing and the

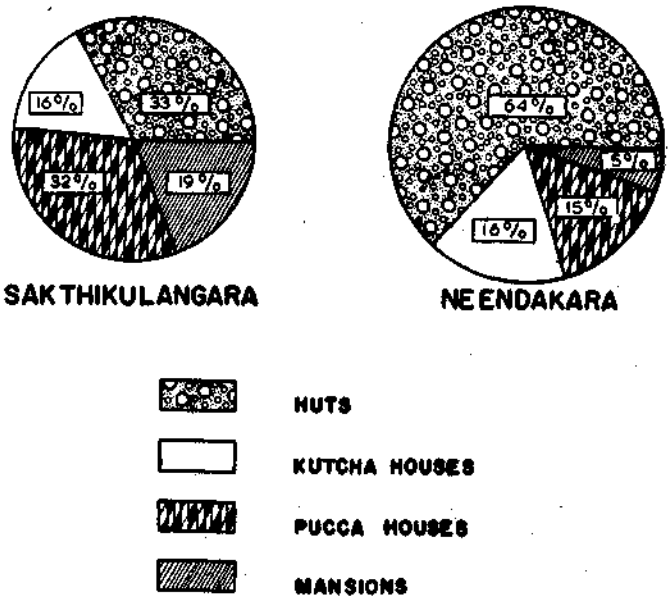


Fig. 2. Proportion of different types of houses in Sakthikulangara and Neendakara.

Table 4. **Literacy among the Fishermen of Sakthikulangara and Neendakara*

Literacy level	Sakthikulangara	Neendakara	Total
Illiterates	1,466	337	1,803
Primary	2,047	801	2,848
Middle	935	419	1,354
Higher Secondary	1,328	376	1,704
Above Higher Secondary	221	95	316
Total	5,997	2,028	8,025

*Those in the age of 5 and above only have been taken into consideration.

number of households coming under each category. Each household is classified under a particular category based on the major source of income.

In Sakthikulangara 30 per cent of the households derive their major income by serving as labourers either in mechanised boats or country crafts. About 20 per cent of the households derive a greater part of their income by the operation of self owned mechanised boats and another 20 per cent by fish trading. About 9 per cent and 8 per cent of the households get their major income by processing and by operating self owned country crafts respectively.

In Neendakara, 46 per cent of the households get their major income by serving as labourers either in mechanised vessels or country crafts. It is interesting to note that a much higher percentage of households in Neendakara (20 per cent) are depending for their major income on the operation of self-owned country crafts as compared with that of Sakthikulangara. The households depending upon other related activities like net making, boat repairing etc. form 14 per cent in Sakthikulangara as against 7 per cent in Neendakara. Only 3 per cent of households in Neendakara get their major income by curing and processing.

f) Employment status

Out of a total fishermen population of 9,116 in the two villages, 2,473 persons are employed, of which 2,219 (90 per cent) are connected with fishing and fishery related activities. The ratio between earning members and the dependents is approximately 1:4. Out of the total work force of 3,008 available in this area it is found that 18 per cent are unemployed. However, a comparison between Neendakara and Sakthikulangara shows that a greater percentage of the work force (25 per cent) is unemployed in the former place as compared with the latter (11 per cent).

It is observed that out of those employed as much as 60 per cent have fishing as their occupation. An interesting feature observed in Sakthikulangara is that among those engaged in fishing as much as 72 per cent are employed in mechanised boats, whereas the same in

Table 5. *Occupational pattern of households*

S. No.	Occupational pattern	No. of households		
		Sakthikulangara	Neendakara	Total
1.	Mech. boat owners	237	47	284
2.	Country craft owners	91	87	178
3.	Labourers engaged in fishing	361	197	558
4.	Fish traders	242	57	299
5.	Curers & Processors	111	12	123
6.	Other allied activities	167	29	196
	TOTAL	1,209	429	1,638

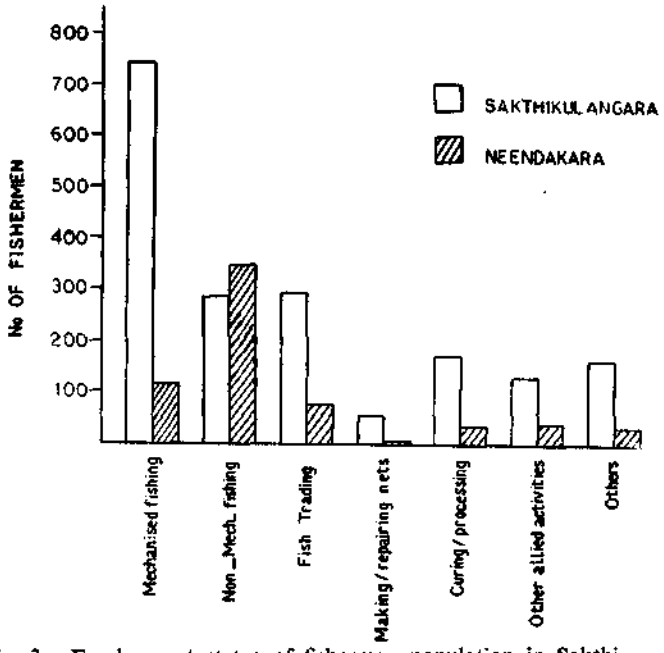


Fig. 3. Employment status of fishermen population in Sakthikulangara and Neendakara.

Neendakara come to only 25 per cent (Fig. 3). In Sakthikulangara, among those employed in fishery related activities, fish traders form the maximum (46 per cent), followed by those engaged in curing and processing (26 per cent). Further 20 per cent of them are employed in activities such as boat building and repairing, freezing, ice making etc. and the rest (8 per cent) are engaged in making/repairing nets. More or less a similar pattern of employment is observed in Neendakara also in respect of fishery related activities. Only a small percentage of people are employed in other sectors like services, business etc. in both the places.

g) Crafts

i Details of Crafts

Altogether in this area there are 336 mechanised boats of which 293 are trawlers and 43 gillnetters. Out of these 287 belong to Sakthikulangara, 258 being fully owned and 29 partly owned. Of the 49 boats belonging to Neendakara 39 are fully owned, the rest being shared (Table 6).

