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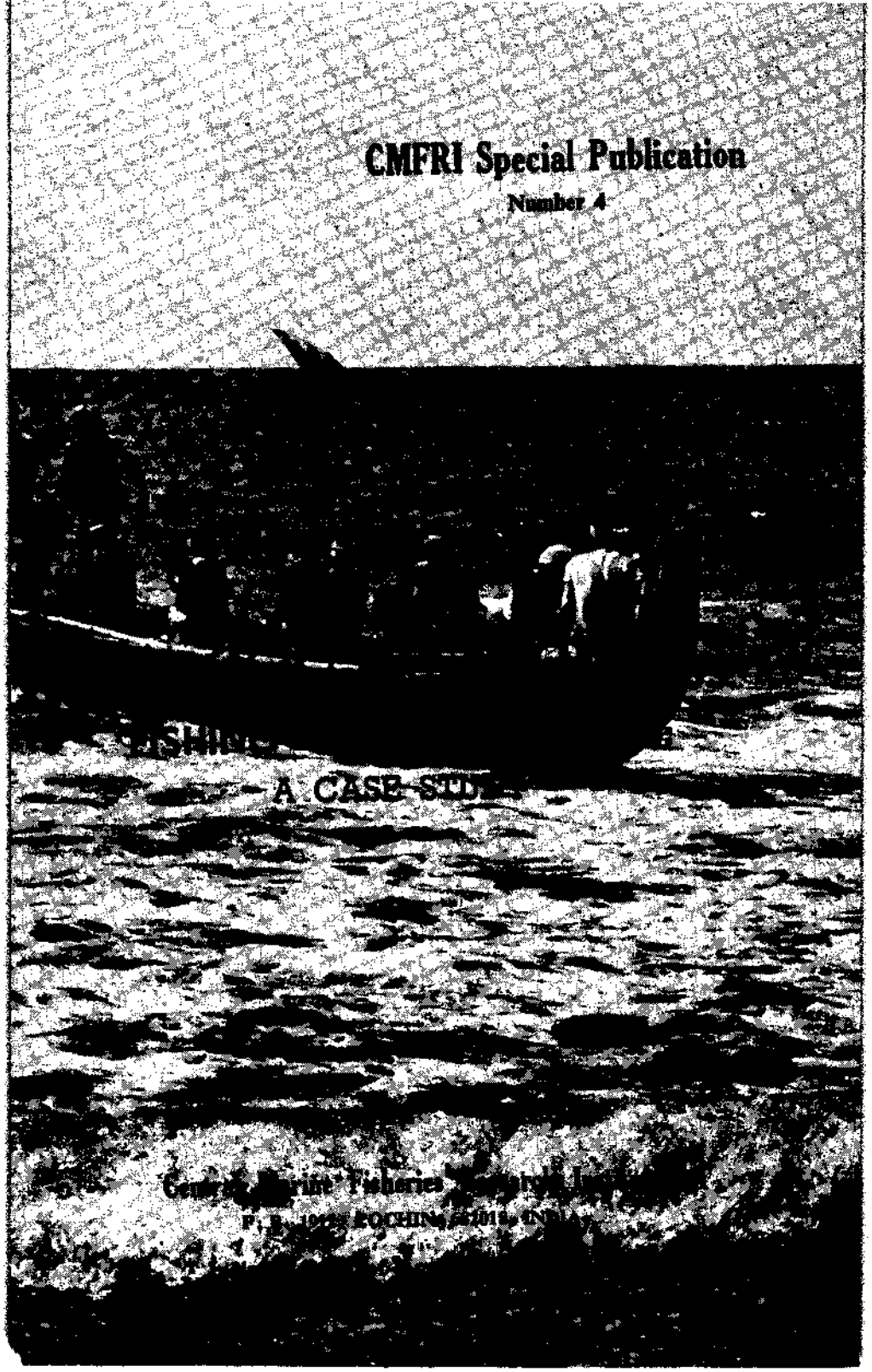

A CASE STUDY

Central Marine Fisheries Research Institute
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ECONOMICS OF THE INDIGENOUS FISHING UNITS AT COCHIN:
A CASE STUDY

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Cover: A dug-out canoe with thangu vala returns to Manassery landing

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PREFACE

During the last three decades we have witnessed progress in the marine fisheries sector, particularly in the introduction of mechanised fishing crafts, use of synthetic material for gear and development of infrastructure facilities. The traditional fisheries sector, still using indigenous crafts such as catamarans and canoes, has taken advantage of nylon in fabricating their fishing gear. On an average, our annual marine fish production is about 1.3 million tonnes, of which nearly 60 per cent is accounted for by traditional fishing methods from a narrow belt along our coast. In spite of this importance, hardly any serious study has been carried out on the economics of operation of the artisanal fisheries in the country. The present report by Shri A. Noble and Shri V. A. Narayanankutty of this Institute on the economics of the indigenous fishing units at Cochin is a case study on some aspects of the small-scale fisheries of the Cochin area. The study is based on several years data collected by the Institute and is but a small step towards understanding the problems of traditional fisheries. The Institute has programmed to take up similar studies in other regions along our coast. The issue of this Number on the occasion of the Seminar on "The Role of Small-scale Fisheries and Coastal Aquaculture in Integrated Rural Development" is considered timely as it focuses attention on an area needing intensive studies and critical evaluation of available information to assist in coastal rural development.

