

GROWTH AND PRODUCTIVITY OF INDIAN FISHERIES*

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ABSTRACT

During the last decade (1970-80) fisheries of India had grown in many spheres. The contribution of fisheries to GDP had increased by registering a growth of 0.38% during the period from 1971 to 1982-83. Number of fishery workers among the total working force had increased. During the year 1977-78 the fisheries had provided employment of 0.7% of all types in the total economically active population and 1.1% of the total workers of primary industry in the whole country. Similarly the number of fishery management units grew from 4,70,591 in 1970-1972 to 6,10,915 in 1981 or an increase of 29.8%. However, there is not much increase with regard to those who own boats during the same period. The number of fishery cooperatives had also increased by 32.4% during 1972 to 1979. The marine fish catches had gone up by 25% from 1973 to 1983. Though there is not significant growth of fish from the EEZ, there is a moderate growth of number of deep sea fishing vessels. Similarly inland fishing and aquaculture have grown up steadily during the last decade though the actual figures are not available for inland fishing vessels. Even in the infrastructural facilities, India had shown a good growth particularly in the construction of medium and minor fishing ports.

Supply of fish products for domestic consumption had increased registering a modest growth. However, the growth of exports of fishery products is enormous during the last decade.

Capital surplus after meeting the expenditure by the boats which are working in the mechanised sector had gone up slightly. Surplus in aquaculture is however showing greater particularly with paddy cum prawn culture which is extensively undertaken in Kerala. Growth in research facilities and also personnel employed with regard to research in fisheries had gone up in relation to the ratio of research workers to the fishermen population.

The productivity per mechanised boat had increased by 8.19% [during 1977-80. The productivity per hectare of an inland fish farm had also gone up. The fisheries of India had shown all round development and growth in all components of fishery industry except from EEZ area.

INTRODUCTION

DURING the last decade (1970-80) fishery productivity growth performance is quite impressive. Similarly the growth of many sectors of fishery economy is very encouraging and is destined to grow very rapidly in the future years. The fisheries, both inland and marine, had shown substantial improvements in

acquiring the necessary infrastructural facilities that are very much required for rapid development of industry.

The growth of production is substantial during the last decade, particularly for inland fisheries. Employment in fishery sector had risen very much, while there is a slow down of growth of marine fish production. This is partly due to lack of capital investment for deep sea fishing. On the one hand the developmental growth in providing major and minor harbours for berthing vessels is remar-

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kable during the last decade, and on the other hand, it had helped significantly to increase fishery export growth during the last decade which is definitely phenomenal.

WHAT IS PRODUCTIVITY ?

Productivity measures the relationship between output (the amount of fish output, value added products, and other services produced in various segments of fishing industry) and input (the quantities of labour, capital, infrastructural facilities and material resources used to produce output). Productivity goes up or is increased when a smaller or lower quantity or amounts of inputs had produced larger quantity of output. In other words, it is the ratio between the output and the sum of all inputs and of course expressed at 100% points when there is an increase or decrease from year to year. The labour productivity is measured in terms of output per worker or per hour of labour. In simple term the fisheries productivity, for instance, is obtained by dividing the total production by number of workers who go for fishing. Though the appropriate method of measuring productivity is to divide the GNP (Gross National Product) by the working force of the whole economy to derive the productivity of the whole economy, in this article only fishery productivity in relation to labour is measured. However, for calculation of productivity all inputs, such as harbours or icing are not taken at present. Labour productivity is usually considered a better measure of welfare, because it reflects the income obtained by a fisherman.

Similarly per boat productivity can also be expressed as the relationship between the fish production and number of boats used. However, the 'total factor productivity' is difficult to measure, particularly in fishing. In fishing not only the boats, but also labour, engines, fishing grounds and other services are employed to produce fish output. In such cases we do not know exactly whether fishermen or the

machines or the fishing grounds or icing or harbour facility have contributed more fish catch.

In this article, we have attempted to measure the productivity of fish output by taking labour per day and the boat employed for the purpose. However, the productivity per acre of fishing ground is not shown here as it is very difficult to give weightage. Further, an attempt is made to measure the growth of fisheries contribution to the Gross Domestic Product (GDP), the growth of fishery working force, the growth of fish production and growth of some other sectors. Though we could not get all the details and the relevant data of all the sectors of fishery economy, we have found out the rate of growth in certain sectors for which the data are available.