The number of non-mechanised crafts (214) is less than the mechanised boats in this area. An interesting feature noted is that the number of plank-built boats are much more in Sakthikulangara than in Neendakara, whereas reverse is the case in respect of catamarans. This shows the higher investment of the people of Sakthikulangara in non-mechanised sector also as compared with that of Neendakara.

ii Ownership

In Sakthikulangara 3 families own 5 or more boats, 5 families own 3 to 4 boats, 193 families have 1 to 2 boats and 36 families have partial ownership (sharing) of boats, whereas in Neendakara 36 families have 1 to 2 boats and 11 families have partial ownership of boats (Fig. 4). 92 families in Sakthikulangara and 105 families in Neendakara own non-mechanised crafts.

It is seen that none of the families in Neendakara own more than two boats whereas 8 families in Sakthikulangara own 3 or more boats. It is also observed that the boats possessed by the people of Neendakara are mostly old and smaller in size as compared with that of Sakthikulangara.

Table 6. *Details of fishing crafts in Sakthikulangara and Neendakara*

Type of craft	Sakthikulangara		Neendakara		
	Owned	Shared	Owned	Shared	Total
1. *Mechanised*					
i) Trawlers	217	27	39	10	293
ii) Gillnetters	41	2	—	—	43
2. *Non-mechanised*					
i) Plank-built boats	52	—	7	—	59
ii) Dug-out boats	40	—	46	—	86
iii) Catamarans	12	—	57	—	69

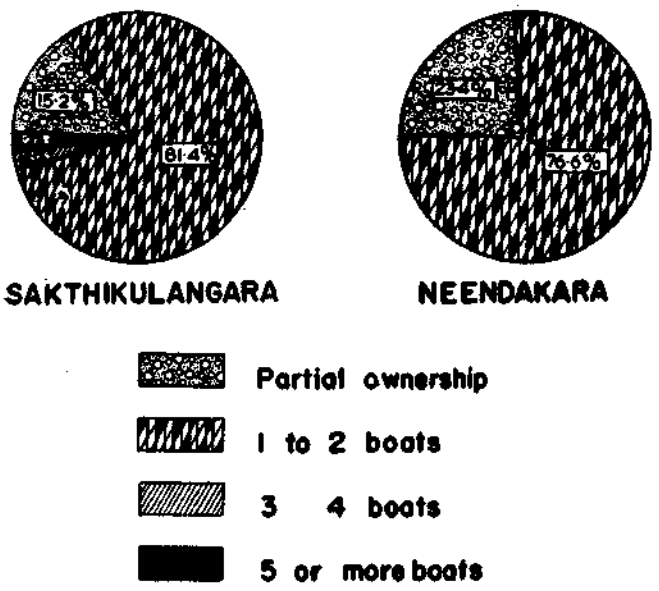


Fig. 4. Family ownership details of mechanised boats in Sakthikulangara and Neendakara.

h) Gears

In Sakthikulangara trawl nets constitute the maximum number followed by gillnets while in Neendakara cast nets form the largest number followed by trawl nets (Table 7). Stake nets form a sizable number in both the places. Hooks and lines occupy an important position in Neendakara.

Table 7. *Fishing gears in Sakthikulangara and Neendakara*

S.No.	Gear	Sakthikulangara	Neendakara
1.	Trawl nets	453	90
2.	Gill nets	305	27
3.	Stake nets	100	52
4.	Cast nets	26	92
5.	Hooks and lines	3	38
6.	Boat seines	—	3
7.	Others	—	11

The process of mechanisation in Neendakara has not obviously been as fast as in Sakthikulangara as reflected in the smaller number of trawl and gill nets. The dependence of the people of Neendakara on non-mechanised fishing is further seen from their possession of sizeable number of cast nets and hooks and lines. Stake nets are found in large numbers in both the places as they are ideally situated on the banks of the Ashtamudi Channel for the operation of the same.

i) Income

There has been significant rise in the level of income of the people of Sakthikulangara and Neendakara in the last two decades. Tables 8 and 9 show the number of families under different income groups based on their major occupation.

In Sakthikulangara about 5 per cent of the fishermen families have a monthly income of Rs. 100/- and below, 37 per cent ranging from Rs. 101/- to 300, 28 per cent ranging from Rs. 301 to 500, 19 per cent ranging from Rs. 501 to Rs. 1,000, 8 per cent ranging from Rs. 1,001 to 2,000, 3 per cent from Rs. 2,001 to 4,000 and 0.5 per cent above Rs. 4,000. In Neendakara 3 per cent of the fishermen families have a monthly income of Rs. 100 and below, 58 per cent come under the income range of Rs. 101 to Rs. 300, 29 per cent Rs. 301 to 500, 9 per cent Rs. 501 to Rs. 1,000 and only one per cent under 1,001 to 2,000, there being none above this income range.

Analysis of income levels of the fishermen families according to different categories of occupation has brought out some interesting features. In Sakthikulangara 7 per cent of the families owning mechanised boats have an income ranging from Rs. 301 to 500 and 44 per cent from Rs. 501 to 1,000 per month, there being none having an income of less than Rs. 300. The rest of the families owning mechanised boats come under the higher income brackets ranging from Rs. 1,001 to Rs. 2,000 and Rs. 2,001 and above constituting 30 per cent and 4 per cent respectively. With regard to the families owning non-mechanised boats it is seen that 21 per cent of families come under income range of Rs. 101 to 300 as against nil in the case of families owning mechanised boats, 34 per cent come under the income range of Rs. 301 to 500, 41 per cent under the range of Rs. 501–1,000. Only 3.3 per cent of the families have an income of Rs. 1,001 to 1,500, there being none above this range. About 45 per cent of the families of wage earners by fishing come under the monthly income range of Rs. 101 to 300 and 40 per cent come under Rs. 301 to 500. It is observed that 48 per cent of the families having fish trade as their occupation have an income of less than Rs. 300 per month. Almost all the families carrying out curing and peeling are in lower income levels of less than Rs. 300 per month.

