

Impact of Fisheries on the Economic Development of Andhra Pradesh

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In Andhra Pradesh, the primary sector consisting of agriculture, livestock, fisheries, etc., contributed substantially to the economy of the state to the tune of 27.5% of the GSDP during 2003-04. The fisheries play a very significant role in the development of the state having contributed Rs. 60,310 million (at current prices) to the primary sector this year, which amounts to about 12%. The export of marine products from Visakhapatnam port has brought in foreign exchange worth about Rs. 9,000 million, during 2002-03. With an impressive infrastructure both in fishing and fish processing, the fisheries sector provides employment to about 2 million people and supports 10 million people in the state. In this paper, an attempt is made to study the impact of fisheries on the development of the economy in the state. Suggestions to achieve the targets to ensure a viable fisheries sector have also been discussed.

Key words: Fisheries, economic development, Andhra Pradesh

Fisheries sector in Andhra Pradesh support about 10 million people and contributes immensely to food security of the state. Fish in large quantities in fresh and frozen condition are exported and transported to neighbouring states for domestic consumption. The primary sector consisting of agriculture, livestock, fisheries, etc., contributed substantially to the economy of the state to the tune of 27.5 % of the GSDP during 2003-04. The fisheries play a very significant role in the development of the state having contributed Rs. 60,310 million (at current prices) to the primary sector.

As the state is poised for further development in the fisheries sector, an assessment of the strength, weakness, opportunities and threats is necessary. In this paper, an attempt is made to evaluate the impact of fisheries on the economic development in Andhra Pradesh.

Materials and Methods

Different parameters such as the marine and inland production, aquaculture production, exports, etc., were collected from various publications of the state and central government sources. Information on Gross State Domestic Product (GSDP) was collected from publications of the Directorate of Economics and Statistics, Govt. of Andhra Pradesh and the official website of the Planning Commission. Details on seafood processing were collected from MPEDA publications. Appropriate linear and non-linear models were used for studying the present trend, short-term forecasts as well as for making projections upto 2020.

Results and Discussion

Contribution to GSDP

The GSDP is one of the most important macro-economic indicators of the economy of a state. It represents the income originating from the factors of production physically located within the geographical boundaries of the state and represents net value of goods and services produced within the state. The total GSDP of Andhra Pradesh is estimated at Rs. 17,78,830 million during the 2003-04 at current prices (Source: Directorate of Economics & Statistics, Govt. of Andhra Pradesh), which is 7.0% of the GDP of the country. The GSDP is constituted by the primary, secondary and tertiary sectors. Fisheries comes under the primary sector along with agriculture, livestock, forestry, mining, quarrying etc. The data for the past few years at constant prices based on 1993-94 and current prices have been analysed, and presented in Tables 1 and 2.

Table 1. Gross State Domestic Product of Andhra Pradesh at constant prices (1993-94) (Rs. x10⁷)

Industry	Primary	Secondary	Tertiary	Total
1993-94	20675.24	12683.99	24507.41	57866.64
1994-95	20404.53	14403.69	26302.85	61111.07
1995-96	21565.34	15240.51	27922.86	64728.71
1996-97	22965.87	15852.37	29990.76	68809.00
1997-98	19461.78	16980.18	31423.83	67865.79
1998-99	24193.95	17278.44	33378.27	74850.66
1999-00	23119.97	18632.48	36641.36	78393.81
2000-01	23781.32	19253.09	39399.78	82434.19
2002-03 ^a	25418.00	22075.00	45262.00	92755.00
2003-04 ^b	27291.00	23255.00	48774.00	99320.00

^aQuick estimate; ^bAdvance estimate

Source: Directorate of Economics and Statistics, Govt. of Andhra Pradesh

Table 2. Gross State Domestic Product of Andhra Pradesh at current prices (Rs. x10⁷)

Year	Primary	Secondary	Tertiary	Total
1993-94	20675.24	12683.99	24507.41	57866.64
1994-95	24182.11	15832.85	28909.38	68924.34
1995-96	27858.21	18208.78	33786.59	79853.58
1996-97	31515.74	20140.92	38490.77	90147.43
1997-98	30110.21	22738.30	42933.76	95782.27
1998-99	39653.49	24464.26	48973.15	113090.90
1999-00	39208.92	27090.36	55403.56	121702.84
2002-03 ^a	47210.00	36207.00	77351.00	160768.00
2003-04 ^b	50998.00	40125.00	86760.00	177883.00