Table 1 explains the share of fisheries in GDP from 1971 to 1982-83. The contribution of fisheries to GDP had grown from 0.66% in 1971 to 10.4% in 1982-83. In absolute figures, at the current prices it had increased from Rs. 2,450 million in 1971 to Rs. 15,105 million in 1983-84. The fisheries share of percentage in primary industry (agriculture, forestry, fisheries, mining and quarrying) had gone up from 1.37% in 1971 to 3.02% in 1982-83. However, the share of fisheries in GDP is not phenomenal as compared to some of the fishing nations of the world. For instance, in Philippines the share of GDP of fisheries was 5.51%, while in Republic of Korea it was 3.42% during the year 1980. In USSR, Japan, USA, fish output still do not contribute much to their GDPs. (1.02, 0.36 and 0.09% respectively). However, fish output contributed more than 4% per cent to GDPs in Burma, Senegal, Bangladesh, Malaysia and Seychelles. In India, during the last eleven years the average annual rate of growth is 5.23%, which is very impressive. If the same rate of growth is maintained, the fisheries may contribute around Rs. 2,60,670 millions to the GDP by 2000 A.D.

TABLE 1. *Share of fisheries in Gross Domestic Product (GDP) (Unit : In millions of local currency*

Year	GDP (A)	Of which : Primary Industry (B)	Of Which : Fisheries		
			Value	As % of A	As % of B
1971	367,360	178,020	2,450	0.66	1.37
1974	632,630	297,400	4,540	0.71	1.52
1977-78	811,790	340,870	6,180	0.76	1.81
1978-79	869,100	345,980	7,280	0.83	2.10
1979-80	939,830	355,330	7,200	0.73	2.02
1980-81	1,142,710	444,020	8,840	0.77	1.99
1981-82	1,304,650	470,920	11,030	0.84	2.34
1982-83	1,451,410 (f)	499,458	15,105**	1.04	3.02

Source : For figures upto 1980, *National Accounts Statistics, February, 1982* issued by Central Statistical Organisation, Department of Statistics, Ministry of Planning, Government of India, New Delhi, pp. 4-20 ; for 1980-81 figure *National Accounts Statistics February, 1983* ; for 1981-82 figure *Hand-Book on Fisheries Statistics, 1982*, Pub. Ministry of Agriculture, Government of India, New Delhi, p. 84.

* NOTE : (A) Current prices
(B) Including agriculture, forestry, fisheries and mining.

** Estimated (f) See *National Accounts Statistics, Central Statistical Organisation, 1984*, p. 2.

TABLE 2. *Fisheries employment vis-a-vis economically active population* ^{a b}

(Unit : 1,000)

Item	1971	1972	1977-78 ^d
Total economically active population (A)	180,373	219,500	260,900
Of which : Primary Industry ^c (B)	130,813	153,320	160,300
*Fisheries (C)	586	1,406.7 (i)	1786.6 (i)
Of which : Employers and Self-employed	N.A.	768.2 (h)	892.4 (h) 1977
Employees	N.A.	460.00 (h)	489.33 (h) 1977
Unpaid family workers	N.A.	493.6 (h)	664.9 (h)
C/A (%)	0.325	0.641	0.685
C/B (%)	0.448	0.918	1.114

Source : For column 1 *National Accounts Statistics 1970-71 to 1975-76*, Pub. January, 1978. The figure in the Column 2 in the first row, given for 1972, the National Sample Survey Statistics based on 27th round. No statistics were available for the estimation of employment during 1975, but only for 1972-73. Figure for 1975 from *India, 1981*. Pub. the Government of India, p. 164. But these figures do not include the employment in agriculture and allied industries. So the estimation for 1977 agriculture is same as the increase that took place during 1971 to 1973.

(d) *Statistical outline of India, 1982*, Data for the year 1977-78. Services Limited, Bombay, p. 132.

NOTE : (i) For figure of 1406.7 Census of Live Stock, 1977. No figure was available for 1975 and available for 1972 and 1977. This includes fishermen engaged in actual operations of fishing or fish seed collection or both, marketing, net making and repairing.

(h) These are all estimations based on *Live Stock Census* figures, and no statistics were available for self employed, employees and unpaid family workers.

Table 2 gives the working force in the whole fishery sector as well as for the whole country. This had also gone up from 0.325 % in 1971 to 0.685% in 1977-78 in the total working force of the whole country. The average rate of growth per year is 15.8%. The self-employed workers had increased from 7,68,200 in 1972 to 8,92,400 in 1977-78. Similarly there is a slight growth of hired employees from 4,60,000 in 1972 to 4,89,033 in 1977-78. Though it is very difficult to estimate the projected figure for 2000 A.D., it can be safely said that fisheries are capable of providing more employment to many people in the coming years. The projection of the working force in the whole fishery sector for the 2000 A.D. will be 5.682 million.