Table 8. *Classification of fishermen families based on occupation and monthly income—Sakthikulangara*

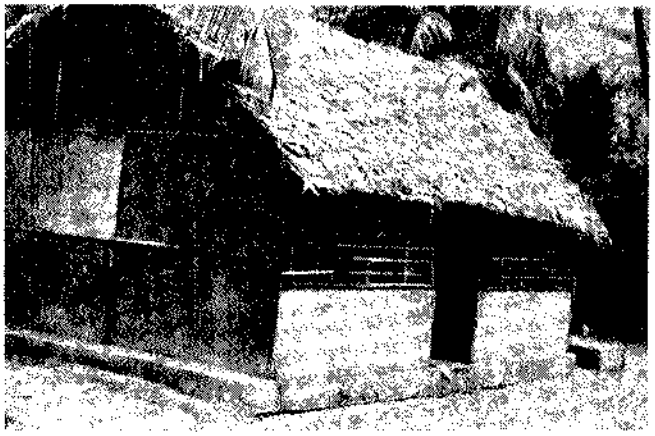
Income group (in Rs.)	Families in different categories						
	Owning mechanised boats	Owning non-mechanised boats	Wage earners by fishing	Fish trading	Labourers doing curing & peeling	Fishery related activities	Total
100 & below	—	1	14	5	27	15	62
101–200	—	9	54	40	62	25	190
201–300	—	10	155	70	19	43	297
301–400	11	14	76	46	3	27	177
401–500	6	17	34	41	—	21	119
501–600	17	11	20	22	—	13	83
601–800	39	14	6	9	—	4	72
801–1,000	48	12	1	7	—	2	70
1,001–1,500	59	3	1	1	—	7	71
1,501–2,000	23	—	—	1	—	2	26
2,001–3,000	19	—	—	—	—	5	24
3,001–4,000	10	—	—	—	—	1	11
4,001–5,000	4	—	—	—	—	—	4
5,001 & above	1	—	—	—	—	2	3

Table 9. *Classification of fishermen families based on occupation and monthly income- Neendakara*

Income group	Families in different categories						
	Owning mechanised boats	Owning non-mechanised boats	Wage earners by fishing	Fish trading	Labourers doing curing and peeling	Fishery related activities	Total
100 & below	—	—	4	—	3	5	12
101–200	—	10	73	24	6	9	122
201–300	—	22	80	12	3	9	126
301–400	9	33	25	12	—	1	80
401–500	8	13	12	6	—	5	44
501–600	12	8	3	3	—	—	26
601–800	13	1	—	—	—	—	14
801–1000	2	—	—	—	—	—	2
1,001–1,500	2	—	—	—	—	—	2
1,501–2,000	1	—	—	—	—	—	1

In Neendakara among the families owning mechanised boats 36 per cent fall under the monthly income range of Rs. 301 to 500, 58 per cent under Rs. 501 to 1,000 and 6 per cent under Rs. 1,001 to 2,000. A majority of the families (53 per cent) possessing nonmechanised boats come under the category of Rs. 301–500, the next highest (37 per cent) falling under the category Rs. 101 to 300. 80 per cent of the families of wage earners by fishing earn an income of only Rs. 300 and less. All the families engaged in curing and peeling, 79 per cent of the families engaged in fishery related activities and 63 per cent engaged in fish trading have a monthly income of less than Rs. 300.

It is seen that the percentage of families having an income of less than Rs. 300 per month are more in



1. A fisherman's hut.

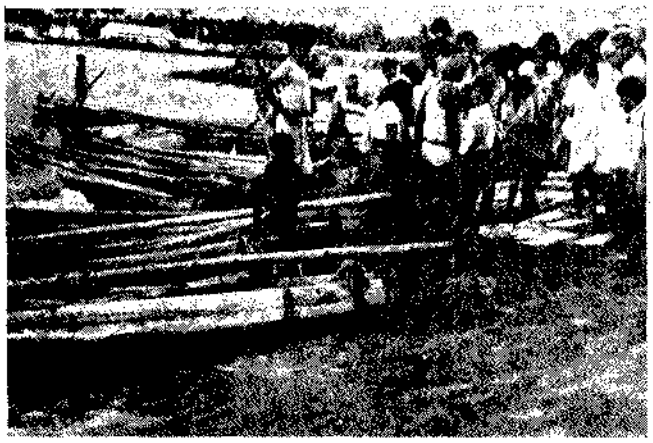
2. Children inside a hut.

3. Cycles waiting to take fish.

4. Inside a peeling shed near the fish landing centre.

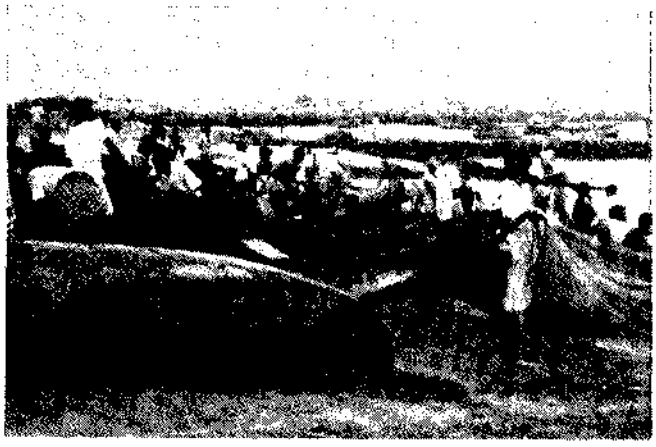
5. Fish prepared for curing.