^aQuick estimate; ^bAdvance estimate

Source: Directorate of Economics and Statistics, Govt. of Andhra Pradesh

Table 3. Comparison of annual growth rate of Andhra Pradesh and India

Year	Andhra Pradesh		India	
	GSDP (Rs. x10 ⁷)	Growth rate(%)	GDP(Rs. x10 ⁷)	Growth rate(%)
1993-94	57867	-	769265	-
1994-95	61114	5.60	822649	6.94
1995-96	64729	5.90	884388	7.50
1996-97	68809	6.30	953667	7.83
1997-98	67866	-1.40	1005945	5.48
1998-99	74851	10.30	1070774	6.44
1999-00	78394	4.70	1136840	6.17
2000-01	82434	5.20	1198600	5.43
2001-02	84926	3.02	1267800	5.77
2002-03	92755	9.22	1318321	3.98
2003-04	99320	7.08	1424507	8.05
Mean	-	5.59	-	6.36

Source: Directorate of Economics and Statistics, Govt. of Andhra Pradesh;
Economic Survey, Ministry of Finance, Govt. of India

The analysis shows that the contribution of primary, secondary and tertiary sectors is 27.48%, 23.41% and 49.11%, respectively, at constant prices and 28.67%, 22.56% and 48.77%, respectively, at current prices, during 2003-04. The growth indices of each sector during the past decade are 1.32 for primary sector, 1.83 for the secondary and 1.99 for the tertiary sector. This indicates that the rate of growth has been 32%, 83% and 99%, respectively, for the above sectors. This growth has been substantial in respect of all the sectors, which is a clear indication of a healthy economy. During 1993-94, the contribution of the sectors

were noted to be 35.73%, 21.92% and 42.35% respectively at constant prices. In fact, the primary sector's contribution to the GSDP has declined from 62 to 36% between 1960-61 and 1993-94 and further to 27% during 2003-04 (NIRD, 1999). A comparison clearly indicates that the contribution of primary sector to GSDP is gradually decreasing which means that the dependency of the state's economy is gradually shifting to secondary and tertiary sectors. This is similar to the trend noticed in many developing countries of the world.

The contribution of Andhra Pradesh to national GDP amounting to Rs. 1,42,45,070 million (constant prices) during 2003-04 was only 7.0%. A comparison with all India growth rate (Table 3) suggests that the annual growth rate of Andhra Pradesh was less than the national figures throughout the past decade except during 1998-99 period.

Contribution of fisheries to economic development

The contribution of fisheries to the primary sector in Andhra Pradesh was 7.96% in 1999-2000 and 2.57% to the total GSDP (at current prices), which is substantial, compared to the all India figures of 4.73% and 1.38%, respectively (CSO, 2001). The contribution of fisheries to the primary sector has been steadily increasing during the past decade and it reached 9.53% during 2003-04 (Table 4). At current prices, the contribution of fisheries to the primary sector and total GSDP was 11.83% and 3.39%, respectively (Table 5).

Table 4. Contribution of fisheries to the GSDP of Andhra Pradesh at constant prices

Year	GSDP (Rs. $\times 10^7$)			%	%
	Fisheries	Primary sector	Total (primary, secondary and tertiary sectors)		
1993-94	1172.89	20675.24	57866.64	5.67	2.03
1994-95	1306.75	20404.53	61111.07	6.40	2.14
1995-96	1277.35	21565.34	64728.71	5.92	1.97
1996-97	1345.29	22965.87	68809.00	5.86	1.96
1997-98	1411.72	19461.78	67865.79	7.25	2.08
1998-99	1580.07	24193.95	74850.66	6.53	2.11
1999-00	1807.69	23119.97	78393.81	7.82	2.31
2000-01	1897.96	23781.32	82434.19	7.98	2.30
2001-02 ^a	1933.26	-	84925.83	-	2.27
2002-03 ^b	2623.00	25418.00	92755.00	10.32	2.83
2003-04 ^c	2602.00	27291.00	99320.00	9.53	2.62

^aPredicted value; ^bQuick estimate; ^cAdvance estimate

Source: Directorate of Economics and Statistics, Govt. of Andhra Pradesh

Table 5. Contribution of fisheries to the GSDP of Andhra Pradesh at current prices