GROWTH OF MANAGEMENT UNITS

There is an overall growth in the number of fishery management units during the last decade. A management unit is defined as the one which is exclusively managed and organised its own production under either by a firm or by a corporation or by a single fisherman's household. If it is organised and managed by an individual, the economic decisions will be taken by himself and he is fully responsible for its losses and returns. Similarly, a single firm or a joint corporation manages and takes its own decisions for efficient productive operations. In this context, the growth of management units in India has been studied. In India all the fishermen's households are independent economic units. Similarly cooperatives, private companies, government corporations and others involved in the trade are taken as management units. However in fisheries there are many statistical discrepancies with regard to the estimation of fishermen's households. According to 1972 Census there were 3,82,600 full time fishermen members who were engaged in fishing operations. This number had increased to 4,51,100 in 1977 according to the Census. These families could not be taken as single fishermen's households

as 2 or 3 the workers might have come from the same family. Under these circumstances, a boat, whether mechanised, or non-mechanised, could be taken as one management unit since it is performing some economic functions of production, organisation and management.

Therefore we have taken a boat as one management unit. Generally a boat is managed by one person. According to the Censuses of 1972 and 1977 there were 2,17,400 and 1,96,500 non-mechanised boats during these years, while mechanised boats were 12,600 and 18,700. Hence, total number of management units would be 2,30,000 in marine fisheries during the year 1972 and 2,15,200 in 1977. However for 1981 the number was 2,10,053 (this was arrived after the growth rate of number boats in 1981). Viewed against this, the management units had decreased from 2,30,000 in 1972 to 2,10,053 in 1980 showing a 8.7% decrease during the said period. This decreased tendency is due to the less number of non-mechanised boats during 1977. But the overall growth is there in mechanised boats during that period. The total management units in marine sector had increased from 3,28,818 in 1972 to 3,65,747 in 1981 (increase of 11.23%).

Similarly we have studied the growth of management units in inland fishing sector also. We do not have proper statistics of fishing boats in the inland fishing sector. There were 7,68,200 full and part time workers in 1972 and 8,61,200 workers in 1977 as per Censuses. One fourth of them might have come from the inland fishing sector 1,92,050 in 1972 and 2,15,300 in 1977. Assuming 2 workers might have come from one family, the number of fishermen's households in inland sector might be 96,025 in 1972 and 1,07,650 in 1977.

In inland sector also, there is an overall increase of management units from 1,41,773 in 1970 to 2,45,168 in 1981 (the increase is 72.3%). With this growth rate performance

TABLE 3. Number of fisheries management units by type engaged in marine and inland fishing

Sector	1970	1972	1976	1980	1981
<i>Marine Fishing</i>					
Fishermen's management unit	—	2,30,000	—	—	2,10,053
Cooperatives ..	—	2,016	—	—	2,500
Private Companies ..	—	196	—	—	328
Government Corporations ..	—	6	—	—	N.A.
Others ..	—	96,600	—	—	1,52,866
Total ..	—	3,28,818	—	—	3,65,647
<i>Inland Fishing</i>					
<i>Individual Fishermen</i>					
Households ..	91,541	—	—	—	1,18,458
Cooperatives ..	1,929	—	—	—	3,502
Private Companies ..	N.A.	—	—	—	N.A.
Government Corporations ..	—	—	—	—	7
Others : (i) Seed Farms ..	—	—	—	—	2,257
<i>Trades and Business</i>					
Establishment ..	48,303	—	—	—	1,20,944(B)
Total ..	1,41,773	—	—	—	2,45,168

Source : Compiled and estimated from P. S. Rao, *Fishery Economics and Management in India*, 1983. (Bombay : Pioneer Publishers) and *Hand Book on Fisheries Statistics*, 1986, P. 43.