6. Net mending.



7. Catamarans landing their catches.

10. Mechanised boats at the jetty.



8. Canoes preparing for fishing trip.

11. Unloading of catches from the mechanised boat.

9. Auction of fish at the landing centre.

12. Transportation of fish by tempo vans.

Neendakara (61 per cent) than in Sakthikulangara (42 per cent). The percentage of families having an income of Rs. 301–1,000 are more in the latter (47 per cent) as compared with the former (38 per cent). 12 per cent of the families in Sakthikulangara come under the higher income bracket of Rs. 1,000 and above as against only 0.6 per cent in Neendakara.

Fishery related infrastructure facilities

Most of the boats fishing in the area land their catches at privately owned jetties and platforms situated on the Sakthikulangara side of the channel. There are about 23 wooden jetties and one concrete jetty at this centre. The mechanised boats operating from this centre draw mostly their diesel, engine and lubricating oil requirements from the 10 marine diesel bunks situated on the shore side of Sakthikulangara. In this area there are 16 freezing cum cold storage plants. The capacity of the freezing plants range from 1 to 21 tonnes per day adding to a total of 75 tonnes for 24 hours. The cold-storage capacity ranges from 30 to 180 tonnes, making a total of 1,330 tonnes. There is only one canning plant in this area with a capacity of 1.5 tonnes per day. There are 32 ice plants in Sakthikulangara–Neendakara area having capacities ranging from 7 to 40 tonnes with a total production capacity of 350 tonnes per day. All the plants do not work throughout the year as there is lack of demand for ice in the lean season. However, during the peak season the entire capacity is utilized by the fishing industry. Some of the ice factories are attached with the freezing plants. There are about 159 peeling sheds located in the surveyed area. The total quantity of prawns that could be peeled in these sheds is about 75 tonnes per day. There are 10 boat building cum repairing yards, 11 marine engineering workshops and 8 marine spare parts shops located in this area.

The total number of workers in these subsidiary industries are about 3,000 comprising 2,332 engaged in the peeling sheds, 320 in freezing cum cold storage plants, 125 in ice factories, 55 in net making/repairing and the rest in other allied industries. This work force is drawn not only from Sakthikulangara/Neendakara but also from adjoining places.

Boats and fuel requirements

The boats in the first two categories, falling less than 30 ft. length, are old compared to the 30–32 ft. boats, for which preference has been shown in recent years. The total diesel requirements of these local boats are estimated to be 29,560 litres per day (Table 10).

Shortage in diesel oil is a problem frequently faced by the fishermen of Sakthikulangara and Neendakara. Besides the local boats, large number of boats coming from other areas operate from this centre during part of the year. In the lean season even some of the local boats migrate to other places for fishing. Hence calculation of the fuel requirements for fishing operations at Sakthikulangara/Neendakara must also take into account these factors.

The average number of boats operating daily during 1978–80 period was 595 (Table 11). Neendakara Bay is relatively quiet during the monsoon months of June to September and at this time prawns are available in

Table 10. *Mechanised boats with size, horse power and their average diesel requirements per day*

Size of boat (ft.)	No. of boats with range of horse power						Total boats	Average diesel required per day (litres)	Average diesel required per boat/ day (litres)
	24–30	30–40	40–50	50–60	60–80	80 & above			
24–26	32	4	1	—	—	—	37	930	25
28–30	—	29	26	2	—	—	57	2,000	35
30–32	—	18	74	83	59	8	242	26,630	110

Table 11. *Monthwise average number of mechanised boats operating per day during* 1978-80 *at Sakthikulangara*

Month	Average No. of units operating per day		
	1978	1979	1980
January	850	160	205
February	333	205	218
March	318	190	467
April	359	274	672
May	942	669	953
June	1,003	287	662
July	1,578	931	1,220
August	1,360	916	740
September	963	725	1,128
October	371	437	449
November	300	368	334
December	288	228	285

plenty. Hence a large number of boats migrate to this centre during this period and engage in trawling operations. On account of this there is a sharp rise in the demand for diesel oil in this season. However shortage of the same was observed during this period which resulted in many of the boats being kept idle or their operations being restricted. It is estimated that on the average 960 boats go for daily fishing during this period and the diesel requirement for these boats amounts to nearly 1 lakh litres per day. A regular supply of this quantity of diesel will go a long way in meeting the fuel demand of the mechanised boats.

Fish landings by mechanised boats

The annual fish landings by mechanised units at Sakthikulangara from 1970 to 1980 are given in Table 12.

During the period 1970–75 the total catch showed an increasing trend from 26,704 tonnes to 1,51,095 tonnes except for 1972 when there was a fall. During this period the effort expended also showed a steady increase. The catch and effort expended showed a sharp decline in 1976 and revived again in 1977–78 period. However a fall was observed both in catch and effort in 1979. But in 1980 the effort expended increased tremendously to 48,43,440 man hours realising a catch of 84,556 tonnes. In general, the prawn catches also showed an increasing trend during 1970–75 period, attaining a maximum catch of 56,750 tonnes in 1975. But in the subsequent 1976–80 period the landings of prawns fluctuated from 14,582 tonnes to 36,559 tonnes (Fig. 5).