E. G. Silas

Economics of the indigenous fishing units at Cochin: a case study

A. NOBLE
and
V. A. NARAYANAN KUTTY

INTRODUCTION

Mechanised fishing for shrimps and bottom fishes has now appreciably set its roots in the country. Experimental purse-seining for exploiting our pelagic resources like the oil sardine and mackerel was initiated by the erstwhile INP in the past (Menon, 1970) and commercial exploitation also has started recently at some places in the country (Jayaraj, 1978). Nevertheless, the indigenous fishing crafts and gears still stay as stalwarts in exploiting the above mentioned pelagic resources, which contribute to a major portion of the marine fish production in India.

INDIGENOUS FISHING UNITS OF COCHIN

The types of gears usually used for fishing in the region between Quilon and Cochin are the boat seine, Thangu vala; and the gill net, Ayila vala. Kuriyan *et al.* (1962) and Noble (1974) respectively had described the design and operation of the Thangu vala. A dug-out canoe generally 12 to 13 m long and 1 m wide with a crew of 15 is used for operating Thangu vala which is 90 m long, 24 m broad in the middle and narrower with 7.5 m width at the ends; and has a mesh size of 2 cm. A smaller dug-out canoe having the capacity to

carry only 5 people is used for the operation of Ayila vala which is 220 m long and 8 m wide, and has a mesh size of 5 cm. Sathyanarayana and Sadanandan (1962) had described the "Chala vala", the encircling gill net for sardine and mackerel. The design and operation of Chala vala and Ayila vala are one and the same. But Ayila vala has a larger mesh and is specific for catching mackerel when medium sized or bigger ones occur in shoals (Noble, 1974).

INVESTMENT

Informations on initial investment, recurring expenditure on annual maintenance and resale value of the unit at the end of each year were collected by enquiring a few local unit owners, and from the average worked out it is understood that a sum of Rs. 21,150|- is required to fabricate a new Thangu vala, its canoe and related accessory appliances (Table 1). This unit on account of depreciation will sell at a

TABLE I

Capital investment on a new indigenous fishing unit at Cochin (average of 5 observations)

	Thangu vala unit	Ayila vala unit
Dugout canoe	Rs. 9000	Rs. 2875
Nylon net	Rs. 11400	Rs. 2250
Other appliances	Rs. 750	Rs. 250
Total	Rs. 21150	Rs. 5375

price of Rs. 16,570|- only at the end of the year. By incurring an expenditure of Rs. 840|- on repair the unit can be put on operation in the beginning of the 2nd year. The resale value at the end of a year, together with the cost on repair and maintenance makes the initial investment of the unit in the beginning of the next year. Adding the price at the end of the year with the depreciation and charges on maintenance, the total cost is computed.

As years pass by, values of depreciation and maintenance go on increasing, whereas the resale value at the end of each

year keeps falling (Table II). The percentage of depreciation on the initial investment exhibits an increasing trend during the 10 years under observation and as it is plotted in Fig. 1, the life of a unit can only be around 14 years. The canoe of the Thangu vala unit, however, can survive longer up to 18 years. The life of the canoe as reported by Kuriyan *et al* (1962) is between 8 to 20 years. The net, on the other hand, subjected to severe strains during fishing seems to have shorter life (Fig. 1), and the damages and loss to the accessory appliances are higher rendering their life still shorter.