TABLE 4. Ice making, cold storage and freezing facilities for fish and fisheries products

Year	<i>Ice plants</i>		<i>Frozen Chambers</i>		<i>Cold Storage</i>		<i>Freezing Plants</i>	
	Number	Total Capacity	Number	Total Capacity	Number	Total Capacity	Number	Total Capacity
1972	27	65.00	N.A.	N.A.	34*	1475	N.A.	N.A.
1976	46	564.25	64	249.72	290	11105.2	240	1100.61
1978	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1979	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1980	156	1915.75	69	249.64	378	35942.35	322	1486.13
1981	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1982	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1983	349	4293	72	250	389	36988	355	1546

Source : P. S. Rao's 'Report on Fishing Industry of India', submitted to the Asian Productivity Organisation's Symposium, held in Tokyo, November 12-18, 1985.

it can be projected that in whole fishery sector the management units will grow in future, because India being a democratic country, more number of fish farmers, fishing units, cooperatives and firms will be organised either as single management units or group managed units.

In Table 3 'Others' include those fishermen who carry boating, sea farming, salt making and agriculture.

HARBOUR AND OTHER INFRASTRUCTURAL FACILITIES

There is a tremendous growth with regard to the construction of major, minor and medium harbours in the country. Although these facilities do not directly show the increased

infrastructural facilities such as cold storages, freezing, ice manufacturing and canning plants and other have been created to facilitate for the export of fishery products. All these have an important bearing on the increased productivity of marine fish production and they can be attributed for bringing a change in the economic performance of the whole fishery industry.

GROWTH OF PRODUCTIVITY OF LABOUR AND BOAT

There is a growth of productivity per small mechanised boat from 1978 to 1980. It has increased from 31.75 tonnes in 1978 to 34.35 tonnes in 1980 (Table 6). The annual average rate of growth of productivity is 4.2%. This productivity had taken place inspite of the

TABLE 5. Number of fishing harbours and landing centres constructed during 1971-1985

Type of Harbours	Sanctioned	Commissioned	Under Construction	Total Investment in Rs. (crores) from 1951-1990
Major Fishing Harbours ..	5	4	1	62.50
Minor Fishing Harbours ..	26	9	17	66.48
Small Landing Centres ..	97	73	24	
Total ..	128	86	42	128.98

Source: *Hand Book on Fisheries Statistics, 1986.*

productivity of fish output, they would definitely have to be taken into account for measuring the 'total factor productivity'. The total factor productivity means all those inputs which have contributed to the growth of productivity. For instance, the inputs such as harbours, cold storage, freezing and ice manufacturing facilities, have indirectly helped to increase the productivity of fish output. During the last one and half decades, 5 major harbours, 26 minor harbours and 97 small landing centres were either have been constructed or being constructed. Similarly other

number of boats that had increased from 14,282 in 1978 to 16,100 in 1980. The gross value produced by a worker had increased from Rs. 3.67 to Rs. 5.29 at current prices. However, at constant prices of 1977 (base 100) there is also an increase of 23% in 1978 over 1977 and 17% increase in 1980 over 1979 values.

Similarly the productivity per man in mechanised fishing had also increased from 4.89 tonnes in 1978 to 5.29 tonnes in 1980 per man per year. The annual average rate of growth

per year was 4.19%. Thus the growth productivity per man was very impressive (Table 6).

Table 7 explains the relationship between investment and the fish output produced during those years. For arriving at the fish output value, the mechanised sector's contribution to the value of GDP produced in those years

proportion had increased from 7.79% in 1977-78 to 9.35% in 1978-80. Productivity per man per year and also the fish output are increasing. At least a moderate 25 to 30% would have been the best indicator to show the growth of the ratio fish output to its capital investment. Between 1970 and 1977 investment in manufacturing gave an output of 28.8% in Japan,

TABLE 6. Catch productivity for whole fishing season per small mechanised boat, per person and per hour

Year	Catch* obtained (in t)	Total No. of boats operated	Catch per boat (t)	Catch per person (t)	Gross value per hour (in Rs.)
1977-78	.. 4,53,522	14,282	31.75	4.89	3.67
1978-79	.. 5,12,317	15,281	33.53	5.16	4.52
1979-80	.. 5,53,113	16,100	34.35	5.29	5.29

NOTES : * These catches were estimated on the basis of percentage catches calculated for the mechanised boats, which were obtained from the total catch produced by traditional and mechanised sector. For 1977-78, 36% of the total catch, for 1978-79, 36.5% of the total Catch and for 1979-80, 37% of the total catch, were taken. Details not available for estimating the productivity of the all sizes of the boats. The 6th column figures were calculated at 2000 hrs for the whole fishing season.