It may be noted that the increase in effort has not resulted in proportionate increase in the total catch. The CPUE for total catch showed an overall decline from 182.67 kg/hour in 1970 to 17.46 kg/hr in 1980, maximum CPUE being 186.25 kg/hr in 1971. Similarly the CPUE for prawns also showed an overall decline to 7.55 kg/hr. in 1980 from the maximum of 82.6 kg/hr in 1973. Though there have been fluctuations in the landings of fish and prawns and also decline in their

Table 12. *Annual fish landings by mechanised boats at Sakthikulangara from* 1970–1980

Year	Total effort in man hours	Total catch (tonnes)	CPUE for total catch (kg/hr)	Prawn catch (tonnes)	CPUE for prawns (kg/hr)
1970	1,46,185	26,704	182.67	1,845	12.60
1971	2,76,476	51,493	186.25	11,004	39.80
1972	3,83,227	23,622	61.64	11,267	29.40
1973	5,50,370	66,064	120.04	45,477	82.60
1974	8,23,719	77,748	94.39	27,764	33.70
1975	13,31,728	1,51,095	113.46	56,750	42.60
1976	5,36,897	29,836	55.57	14,993	27.90
1977	13,36,732	45,828	34.28	24,121	18.00
1978	24,13,475	89,892	37.25	33,143	13.70
1979	7,23,730	56,016	77.40	14,582	20.10
1980	48,43,440	84,556	17.46	36,559	7.55

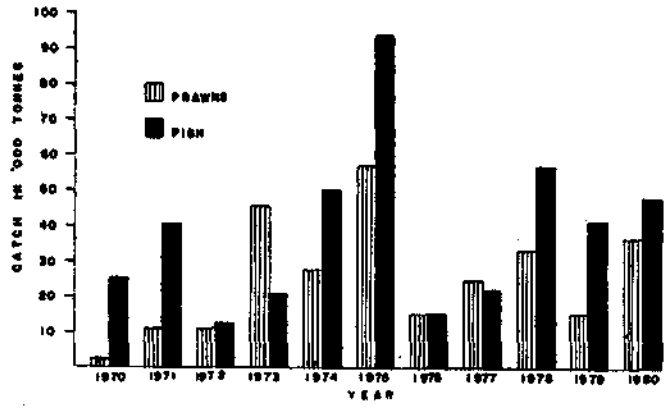


Fig. 5. Annual landings of fish and prawns by mechanised boats at Sakthikulangara (1970–1980).

catch rates in recent years, this has not adversely affected the economic conditions of fishermen because of the increase in the unit value realised for prawns as well as fish.

Out of a total of 84,556 tonnes of fish landed during 1980, as much as 61% (51,205 tonnes) are caught by the boats that have come from outside and only 39% (33,351 tonnes) are accounted by the mechanised boats belonging to Sakthikulangara/Neendakara (Table 13).

However seasonal variations were noticed in the share of the total catch between the local boats and outside boats. In the first 4 months (i.e. January to April) the local boats accounted for 60% of the output as against 40% by outside boats. During the subsequent May to September period, there was a reversal in the trend, the landings by the outside boats being 68% and by the local boats 32%. This reversal is due to the large number of boats migrating from other places to Sakthikulangara to fish for prawns which are caught in large quantities in this period. With the end of the "Karikadi" fishery in September the boats that migrated from outside leave Sakthikulangara to other areas. Hence during October–December period the share in the total catch for local boats rose to 85%.

The number of persons engaged in non-mechanised fishing is 285 and 347 in Sakthikulangara and Neendakara respectively, operating 214 indigenous crafts. Although the landings by the non-mechanised crafts of this area

Table 13. *Monthly output generated (catch in tonnes) during* 1980 *by the local mechanised boats and those that have come from outside*

Months	Mechanised boats from Sakthikulangara–Neendakara		Mechanised boat from outside		
	Average No. of local units operating per day	Monthly output	Average No. of outside units operating per day	Monthly output	Total output
January	205	654	—	—	654
February	218	699	—	—	699
March	320	1,564	147	718	2,282
April	320	2,764	352	3,040	5,804
May	320	2,657	633	5,255	7,912
June	320	1,800	432	1,923	3,723
July	320	7,875	900	22,150	30,025
August	320	4,982	420	6,539	11,521
September	320	4,167	808	10,520	14,687
October	320	2,355	129	949	3,304
November	320	2,526	14	111	2,637
December	285	1,308	—	—	1,308

alone are not available, the catches of this traditional sector for the whole coastal belt of Quilon District with 33 landing centres including Sakthikulangara–Neendakara have been 19,453 tonnes in 1978, 11,927 tonnes in 1979 and 20,463 tonnes in 1980. These catches mainly comprised sardines, anchovies, perches, carangids, catfishes, *Lactarius* and mullets.

Marketing

At Sakthikulangara, gill netters land their catches in the morning hours, while in the afternoon, catches from trawlers are landed. In addition, indigenous boats also land their catches in an adjacent area meant for them. The gill netters bring their catches to the jetty between 6 AM and 9 AM during which period marketing of the same is held. The trawlers land their catches from about 11 AM to 5 PM. The catches are disposed off by auctions at the landing centre itself. The quantity of fish auctioned in the afternoon is much more than that auctioned in the morning.

A study of the disposal of the catch to the different categories of buyers at the landing centre during the observation period (March–April 1980) was made and the details are furnished in Table 14.

Table 14. *Number of buyers (per day) from different categories and the fish purchased by them in percentages (March-April* 1980*)*

S. No.	Category	Number	Quantity purchased (per cent)
1.	Agents of Freezing plants	50	36
2.	Wholesale traders	130	23
3.	Commission agents	75	12
4.	Cycle vendors	475	11
5.	Head load vendors	770	13
6.	Others	700	5
	TOTAL	2,200	100

Among the various categories of buyers, headload vendors comprising mostly women form the maximum number (35%). They go to the nearby markets and interior areas for selling the fish. At times a few headload vendors join together and hire a cart for transportation of fish to the market for selling. They are followed by "others" (32%) comprising miscellaneous groups of buyers such as hoteliers, old fisherfolk and people coming from nearby areas to buy in small quantities for domestic consumption. The next important category is cycle vendors (22%) who buy basket loads of fish and carry them in their cycles to the interior places up to about 40 km. The number of wholesale traders constitute 6% in the total. They purchase either directly from the boat owners or from commission agents. Commission agents are also one among the buyers who sell on the spot itself or send the same for sale to various destinations by road or by train. Agents deputed by the prawn processing companies (2%) buy large quantities of prawns. It may be noted from the table that maximum quantity of the catches are purchased by agents of freezing plants and by wholesale traders. Their purchases further go up during the "Karikadi" season in June–August period.