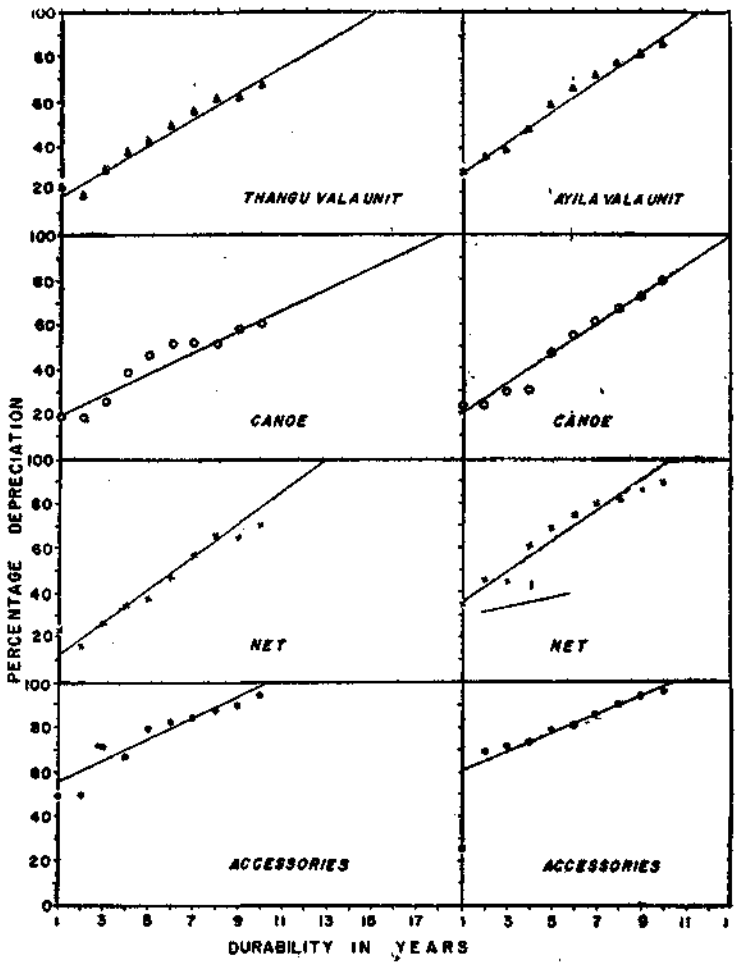

Fig. 1. Life expectancy of the indigenous fishing crafts and gears at Cochin.

TABLE II

Projection of cost, depreciation and maintenance of the indigenous fishing units at Cochin in rupees.

	Thangu vala unit					Ayila vala unit				
	Initial cost	Price at end of year	Depre-ciat-ion	Main-ten-ance	Total cost	Initial cost	Price at end of year	Depre-ciat-ion	Main-ten-ance	Total cost
1st year	21150	16570	4580	840	21990	5375	3850	1525	400	5775
2nd year	17410	14226	3184	1430	18840	4250	2750	1500	1050	5300
3rd year	15656	11290	4366	3195	18851	3800	2350	1450	1500	5300
4th year	14485	9112	5373	4625	19110	3850	2040	1810	1675	5525
5th year	13737	7902	5835	5130	18867	3715	1535	2180	2075	5790
6th year	13032	6578	6454	5850	18882	3610	1230	2380	2450	6060
7th year	12428	5470	6958	6375	18803	3680	1025	2655	2625	6305
8th year	11845	4560	7285	7500	19345	3650	845	2805	2850	6500
9th year	12060	4550	7510	7650	19710	3695	690	3005	3025	6720
10th year	12200	4030	8170	7800	20000	3715	510	3205	3200	6915
Average	14400	8429	5972	5040	19440	3934	1683	2252	2085	6019

Note: Initial price on the years following the first include the cost at the end of the previous year and its maintenance charges.

The initial investment required to commission a new Ayila vala unit on an average amounts to Rs. 5,375|- only. (Table I). The Ayila vala being a gill net undergoes too much of damage during fishing. The rate of depreciation and the cost on annual maintenance hence are comparatively high (Table II) and its total cost crosses the amount of initial investment quicker than that in the case of a Thangu vala unit. The percentage of depreciation on the initial investment of the unit plotted in Fig. 1, shows its life span to be around 11 years, the boat living up to 13 and the net and the accessory appliances surviving around 10 years. The average total cost of the Ayila vala unit for the 10 year period is 12% higher than that of the initial investment.

As days go by, the materials used to fabricate the net as well as the canoe and accessory appliances lose strength, decreasing efficiency and durability and increasing wear and tear. The net cannot stand the stress and strain of fishing particularly of hauling the catch up without easily undergoing frequent and extensive damages, and result in the escape of fish caught. In such conditions, the cost on annual maintenance escalates and together with persistent loss of effort, and higher rate of depreciation; operation of the unit turns uneconomical and warrants its condemnation.

CATCH AND EFFORT

Statistical data on the fish landing at Manassery (Cochin) and also the number of units operated and the man power employed for fishing are being collected regularly on every other day throughout the year. But as the local fisherfolk are Christians, Sundays and at times a few of their festivals are observed as holidays and in a year the number of fishing days vary between 310 to 312 days only.

From the data collected during July, 1967 to June, 1977; the number of Thangu vala and Ayila vala operated annually, and the quantities of fish landed by them each year are estimated and given in Fig. 2 and 3 respectively. During the 10-year period under consideration, a total number of 94,481

units of Thangu vala were operated at Manassery landing a catch of 31,221,865 kg constituted by 66.93% oil sardine,

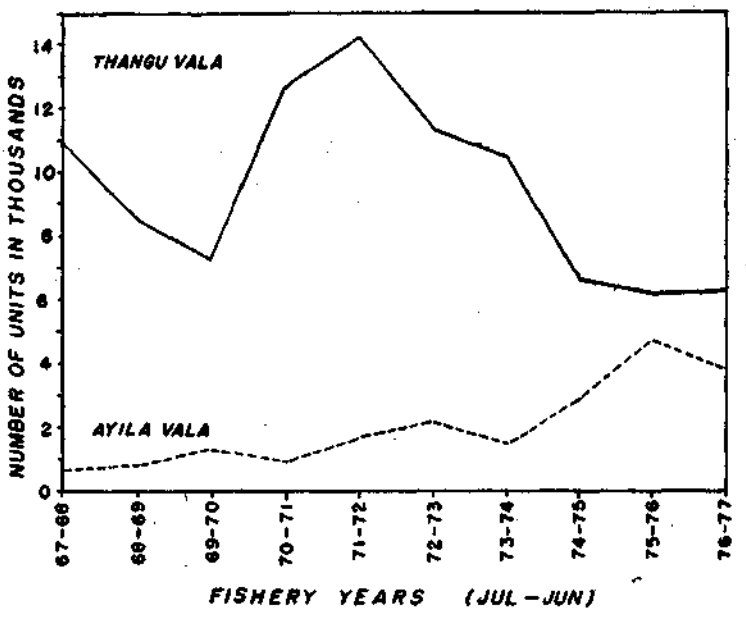

Fig. 2. Number of indigenous units operated annually for fishing at Manassery (Cochin).