TABLE 7. Boat investment and its relationship to fish output

Year	Boat investment in Rs. (millions)*	Fish output in Rs. value (million)	Percentage of fish output
1977-78	.. 2856.4	222.5	7.79
1978-79	.. 2870.5	263.7	9.26
1979-80	.. 2849.6	266.4	9.35

* The investment was calculated at an average rate of Rs. 2 lakhs per boat in the year 1977-78. For the year 1978-79, the depreciation was calculated at 10% for the old boats and for the new boats at the rate of Rs. 3 lakhs per boat was taken in the year 1978-79. And similarly for 1979-80 for the new boats Rs. 3.25 lakhs per boat was taken. Depreciation for the 1979-80 boats was taken on the residual value of the 1978-79 and 1977-78 boats.

was taken (Table 1 for GDP values). Value of fish output as a proportion of the investment on fishing boats, was 7.79% in 1977-78; 9.26% in 1978-79 and 9.35% in 1978-80. The

15.9% in West Germany, 14.7% in Canada, but only 9.6% in the United States. For many years in fact, the capital investment in fishing industry trailed behind all the other sectors of Indian economy particularly even compared with agricultural investment. As such, there is no much capital investment in Indian fisheries.

GROWTH OF FISH PRODUCTION

The marine fish production had increased from 1.16 million tonnes in 1971 to 1.77 million tonnes in 1984. The annual average growth rate is 4.08%. Similarly the inland fish production had increased from 0.69 million tonnes in 1971 to 1.08 million tonnes in 1984. The annual average growth rate is 4.35%. The growth rate of marine fish production is a little bit lesser than the inland fish production growth rate. The marine fish production growth rate could not go up much partly due

to lack of capital investment in deep sea fishing areas. All operations are done from the inshore area which means there is over-capitalisation. New capital and technologies are required to increase the marine fish production from the EEZ. At present there is no room to increase the capital in the inshore areas. However, the total growth rate of fish is 4.19% (Table 8).

TABLE 8. *Indian fish production (in million tonnes)*

Year	Marine	Inland	Total
1971	1.161	0.690	1.851
1981	1.445	0.999	2.444
1982	1.427	0.940	2.367
1983	1.519	0.987	2.506
1984	1.772	1.082	2.859

Source : *Hand Book of Fishery Statistics* 1986.

The projected total production in the 2000 A.D. will be 5.51 million tonnes. However this projection may become true when all the factors such as deep sea fishing, intensive fish culture and other factors are taken into account.

Table 9 provides the index numbers of fish production during 1971 to 1984. The overall increase is 54.4%. The year to year percentage increase of fish production under indices is there, but for one year i.e 1982, the average rate of growth per year is declining. When index numbers are taken the average annual rate of growth is 4.2%.

TABLE 9. *Annual index of fish production (marine and inland)*

Year	Marine	Inland	Total	Yearly Average increase
1971	169.9	248.8	192.7	—
1981	211.4	360.2	254.3	31.97
1982	208.8	338.7	246.3	-3.15
1983	222.2	355.9	260.8	5.89
1984	259.9	390.0	297.5	14.07

Source : Ministry of Agriculture, *Hand Book on Fisheries Statistics*, 1986, p. 2.

EXPORT GROWTH

The growth of export of marine products is highly impressive during the last one and half decades. It requires no explanation. However, the growth rates are given here to have an idea regarding the export performance. It had increased from 65,907 tonnes in 1977-78 to 85,843 tonnes in 1986-87, which indicates a growth of 30.25% in the exports during the last 9 years and the annual average growth rate is 3.36%. The projected quantity of marine exports in 2000 A.D. will be 1,29,554 tonnes. Similarly the value of the exports also had increased by 154.58% during the same period, with an annual average growth rate of 17.18%. It is difficult to project the increased value of exports in 2000 A.D., because of change in prices of fish products and also the inflation that would occur in the 2000 A.D. However, if there is no inflation and no change in prices this will bring a value of Rs. 6952 millions.

TABLE 10. *Marine products exports from India, from 1977-78 to 1986-87*

Year	Quantity (in tonnes 000)	Value (in Rs. million)
1977-78	65.91	1809.5
1978-79	86.89	2346.2
1979-80	86.40	2448.4
1980-81	75.59	2348.4
1981-82	70.11	2860.1
1982-83	78.18	3613.6
1983-84	92.69	3730.2
1984-85	86.19	3842.9
1985-86	83.05	3980.0
1986-87	85.84	4606.7

Source : *Hand Book of Fisheries Statistics*, 1986.