A study was made during the period of survey regarding the quantities of fish (including prawns) sold in fresh condition for immediate consumption and for processing which includes not only freezing but also curing, salting etc. (Table 15).

Table 15. *Percentage distribution of fish for processing and fresh sale (April-May)* 1980

Species	Per cent distribution	
	Processing	Fresh
Prawns	85	15
Cat fish	50	50
Tuna	15	85
Pomfret	—	100
Seer	10	90
Sharks	60	40
Rays	60	40
Nemipterus	20	80
Oil sardine	20	80
Mackerel	10	90
Others	15	85

It could be observed from the Table that as much as 85% of the prawns are taken for freezing for export. The remaining 15 per cent did not go for freezing because of their small size, not being suitable for export. As good landings of cat fish occurred during this period,only 50 per cent could be absorbed for fresh sale, the rest going for curing. Except for sharks and rays, the rest of the fishes mostly go in for fresh sales.

Table 16. *Price of fish at Sakthikulangara and Quilon*

Name of fish	Average price per kg. received by fishermen at Sakthikulangara (Rs.)	Average retail price per kg. at Quilon market (Rs.)	Margin percentage increase per kg.
Seer fish	10.00	14.00	+ 4.00 (40%)
Pomfret	10.00	15.00	+ 5.00 (50%)
Cat fish	3.50	5.50	+ 2.00 (57%)
Tuna	5.00	7.50	+ 2.50 (50%)
Rays	2.50	3.50	+ 1.00 (40%)
Oil sardine	1.00	2.00	+ 1.00 (100%)
Mackerel	2.75	4.50	+ 1.75 (64%)

The prices of selected species of fish at Sakthikulangara landing centre and the price it fetched at Quilon market were observed at regular intervals during March–May 1980 and average of the same are furnished in Table 16.

The difference in the prices for the various varieties of fish between the landing centre and the market ranged from 40 per cent to 100 per cent. The range in the increase in the price of rays, seer fish, pomfret, catfish and tuna was 40 per cent to 57 per cent. The maximum difference in prices was observed in the case of mackerel and oil sardine and this can be attributed to their scarcity in the market at this period.

Exports

Sakthikulangara–Neendakara is the most important centre for processing and freezing of prawns, ranking only next to Cochin. Almost entire quantity of prawns are frozen for export. The quantity of marine products exported, the value realised and the unit value per kg are shown in Fig. 6.

During 1970–'75 period, the quantity of marine products exported was in the range of 3,000 to 4,000 tonnes fetching between 4.6 to 7.8 million rupees. However a decline in the exports was noticed during 1976—79 period, the range being 1,000 to 2,000 tonnes. The price realised was 3.3 to 5.1 million rupees. But there was a recovery in the exports to the tune of 2,318 tonnes during 1979–80. During 1970–80 there was a steady rise in the unit value realised per kg from 13 rupees to 40 rupees. The spectacular rise in the value realised in 1979–80 is due to the increase in terms of quantity as well as unit value realised per kg.

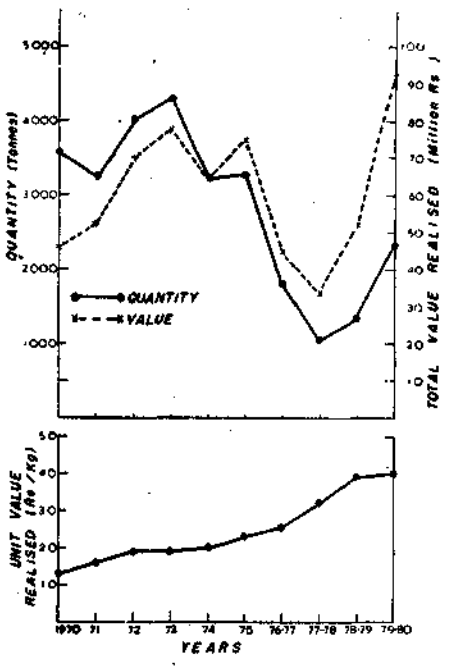


Fig. 6. Quantity, value and unit value of exports of marine products(1970–1980) from Sakthikulangara–Neendakara. (Source: MPEDA)

Conclusion

The impact of mechanised fishing in the last two decades on the living conditions of the people of Sakthikulangara–Neendakara area has been manifold. Housing is one of the important parameters in assessing the economic progress of the people and in this field significant improvement has been noticed as compared with that of fifties (Table 17).

Table 17. *Percentage of different types of houses in* 1954 *and* 1980

Types of houses	Sakthikulangara		Neendakara	
	1954	1980	1954	1980
Huts	47	33	65	64
Kutcha	44	16	29	16
Pucca	9	32	6	15
Mansion	—	19	—	5

The proportion of Kutcha houses decreased from 44 per cent in Sakthikulangara and 29 per cent in Neendakara in 1954 to 16 per cent in 1980 in both the places. As regards pucca houses and mansions their proportion increased from 9 per cent to 51 per cent in the former place and 6 to 20 per cent in the latter place. However the decline in the proportion of huts in Sakthikulangara is 14 per cent, the same being only one per cent in Neendakara. The marginal decline in the proportion of huts in Neendakara shows that the development benefits did not accrue to the dwellers of huts of this place to the extent observed in the case of Sakthikulangara.

Though information relating to the number of literates among the total population in this area in the fifties and sixties could not be obtained, it is obvious that great progress has been made during this period in this field as evidenced by the fact that at present as much as 79.5 per cent of the population of this area are literates. However information was available as to how many among literates were in different levels of education in 1954 and a comparison of the same with the existing situation shown in Table 18 gives an idea of the marked improvement that has since taken place.