12.80% mackerel, 17.14% other fish and 3.13% prawns. Dividing this total catch by the total number of fishing units operated, the catch per unit per day of Thangu vala is found to be 330.457 kg. In a year of average 311 fishing days, the annual catch is estimated to be 102,772.130 kg consisting of 99555.361 kg of fish and 3216.769 kg of prawns (Table III). Similarly there was a total of 20,519 units of Ayila vala also operated for the same period, landing an estimated total of 1,368,953 kg catch comprising oil sardine 36.61%, mackerel 34.79%, other fish 27.86% and prawns 0.92%. The catch per unit per day of Ayila vala works out to be 66.716 kg bringing its annual catch to 20,748.676 kg. As seen in Table III this includes 20,557.788 kg of fish and 190.888 kg of prawns.

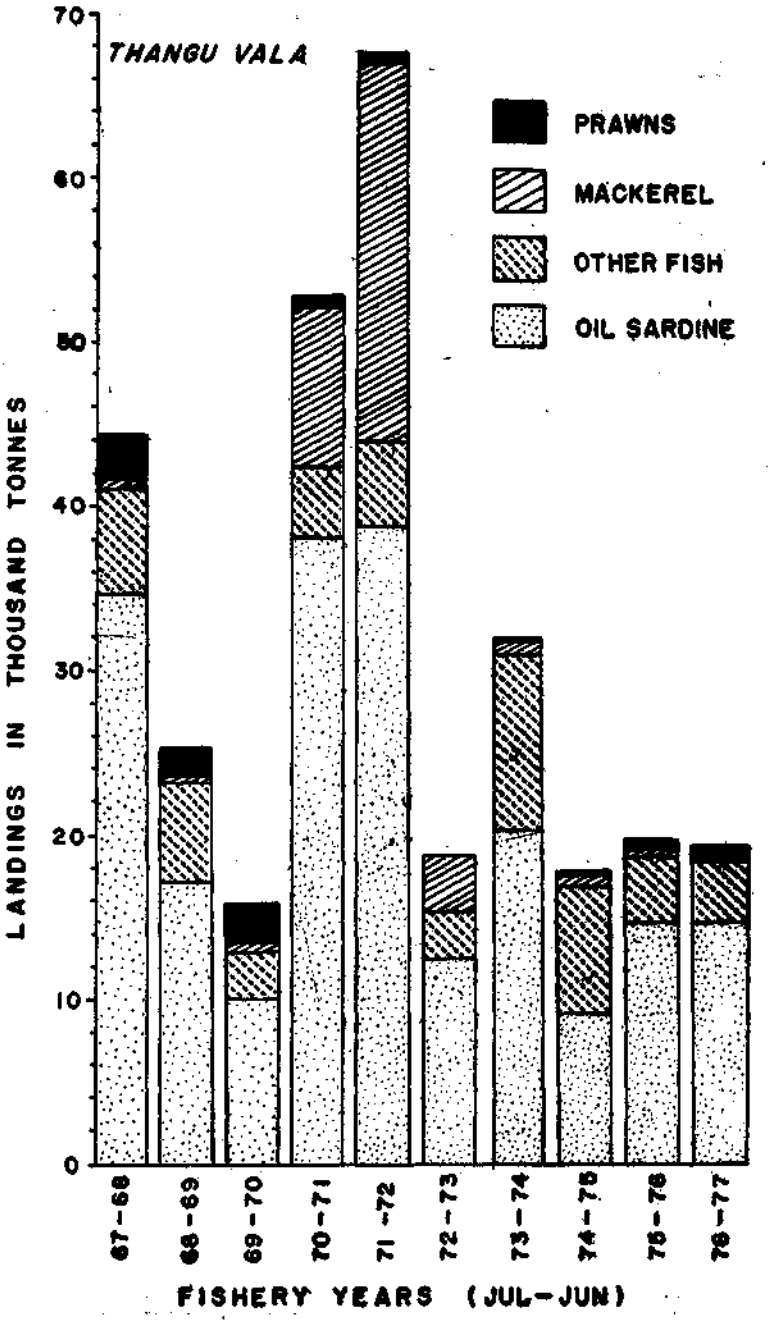

Fig. 3. Annual fish landings of the thangu vala unit at Manassery (Cochin).