Year	GSDP (Rs. x10 ⁷)			%	%
	Fisheries	Primary sector	Total (primary, secondary and tertiary sectors)		
1993-94	1172.89	20675.24	57866.64	5.67	2.03
1994-95	1453.16	24182.11	68924.34	6.01	2.11
1995-96	1613.94	27858.21	79853.58	5.79	2.02
1996-97	1803.70	31515.74	90147.43	5.72	2.00
1997-98	2127.11	30110.21	95782.27	7.06	2.22
1998-99	2574.47	39653.49	113090.90	6.49	2.28
1999-00	3122.88	39208.92	121702.84	7.96	2.57
2002-03 ^a	6250.00	47210.00	160768.00	13.24	3.89
2003-04 ^b	6031.00	50998.00	177883.00	11.83	3.39

^aQuick estimate; ^bAdvance estimate

Source: Directorate of Economics and Statistics, Govt. of Andhra Pradesh

The rate of growth during the decade, showed that growth index was 2.22 in fisheries as compared to 1.32 in agriculture. It means that GSDP in Andhra Pradesh reached 222% during the decade compared to 132% in agriculture. This could be attained with an annual average growth of 7.25%. Thus, the pace of growth in fisheries is much higher than that of all other sub-sectors of the primary sector. The annual average growth in agriculture, livestock and forestry were 2.1, 5.44 and 1.43%, respectively (Anon, 2003).

Based on annual GSDP figures for the past decade, models were developed and tested for short and long-term forecasts. At constant prices, a linear model of the following form was found to be the best fit for GSDP from fisheries with an R² of 0.88 and significant coefficients:

$$Y = 857.29 + 144.36 * t,$$

where time t = 1, representing the year 1993-94.

Based on this model, it has been projected that the contribution of fisheries to the GSDP of Andhra Pradesh will be Rs. 33,115 million, in the year 2010. For short term forecast for GSDP from fisheries the non-linear model given below was found to be more appropriate:

$$Y = e^{(6.927 + (0.0814 * t))}$$

The following model was fit for the total GSDP:

$$Y = 52157.58 + 3929.2 * t,$$

272 Sustainable Fisheries Development : Focus on Andhra Pradesh

The forecast of total GSDP for the year 2010, as per this model is Rs. 11,89,540 million.

Table 6. Gross District Domestic Product (GDDP) and Net District Domestic Product (NDDP) of Andhra Pradesh at factor cost by kind of economic activity at current prices - 1997-98

Coastal districts	GDDP (Rs. x10 ⁵)	% contribution to GDDP	NDDP (Rs. x10 ⁵)	% contribution to NDDP
Srikakulam	221153	2.31	201368	2.35
Vizianagaram	199554	2.08	183919	2.14
Visakhapatnam	555678	5.80	486821	5.67
East Godavari	594045	6.20	542953	6.33
West Godavari	532428	5.56	488136	5.69
Krishna	658023	6.87	594712	6.93
Guntur	685017	7.15	631986	7.37
Prakasam	357638	3.73	327056	3.81
Nellore	373572	3.90	340540	3.97
Total (Coastal districts)	4177108	43.61	3797491	44.26
Total (14 other districts)	5401119	56.39	4781644	55.74
All districts	9578227	100.00	8579135	100.00

Source: Planning Dept., Govt. of Andhra Pradesh (2004)

Table 7. Per capita GDDP and NDDP of Andhra Pradesh at current prices - 1997-98 (Rs.)

Coastal districts	Per capita GDDP	Per capita NDDP
Srikakulam	9527.83	8675.44
Vizianagaram	9453.31	8712.65
Visakhapatnam	16915.14	14819.10
East Godavari	13084.37	11959.02
West Godavari	15136.25	13877.09
Krishna	17790.02	16078.37
Guntur	16679.26	15388.02
Prakasam	12961.82	11853.44
Nellore	15615.86	14235.07
Total (coastal districts)	14537.56	13216.38
Total (other districts)	14298.21	12658.29

Source: Planning Dept., Govt. of Andhra Pradesh (2004)

The coastal districts play a very important role in the overall economy of Andhra Pradesh. The percentage contribution of the nine coastal districts to the GSDP of Andhra Pradesh is 43.61% and to the NDDP 44.26% (Table 6). Out of

nine coastal districts, five contribute more than 5.0% to the GDDP and NDDP (West Godavari, Visakhapatnam, East Godavari, Krishna and Guntur).

The per capita GDDP and NDDP for the coastal districts were Rs. 14,538 and Rs. 13,216, respectively, while that for the other districts taken together were Rs. 14,298 and Rs. 12,658, respectively (Table 7). This is appreciable considering the fact that the coastal districts are densely populated in comparison with the other districts of the state (barring the capital Hyderabad).