SUPPLY OF FISH AND FISHERY PRODUCTS AVAILABLE FOR DOMESTIC CONSUMPTION

Supply of fish products for domestic consumption has increased registering a modest growth. Total quantity of supply of fish has increased from 1.82 million tonnes in 1971 to 2.214

million in tonnes in 1975 ; of which 2.03 million tonnes was utilised for food and the rest was probably utilised for non food use *i.e.* 0.19 million tonnes. Statistics are not available about the consumption of sea weeds. However, about 19,400 tonnes of shellfish must have been utilised for food. In 1975 the total supply of 2.32 million tonnes was used for food which indicates an increase of 22.6% in the consumption of fish food over 1970.

In 1980 the total supply of fish was 2.425 million tonnes, of which 2.256 million tonnes was utilised for food. This indicates an increase of 11% over the 1975 figure. But

negligible quantity of imports and it is estimated at 200 tonnes. Changes in stock and transit are not much as the fresh fish is about 65% and another 30% is consumed in dried form. The dried fish utilisation was 0.647 million tonnes. In 1982 the actual dry fish consumption would be roughly 0.388 million tonnes. In fact the actual supply that was available for human consumption after deducting the losses in dry fish conversion comes to 0.179 million tonnes. But we have not shown for all the years under transit losses as proper figures are not available. The trend for consumption pattern for the next decade, would be the same as what had been indicated in earlier years.

TABLE 11. *Business and economic analysis of boats and fish farms*

Item	Marine fishing unit average size of boat (30-36 feet) (a)		Inland fishing unit average size of boat above 5m year 1979	Aquaculture size 0.60 hectare year 1984 (b)
	1971 (Rs.)	1978-79 (Rs.)	(Rs.)	(Rs.)
Gross fisheries income	47,950	1,72,984.30	1,187.00	19,186.33
Fisheries expenditure ..	28,434	1,41,833.68	269.90	9,865.13
Net fisheries income ..	19,516	31,070.62	917.10	9,321.00
Fixed capital (investment average) ..	66,206	1,58,434.50	29,310.00	5,000.00 (c)
Returns to capital (%) ..	29.48	19.61	3.21	86.4

Sources : (a) P. S. Rao *et al.*, 1978. 'Cost of Production and Earnings of Mechanised Fishing Boats', *Mysore Journal of Agriculture Sciences*, 12 : 326-331. (b) Figures based on K. Thankappan, 'Economics of Paddy Fields Prawn Filtration : Case studies in and around Cochin' of Dissertation (unpublished); (c) estimated. For other columns : P.S. Rao's 'Report Fishing Industry of India'.

there is a decrease in consumption in the year 1981 over the figure of 1980. This is because the production has come down in that year. Similar is the case in 1982. In the total available supply a large portion of the catch is being utilised for human consumption only. This is because very little is being exported and about 0.105 million tonnes of fresh fish is being utilised for exports. That is only 4.4% in the total availability of fish for human consumption during 1982. There is very

BUSINESS AND ECONOMIC ANALYSIS OF FISHRY UNITS

Capital surplus after meeting the expenditure by the boats which are working in the mechanised sector had gone up slightly, though the returns to capital investment had declined in recent years (Table 11). In inland fishing, the business profit is very much less, because there is probably less capital investment and no modernization of fishing techniques and

implements. However, surplus in aquaculture is highest, particularly with paddy cum prawn culture which is extensively undertaken in Kerala. The returns of capital investment is very high and in fact this occurred without using any scientific inputs to increase production.

GROWTH IN RESEARCH PERSONNEL

Growth in research facilities and also personnel employed with regard to research in fisheries had gone up in relation to the ratio of research workers to the fishermen population. At the centre, the number of research workers had increased from 14 in 1972 to 20 in 1982. Similarly, at the States and at research institutes it had gone up from 544 in 1972 to 744 in 1982. The ratio of research workers to working fishermen in 1977 was 1:2671 whereas in 1972 was 2813.

CONCLUSION

The fisheries of India have shown a steady growth and productivity and competitiveness in stabilizing the fishing Industry. There is overall growth and development in all sectors except in deep sea fishing exploitation. If deep sea fishing is undertaken it may show a higher productivity and economic growth of fisheries. The contribution of fisheries to GDP, working force, management units had shown a rapid growth. The productivity can be enhanced if the workers are provided with better working atmosphere and conditions on the boat as well as on shore. Investment had to be increased in training of the people particularly in managing the small scale boats. The utilisation of manpower in the small scale mechanised boats is excess or surplus at present and this has to be reduced in order to have high productivity of labour. In inland fish culture productivity can be increased if all the fish farmers are trained in scientific skills.