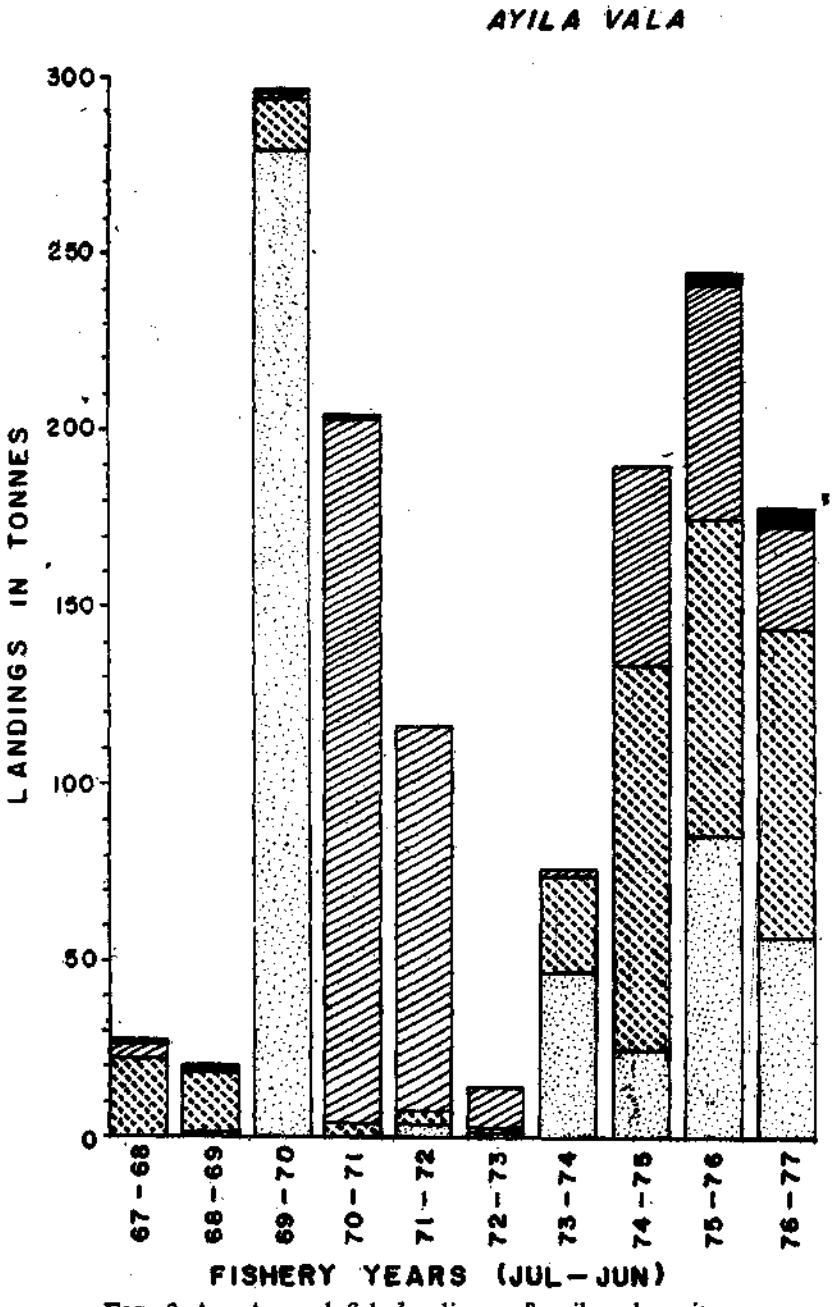

FIG. 3 A. Annual fish landings of ayila vala units

TABLE III

Estimated annual landings of fish in kg at Cochin (Manassery) by indigenous fishing units and the value in rupees.

Items	Thangu vala unit		Ayila vala unit	
	Catch	Value	Catch	Value
Oil sardine	68785.386	68785|-	7596.090	7596|-
Mackerel	13154.832	26309|-	7218.464	14437|-
Other fish	17615.143	17615|-	5743.234	5743|-
Total	99555.361	112709|-	20557.788	27776|-
Prawns	3216.769	64335|-	190.888	3818|-
Grand total	102772.130	177044|-	20748.676	31594|-

REVENUE

Commercial sized mackerel are generally sold 2 to 5 a rupee, and for comparison, its price, as was done by Varghese and Radhakrishnan (1977), can be put as Rs. 2|- per kg. Wide fluctuations are noticed in the price of oil sardine, its heavy catches often bringing in glut in the market. On the other hand, the miscellaneous fish sell cheap, and like Varghese (1976), an arbitrary average price of Re. 1|- can safely be fixed for a kg of sardine and other fish to compute the revenue returns of this highly perishable commodity. The prawn landings by the indigenous fishing units at Manassery consist mainly of *Penaeus indicus* and *Metapenaeus dobsoni*. *P. indicus* easily fetches a price of Rs. 30|- a kg and *M. dobsoni* Rs. 10|- per kg. The average price of prawns at Cochin can then conveniently be put as Rs. 20|- for a kg. At the above rates, the Thangu vala catch might have realised an average annual price of Rs. 112,709|- for the fish caught, and Rs. 64,335|- for the prawns; and the Ayila vala landings might have fetched a sum of Rs. 27,776|- for the fish and Rs. 3,818|- for prawns (Table III).