Table 18. *Percentage with primary education, middle, higher secondary and above in* 1954 *and* 1980 *in Sakthikulangara-Neendakara area*

Educational status	1954	1980
Primary	67	46
Middle	18	22
Higher secondary and above	15	32

Reference to Table 4 would show that the percentage of illiterates is more in Sakthikulangara than in Neendakara even though the former place is economically in a better position than the latter. This can be due to the desire of the parents of lower income group of Sakthikulangara to send their boys for fishing and other related activities at an early age thereby getting a good income, in preference to sending them to schools. But for the people of Neendakara the opportunities for the boys to get employed in fishing vessels and fishery related activities are relatively less and hence the poor parents send their children to schools where they get free midday meals.

One of the major benefits derived on account of mechanisation is the increased employment opportunities in Sakthikulangara–Neendakara area. Fishing and fishery related activities provided employment for about 2,100 persons in 1953, 2,400 in 1963, 5,800 persons in 1968 (Agricultural Division, State Planning Board, Kerala–1969) and about 7,500 persons in 1980, the increase at present being more than 3½ times over that of 1953. The growth is more striking if we take the persons employed in the subsidiary industries alone. The increase in this field was from 300 workers in 1963 to 2,100 workers in 1968 and 3,000 workers in 1980. However it may be observed that out of the total of 7,500 persons employed, only 2,219 are drawn from Sakthikulangara–Neendakara, the rest hailing from other places. One interesting feature noticed is that a greater percentage of people are unemployed in Neendakara than in Sakthikulangara. This can be due to more job opportunities being available in Sakthikulangara than in Neendakara, as in the former place the process of mechanisation has gone farther than in the latter.

As a consequence of the introduction of mechanised fishing there was a reduction in the number of indigenous boats in this area from 493 in 1953 to 214 in 1980. At the same time mechanised boats possessed by the people of this area increased from 138 in 1963 (Agricultural Division, State Planning Board, Kerala, 1969) to 336 in 1980.

There has been significant increase in the infrastructure facilities also. The ice production capacity which was 25 tonnes in 1963, rose to 83 tonnes in 1968 and 350 tonnes in 1980. The freezing capacity per day which stood at 9 tonnes in 1963 increased to 37 tonnes in 1968 and to 75 tonnes in 1980. Similarly the cold storage capacity also showed an increase from 325 tonnes in 1963 to 785 tonnes in 1968 to the present capacity of 1,330 tonnes.

The process of mechanisation during the last two decades has a great impact in the total landings of fish and prawns in Sakthikulangara–Neendakara area. This has resulted in better exploitation of resources realising more catches of prawns, seer fish, pomfrets, tunnies etc. The catch which had been in the neighbourhood of 2,000 tonnes in 1953 rose to 13,000 tonnes in 1968 and in 1980 it is 85,000 tonnes. Although there has been an enormous increase in the catches as compared to that of the sixties, a declining trend in the catches is observed with increasing input of effort over the successive years in recent times as reported in *Marine Fisheries Information Service T & E Series No.* 18, 1980. Hence it has become necessary that conservation measures be taken to restrict the catches to the level of maximum sustainable yield in the coming years.

Another far reaching impact of mechanisation was seen in the exports of marine products from this area. In 1953 only dried prawns and fish were exported, valued at less than 100 thousand rupees. Export of frozen prawns and lobsters commenced only in the late fifties with the establishment of freezing plants and cold storages. In 1967 the quantity of marine products exported from here was 1,736 tonnes valued at 19.69 million rupees, in 1970, it was 3,597 tonnes valued at 46.43 million rupees and in 1979–80, 2,318 tonnes valued at 92.18 million rupees as per statistics given by MPEDA. Even though there was a sharp increase in the landings of prawns in Sakthikulangara from about 2,000 tonnes in 1970 to 36,559 tonnes in 1980, this is not reflected in the export figures from this place. This may be due to the constraints imposed in limited freezing capacity (75 tonnes) per day which is not enough especially during the peak season and also due to large quantities of prawns going for processing to outside places like Quilon, Alleppey and Cochin etc.

The greatest impact of mechanisation is seen in the level of income of the people of Sakthikulangara and Neendakara. The report of the State Planning Board, Kerala, 1969 reveals that the annual income per fishermen household in this area was Rs. 624 in 1954 and Rs. 1,251 in 1963 with per capita income of Rs. 118 and Rs. 192 respectively. In 1980 the annual income per fishermen household has risen sharply to Rs. 4,975, the per capita income being Rs. 887. Thus an eight fold increase has been noticed since 1954 in the annual as well as per capita income.

However it is seen that the benefits arising out of the introduction of mechanised fishing are seen more in Sakthikulangara than in Neendakara. The annual income per fishermen household in Sakthikulangara in 1980 works out to Rs. 6,420 with a per capita income of Rs. 1,184, whereas the same for Neendakara is Rs. 3,529 and Rs. 590 respectively. This is because the developmental activities are more centred in Sakthikulangara than in Neendakara. Almost all the mechanised boats land at Sakthikulangara which has jetty and other facilities and this in turn have brought more business transactions leading to higher prosperity of the people.

The average indebtedness of the fishermen families in this area was found to be Rs. 449 in 1954 and Rs. 286 in 1963 (Asari T.R.T. and M.D. Menon, 1963). At present the average outstanding debt per indebted household in Neendakara and Sakthikulangara works out to Rs. 6,671 and Rs. 29,786 respectively. This huge increase in the indebtedness can be attributed to the fact that a good number of them took substantial loans from banks and other agencies for the purchase of mechanised boats to be paid back on easy instalments. Hence this need not be considered as a negative impact, as the bulk of the loans has been utilized for investment on productive purposes.

Although there has been a rise in the income level of the people of this area, it is seen that as much as 53 per cent of the fishermen families still get an income of less than Rs. 3,600 per annum. The families in the middle and higher income groups are more benefited by the additional income generated due to the introduction of mechanisation in fishing as also indicated by the decrease in the percentage of kutcha houses, increase in pucca houses and mansions in the places. The financial position of the lower income groups could not permit them either to purchase mechanised boats or to invest huge amount of money on fishery related activities which are having high income generating potential. Hence further developmental programmes should be so formulated to take care of this sector. A good number of people of this category get only seasonal employment in fishery related activities such as peeling and curing. Development of small scale industries like coir making and net making which have a good scope in this area will enable these people to be gainfully employed during the off season.