Fish for food security

The fish catch, both marine and inland, has registered a gradual rising trend over the years (Table 8). The time-series data of the total fish catch clearly follows a linear upward trend indicating the dynamic nature of the fisheries sector in the state. In terms of quantity, Andhra Pradesh produced 0.676 million tonnes of fish in 2001-02 of which 30.3% was contributed by the marine and 69.7% by the inland sectors, respectively. The share of Andhra Pradesh to the fish production at the national level is 15.07% in the inland and 5.87% in the marine sectors. The inland fisheries sector has shown very impressive growth over the years. River systems spreading over 11,514 km, 0.224 million ha of reservoirs, 0.514 million ha of ponds and 0.15 million ha of brackishwater area have contributed to the production of 4,71,170 t of fish during the year 2001-02. Most of the inland fish comes from fish culture both extensive and semi-intensive, in addition to the riverine harvest. The share of Andhra Pradesh in the total fish production is increasing (Table 8).

The time series data on the total fish catch in the state shows an increasing linear trend. The following model formulated on time variable, has been identified as a good fitting model, with $R^2 = 0.813$ and significant coefficients:

$$Y = 206.421 + 26.08 * t, \text{ where variable } t = 1 \text{ during } 1993-94$$

Under baseline conditions, the model gives a production forecast of 7,28,020 t, in the year 2010 and 9,88,820 t, in 2020. Out of the total projected production for the year 2020, 2,54,000 t will be contributed by marine and the rest by the inland sector. The fishing capacity need to be judiciously decided and aspects like diversification of fishing techniques, adoption of modern fishing methods, improvements of craft and gear design, use of advanced electronic equipments for targeted fishing, etc., kept in mind. It must, however, be emphasised that a long term forecast may not be very meaningful in a dynamic system like fisheries though it may serve to be a useful input for future management policy decisions.

274 Sustainable Fisheries Development : Focus on Andhra Pradesh

Table 8. Marine and inland fish production: India and Andhra Pradesh (x10³ t)

Year	Inland		Marine		Total		% contribution of AP
	AP	India	AP	India	AP	India	
1990-91	136.25	1536.25	120.35	2299.65	256.60	3835.90	6.69
1991-92	138.88	1709.33	125.79	2447.28	264.67	4156.61	6.37
1992-93	151.48	1789.05	113.07	2576.25	264.55	4365.30	6.08
1993-94	167.05	1995.50	154.32	2648.84	321.37	4644.34	6.92
1994-95	195.13	2096.76	150.26	2691.81	345.39	4788.57	7.21
1995-96	203.97	2242.32	151.99	2707.06	355.96	4949.38	7.19
1996-97	207.31	2381.43	152.05	2966.81	359.36	5348.24	6.72
1997-98	226.31	2438.04	146.55	2950.46	372.86	5388.50	6.92
1998-99	260.83	2565.81	150.00	2696.46	410.83	5262.27	7.81
1999-00	380.58	2822.73	166.48	2833.85	547.06	5656.58	9.65
2000-01	407.19	2844.83	181.81	2810.17	589.00	5655.00	10.42
2001-02	471.17	3126.18	204.83	2858.82	676.00	5985.00	11.29

Source: GOI (2000); Dept. of Fisheries, Govt. of Andhra Pradesh

Non-linear models of the form $Y = 228.916 * e^{(0.0726 * t)}$, were fitted to production data upto 1999-2000 for short term forecasting, where Y is the predicted catch over time. It was found to have very good fit with $R^2 = 0.897$ and significant coefficients and the total fish production forecast for Andhra Pradesh for 2002-03 was 5,88,250 t. The model can be updated for future short term predictions.

The continental shelf per km of coastline is the least for Andhra Pradesh when compared to other maritime states (Table 9) and as such the fishing effort will have to spread to the deeper waters if the production targets have to be achieved.

Table 9. Length of coastline and continental shelf of maritime states

State	Length of coastline, km	Continental shelf area, km ²	Shelf area per km coastline, km ²
Andhra Pradesh	974	31,000	31.83
Tamil Nadu	1,000	41,000	41.00
Orissa	480	32,000	66.67
Kerala	590	40,000	67.80
Karnataka	300	25,000	83.33
Gujarat	1,600	164,000	102.50
West Bengal	157	17,000	108.28
Maharashtra	720	112,000	155.56

Source: GOI (2000)

Aquaculture in Andhra Pradesh

Andhra Pradesh stands first in coastal aquaculture in the country with a production of 59,190 t during 2002-03. In Andhra Pradesh, there has been domination by the culture sector in shrimp production as compared to the wild caught shrimp fisheries. Area under shrimp aquaculture in Andhra Pradesh increased from 6,000 ha in 1990-91 to 71,420 ha in 2002-03 (Table 10). The rate of increase in area and production for Andhra Pradesh has been much higher than that for India. There was an increasing trend in productivity in the initial phase of expansion of shrimp aquaculture in the state. It sharply declined in the mid-1990s. However, a recovery phase appears to be in sight since 2002-03. The fall in productivity can be attributed to the outbreak of viral diseases largely due to monoculture and intensive cultivation.