PROFIT

The total annual income of a Thangu vala unit, as seen above is Rs. 177,044|-. Seventy per cent of this, amounting to Rs. 123,930.80 is given to its crew as their share, and it is equally divided among 15 of them. The per capita annual income of a crew thus works out to be Rs. 8,262.05 and the income per man per working day Rs. 26.57. The amount of Rs. 53,113.20 left after deducting the crew's share forms the gross revenue of the owner of the fishing unit (Table IV).

The nationalised banks are understood to some extent to be still indifferent to support the fishermen who want to invest on the indigenous fishing units. They are, therefore, left to the mercy of local money lenders who are alleged to charge 25% or even more interest to the principal sum of rupees loaned till the entire amount is paid back in full. A person who borrows a sum of Rs. 21,150|- required to commission a Thangu vala unit has to repay, if agreed up on in 10 equal annual instalments, a sum of Rs. 2,115|- per year towards the principal and Rs. 5,787.50 towards interest on borrowed money. Interest on borrowed money together with the average cost on depreciation and annual maintenance computes the variable cost on the unit to be Rs. 16,798.50 every year (Table IV). Deducting the variable cost from the gross income of the unit owner a sum of Rs. 36,314.70 remains as his net prifit. The percentage of net profit on initial investment (rate of return) of a new Thangu vala unit, is calculated to be 171.70. Against the average total cost for the 10 year period the rate of return works out to be 186.81%.

The average annual turn over of an Ayila vala unit, in the like manner, is estimated to be Rs. 31,594|- (Table IV). The share of the crew for a year at the rate of 70% of the total income comes to 22,115.80; which distributed equally among 5 of its members becomes Rs. 4,423.16 per man per year. Fractioning it by the number of fishing days the income of a crew per working day is found to be Rs. 14.22 only. After deducting the crew's share, a sum of Rs. 9,478.20 remains as the gross annual income of the owner of the fishing

TABLE IV

Income and expenditure statement of the indigenous fishing units at Cochin.

Items	Thangu vala unit		Ayila vala unit	
	Expenditure Rs. P.	Income Rs. P.	Expenditure Rs. P.	Income Rs. P.
1. Gross annual revenue from fish sales (turn over)		177044.00		31594.00
2. Crew's share at 70% of gross income	123930.80		22115.80	
3. Gross income of the unit owner less crew's share		53113.20		9478.20
4. Interest on borrowed money a year	5787.50		1343.75	
5. Depreciation	5971.50		2251.50	
6. Maintenance	5039.50		2085.00	
7. Total of items 4, 5, & 6	16798.50		5680.25	
8. Net income of the unit owner (profit)		36314.70		3797.95
9. Initial investment on a new unit.	Rs. 21150.00		Rs. 5375.00	
10. Profitability = $\frac{\text{Profit x 100}}{\text{Turn over}}$	20.512%		12.02%	
11. Rate of return = $\frac{\text{Profit x 100}}{\text{Investment}}$	171.701%		70.660%	
12. Investment: Turn over ratio	1:8.4		1:5.9	
13. Pay back period = $\frac{\text{Investment}}{\text{Profit}}$	0.6 years		1.4 years	

unit. A sum of Rs. 5680.25 deducted from this towards interest on borrowed money, depreciation, and annual maintenance (Table IV) leaves Rs. 3,797.95 as owner's net profit. Though the initial investment on an Ayila vala unit is Rs. 5,375|- only, its average total cost as already discussed for the 10-year period works out to be Rs. 6,019|- (Table II). The percentage of net profit on the initial investment is 70.66 and on the average total cost only 63.10.

SCOPE

Experiments conducted with the purse-seiners of different sizes like the 43½', 57' and 90' (Varghese and Radhakrishnan, 1977) indicate that during high shoaling period, the 43½' vessel performs the best in exploiting the resource of oil sardine and mackerel in our waters. Depthwise, these resources are abundant up to 55 m bottom depth, but good concentrations appear most frequently in waters shallower than 30 m (PFP, 1976). The 90' unit could not locate much of these resources in deeper areas and therefore big purse-seiners are not required to exploit them (Varghese and Radhakrishnan, 1977). The 36' along with a skiff is also considered not suitable (Varghese and Radhakrishnan, 1977), as there is limitations to the sizes of the nets that it can carry with for fishing (Varghese, 1976).

Though 36' is considered not suitable for the exploitation of mackerel and oil sardine, the net profit made by it appears to be more than that of the big vessels mentioned above (Table V). A 36' mechanised vessel equipped as a purse-seiner cum trawler, according to Varghese (1976) requires a capital investment of Rs. 330,000|-. During unfavourable weather and sea conditions the mechanised fishing units cannot venture out into the sea, and it is observed (Varghese, 1976) to bring in a total revenue of Rs. 400,000|- a year by purse-seining and trawling. In Karnataka, 43½' and 45' vessels, the latter being more preferable, are used for fishing along the coast and a purse-seiner costing about Rs. 400,000|- brings in an average amount equal to its cost through fishing in a year's season (Jayaraj, 1978).