Finally it may not be out of context here to mention about the major constraint in the development of this area, which is the lack of a fishing harbour. During the peak season of June to August as much as 1,000 to 2,000

boats land here and the whole process of transferring the catches from the boats to the shore, marketing, processing and transportation is at present carried out at the crowded jetty and the premises. The State Government should take up the matter of construction of the proposed fishing harbour at Sakthikulangara under top priority. A harbour with berthing facilities for the maximum number of fishing vessels, auction halls, peeling sheds, approach roads and such other infrastructures will go a long way not only in bringing about improved conditions of landing the catches at the most important mechanised boat landing centre of the country but also give an impetus to the growth of the fishing industry in this area.

We are thankful to Shri T. Jacob and other colleagues in Fishery Resources Assessment Division for their help in the preparation of this report. We also thank Shri S. B. Chandrangathan for assistance in collecting the data.

NEWS—INDIA AND OVERSEAS

Fishing harbour at Nizamapatnam

With the assistance of World Bank funds a major fishing harbour is scheduled to be commissioned in 1982 at Nizamapatnam on the east coast of India. Nizamapatnam located near the mouth of the River Krishna in the state of Andhra Pradesh is about 310 km north of Madras and 330 km south of Visakhapatnam. At present fishing is conducted along the coast including the fertile fishing grounds off the mouth of the river Krishna by indigenous craft protected by the bay at the river mouth throughout the year and small mechanised boats operating from distant bases during three months in an year. With the harbour facilities developed here the operations of these mechanised boats could be improved considerably round the year.

The site of the harbour selected by the United Nations Development Programme is about 400 m from the entrance to the sea and a new channel which would also locate the harbour basin will be cut through the sand and the present channel filled up. The landing quay has been designed to hold 45 boats of 9 m length and 9 boats of 10 m length. The entire project would cost Rs. 87 million.

Vast new fishing grounds located in the Arabian Sea

In a recently completed two-year Indian Ocean fishery programme involving several countries and supported by the United Nations Development Programme (UNDP) and the Food and Agricultural Organisation (FAO), the Norwegian research vessel *Dr. Fridtjof Nansen* undertook five exploratory cruises in the Arabian Sea from Pakistan to Somalia. The programme has uncovered a vast fishing ground in this area, which, according to scientists, has the potential of 100 million tonnes of fish, a quantity considered sufficient to increase the present world fish supply by 10 to 25% per year.

With the aid of sophisticated acoustic equipments the survey discovered important concentrations of both small pelagic fish such as sardines, horse mackerel and anchovies as well as demersal fish including ponyfish, threadfin bream, catfish and other varieties. Both these groups of fish are being exploited to some extent in the region. But according to the present survey the rich fishing grounds could bring millions of dollars more to the four countries concerned, namely, Pakistan, Somalia, Oman and the People's Democratic Republic of Yemen by systematic exploitation of the resources available.

World Fishing 29 (10):October 1980

Living pollution-monitoring system

As a part of an extensive research programme the Shell Oil Company in U.K. has found a novel use for mussels as a living pollution—monitoring system. In order to determine the long term effects of off shore oil

operations on the marine environments, mussels are made use of as "living samplers." In the experiment the mussels taken from the north-east coast of Scotland have been planted in the middle of Brent, the UK's biggest oilfield. The mussels were placed in cages carefully positioned by divers at upto a half-mile from oil installations at depths varying from 15 to 125 m.

The experiment is part of the overall research programme designed to find where wastes go, how they dilute and degrade and what their long term effects may be. Since the mussels are continuously filtering litres of sea water for straining out food and all other particles they act like blotting papers, collecting and accumulating minute amounts of chemicals too. Apparently, the mussels which have settled on the oil rigs cannot be made use of for the study, as these mussels would have already accumulated oil and other chemicals, making it difficult to detect changes.

Fishing News, November 28, 1980

Breakthrough in shrimp farming reported

At the first workshop on cryobiology of marine organisms sponsored by the Texas A & M University Sea Grant College Program, the Texas Agricultural Experiment Station and Texas Agricultural Extension Service, Dr. A. Laurence of Texas A & M University reported the results of cryopreservation of shrimp spawns which would be a major breakthrough in shrimp farming.

According to him shrimp spawns could be frozen at temperatures dipping to minus 385 degrees Fahrenheit and preserved for later use in rearing and farming. This method of cryopreservation would result in economic advantages to shrimp farmers as the cost of freezing and storing shrimp seed stock could be as little as 2 cents per 1,000 seeds compared to a selling price of 1$ to 2$ per 1,000. This would allow shrimp farmers to store seed stock, reduce costs, simplifying transportation and guarantee brood stock supplies. Another advantage would be the possibility of running facilities year-round, taking seed stock from frozen storage and placing into mariculture systems as and when needed.

Texas Trawler 7 (3): December 1980

Sri Lanka taking to atom fresh fish

As a result of the recently concluded Agreement on Peaceful Uses of Atomic Energy between Sri Lanka and France, Sri Lanka housewives will soon be able to keep wet fish on the shelves for a week without any fear that it might spoil.

By irradiating, wet fish can be kept without decay for more than a week and this is the cheapest and safest form of fish preservation. Unlike deep freezing, irradiation does not affect the taste and quality of the fish. This method of fish preservation was widely used in Japan.

FNI 19 (7): July 1980

Compiled and prepared by M. J. George, S. K. Dharmaraja & G. Subbaraju.
Published by Dr. M. J. George, Senior Scientist on behalf of the Director, Central Marine Fisheries Research Institute, Cochin-682 018 and printed at PAICO, Cochin-31