TABLE V

Comparative financial projection of various fishing units (values in rupees)

Item \ Type of unit	Thangu vala	Ayila vala	15'	16'	20'	36'	43½'	65'	78'
			GRP Gillnetters			Purse-seine cum trawler	Purse-seine cum trap fishing cum hand lining	Demersal trawling cum single boat pleagic trawling	Trawler for deep sea fish and deep sea lobster
Initial investment	21,150	5,375	41,950	47,500	58,950	330,000	488,000	3,100,000	5,140,000
Gross income from sales	177,044	31,594	45,000	48,000	60,000	400,000	659,500	3,350,400	5,624,640
Expenditure	140,729	27,796	28,200	30,400	34,710	283,300	486,440	2,437,166	4,214,425
Net profit	36,315	3,798	16,800	17,600	25,290	116,700	173,060	913,240	1,410,215
Profitability %	20.51	12.02	37.33	36.67	42.15	29.18	26.24	27.26	25.07
Rate of return %	171.70	70.66	40.05	37.05	42.90	35.36	35.46	29.46	27.44
Investment: Turn over ratio	1:8.37	1:5.88	1:1.07	1:1.01	1:1.02	1:1.21	1:1.35	1:1.08	1:1.09
Pay back period in years	0.58	1.42	2.50	2.70	2.33	2.83	2.82	3.39	3.65
Reference	Table IV of this paper		Vijayan Unni, 1978			Varghese,* 1976	Varghese and Radhakrishnan, 1977*		

* Profit calculated without deducting payment of instalments on loan.

Deducting all expenditure including instalment on loan repayment from the total revenue, Varghese (1976) computed the owner's net profit in a year to be 25.36% of the initial investment. Repayment of loan being adjustment of investment on the assets already in possession should not be deducted as an item of expenditure from the gross revenue. If that is the case the rate of return of this unit increases to 35.36% (Table V). The revised rate of return of the 43½', 65' and 75' multipurpose fishing units dealt with by Varghese and Radhakrishnan (1977) in the above line are also given in Table V. The GRP gillnetters have crafts yet smaller in size needing lesser investment and according to Vijayan Unni (1978) they seem to make still higher rate of return (Table V). Nevertheless, compared to the high profit rate of the indigenous units like the Thangu vala and Ayila vala, the gain by investment on mechanisation is poor.

But this may not be correct always. The financial statement of the 36' vessel by Varghese (1976) revised on price structures of its constituent catch commodities comparable to those of the indigenous fishing units brings out altogether a different satisfactory picture. According to the catch composition given by Varghese (1976), 7% of the fish landed by purse-seining was mackerel. In the total 360 tonnes of purse-seine catches 25.2 tonnes could be mackerel. This mackerel at a reasonable rate of Rs. 2|- a kg could get a sum of Rs. 50,400|- when sold. The remaining 334.8 tonnes comprising sardine and other fish valued at Re. 1|- per kg will realise another sum of Rs. 334,800|-. The total income from purse-seining alone then becomes Rs. 385,200|- (Table VI).

Varghese (1976) has put the price of the trawl catches also at a flat rate of Re. 1|- per kg. The trawl catches of INP medium vessels based at Cochin is generally reported to contain 32.46% prawns (Rao and Dorairaj, 1973). The 40 tonnes of trawl catches at the above rate could have had 12.940 tonnes of prawns. The prawn catches of trawlers are broadly said to contain *Parapenaeopsis stylifera, Metapenaeus dobsoni, M. affinis* and *Penaeus indicus* at a ratio of 28:28: 11:8 (Silas 1977), which at respective comparable market rates of Rs. 3, 10, 17, and 30|- per kg fetches an average

TABLE VI

Financial projection for 36' purse-seine cum trawler (in rupees)

	As given by Varghese, 1976.		Revised			
Number of days work	200		200		240	
Turn over from 160 days purse-seining	360,000		385,200		385,200	
Turn over from 40 days trawling	40,000		163,577		163,577	
Turn over from 40 days additional trawling	—		—		163,577	
Total turn over from fishing		400,000		548,777		712,354
Cost of operation	21,400		21,400		25,680	
Depreciation	42,600		42,600		42,600	
Interest on capital	26,400		26,400		26,400	
Insurance	9,900		9,900		9,900	
Survey, Inspection and Registration	250		250		250	
Repairs and maintenance	14,750		14,750		14,750	
Allowance and refreshment	8,000		8,000		9,600	
Crew's share at 40% of total turn over	160,000		219,511		284,942	
Total expenditure		283,300		342,811		414,122
Net profit		116,700		205,966		298,232
Cost of unit		330,000		330,000		330,000
Profitability %		29,175		37.532		41,866
Rate of return %		35.364		62.414		90.373
Investment: Turn over ratio		1:1.2		1:1.7		1:2.2
Pay back period in years		2.8		1.6		1.1

price of Rs. 10.55 a kg. At this average rate, 12.940 tonnes of prawns could alone go for Rs. 136,517|-. The remaining 27.060 tonnes of fish, at a rate of Re. 1|- a kg will realise another Rs. 27,060|-. The prawn and the fish together will get Rs. 163,577|- for 40 days of trawling and the total for 200 days of both purse-seining and trawling comes to Rs. 548,777|- in place of 400,000|- given by Varghese (1976). Deducting all expenditure from this the net profit as given in Table VI works out to be Rs. 205,966|- and the profitability and the rate of return increase substantially.

The unit said to operate only 200 days at a rate of 20 days a month for 10 months (Varghese, 1976) if possibly can trawl for another 40 days, may reduce its period of idling and minimize loss on potential earning. An additional turn over of Rs. 163,577 can be expected of it, which will substantially increase the profitability and rate of return (Table VI). But it is necessary to caution that it would be extremely difficult to carry out fishing operations in certain parts of the year especially by medium and smaller mechanised crafts on account of inclement weather and unfavourable sea, and even if it be possible the catch and the composition of it may not be very attractive.

The gross income in relation to investment is very good in the indigenous fishing units (Table V). The income is 8.37 times more than the initial investment in Thangu vala unit and 5.88 times in the case of Ayila vala unit. With regard to mechanised fishing units, irrespective of the sizes of the boats and the type of fishing done the ratio of investment to gross income as given in Table V is between 1:1.01-1.35 only. According to the revisions made on the income of the 36' vessel unit the ratio is likely to rise up to 1:2.2 (Table VI). The indigenous units thus undoubtedly bring out proportionately higher rate of production than the mechanised units.

The profitability on the other hand, is higher in the mechanised units than the indigenous ones. This is on account of comparatively low percentage of share given to the crew, which in fact was only 20% in the 15', 18.75% in the 16' and 15% in the 20' GRP gillnetters and 40% in all other

mechanised units considered here. If the crew of the GRP gillnetters are also given 40% of the gross income as their share, the profitability then reduces to 18.59%, 15.58%, and 17.46% respectively in 15', 16', and 20' units. The medium boats as already discussed earlier thus appear to be the most profitable among the mechanised units dealt with in this account. If the mechanised units give 70% of their income as share of the crew, the profit margin of the unit owner will become deplorably low on account of the huge sums on variable costs also to be met.

The 36' purse-seiner cum trawler requiring an initial investment of Rs. 330,000|- needs 9 men a day for purse-seining and only 7 for trawling (Varghese, 1976). This unit, further stated to be working only 200 days a year, the other being off-season due to rough sea and bad weather, does 160 days of purse-seining and 40 days of trawling at the expense of an effort of 1,440 man days for the former and 280 man days for the latter. Forty per cent of its earning calculated according to Varghese (1976) to be Rs. 160,000|- divided among its total effort of 1,720 man days, works out the daily income of one of its crew to be Rs. 93.02. Though this earning looks lucrative, the mechanised fishing reduces employment opportunity to a number of people. The indigenous fishing units, like mechanised vessels, have no compulsory off-season and can scan the sea all through the year employing more number of them. For instance, one Thangu vala unit worth initially Rs. 21,150|-, employing 15 men a day and working 311 days a year engages 4,665 man days of labour at Manassery. Even the small Ayila vala unit with a paltry investment of Rs. 5,375|- only, engages a labour of 1,555 man days at the rate of 5 men per day for 311 days a year. Though the daily earning of the crew of the indigenous fishing units is much less in comparison to that of the mechanised fishing units, it is far in excess to the per capita national income and promotes wider circulation of money in the country.

CONCLUSIONS

The country crafts do not involve any significant operational costs as against huge sums needed for mechanised fish-

ing. The production of fish balanced tactfully with demand keeps the price reasonably high to sustain effort without loss, and the country crafts can economically be put into action even when the fish in the sea is scanty. More over, they can fish in shallow waters like fore-shore areas where draught for plying mechanised vessels without risk is wanting. This does not advance arguments against modernisation and mechanisation of fishing industry and discarding mechanisation altogether. On the contrary, it is inevitable to enhance production through exploitation of the resource that stay far out in the sea eluding the efficiency and capacity of the country crafts to get to them. Better results may come to hand by expanding the existing traditional inshore fishing ground and do co-operative fishing with mechanised and indigenous units working together. The power vessels can tow a fleet of traditional fishing units to the resourceful expanded inshore areas where the latter can flourish in fishing when the former may be pressed into action as carrier boats delivering the goods quickly to the shore. Silent operation and easy manoeuvrability in limited space render the indigenous fishing units more advantageous in trapping the fish, and there is no danger of the country craft entangling and damaging the nets payed below. The sound of the engine of the mechanised boat imperil fishing in most phases, and in mechanised fishing, especially with small units, the propeller of the vessel is a perpetual point of danger to the net. Mechanised boats using big nets may be deployed for catching fish in off-shore waters leaving the inshore and shallow waters to traditional and co-operative endeavour.

It would be appropriate at this juncture to define territories for each type of fishing craft, such as indigenous non-mechanised fishing for the existing narrow traditional, coastal belt, co-operative fishing by mechanised vessels together with non-mechanised units in the expanded inshore areas, and mechanised fishing in offshore and deep sea waters. Such strategic spacing and diversification of fishing in India's newly declared economic zone may bring home blue revolution a reality without endangering job opportunities to the hundreds of thousands of fishermen.

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