Table 10. Shrimp culture area and production

Year	Andhra Pradesh			India		
	Area (ha)	Production (t)	Productivity (kg.ha ⁻¹)	Area (ha)	Production (t)	Productivity (kg.ha ⁻¹)
1990-91	6000	7350	1225.00	65100	35500	545.31
1991-92	8100	9700	1197.53	68227	40000	586.28
1992-93	9500	12800	1347.37	70700	47000	664.78
1993-94	19500	26000	1333.33	82540	62000	751.15
1994-95	34500	34000	985.51	100700	82850	822.74
1995-96	50000	27140	542.80	118983	70753	594.65
1996-97	60249	30577	507.51	135582	70686	521.35
1997-98	66290	34075	514.03	141591	66868	472.26
1998-99	71000	44856	631.77	141837	82634	582.60
1999-00	71000	41860	589.58	141837	78860	555.99
2000-01	71000	53100	747.89	141837	97096	684.56
2001-02	79600	51230	643.59	157400	102940	654.00
2002-03	71420	59190	828.76	152080	115320	758.29

Source: MPEDA, Cochin

Marketing

About 91% of the total fish production in the state is marketed fresh and only 9% is utilised for freezing, curing and other purposes (Fig. 1). No appreciable change is noted in the pattern of disposition of fish over time. Andhra Pradesh has a large number of major and minor domestic markets situated both in urban and rural areas. Since very large quantity of fish is being consumed through domestic markets and transported to distant fish markets by trucks and other

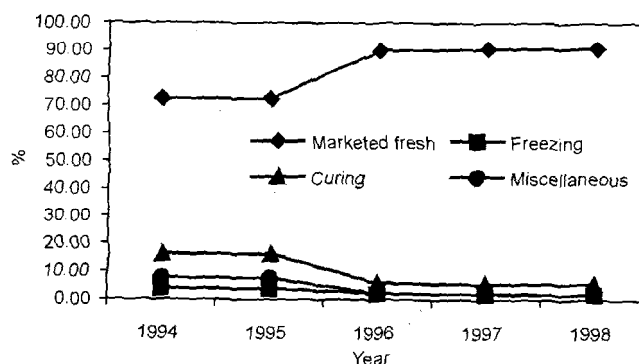


Fig. 1. Trends in disposal of fish catch in Andhra Pradesh

modes of transport, special attention has to be given to handling, packaging and transportation, so that the quality of fish can be maintained.

The processing sector

In the processing sector, the growth in infrastructure has been substantial. The present installed capacity in the fish processing factories in Andhra Pradesh is 2,38,150 t per annum, compared to 38,500 t in 1979-80 (Table 11). The number of fish processing plants rose to 58 from 15 during the same period. Apart from an increase in the capacity in quantitative terms, substantial improvement in quality also is achieved in the plants. At present, there are 19 EU approved processing plants in the state.

The idle capacity in the processing plants increased from 64.5% in 1979-80 to 83.14% in 2003-04 based on two shifts and 250 working days (Table 11).

Table 11. Comparative performance of the seafood industry in Andhra Pradesh

	1979-80	2003-04
No. of plants	15	58
EU approved plants	0	19
Installed capacity ($\times 10^3$ t.yr ⁻¹)	38.5	238.15
Capacity utilisation (@ 2 shifts/day, 250 working days), %	35.5	16.86
Idle capacity, %	64.5	83.14

Source: MPEDA, Cochin

The main reason for high idle capacity is the lack of raw material. In this situation, any further expansion of the plant capacity, need to be controlled. This will also help to lessen competition for the raw materials resulting in improvement of capacity utilisation and profitability of the industry.

Marine products exports

An evaluation of the export scenario in the state indicates that there has been an export growth of 115.81% in quantity and 311.69% in value during the last decade. It was also noted that the export market was highly dominated by shrimp and the contribution of value added products is negligible. In 2001, 81.17% of the exports from Andhra Pradesh were shrimp based. The increase in unit value realisation in dollar terms has been alarmingly low to the tune of only 9.08% during the past 15 years, though in rupee terms it has been as high as 289% during the same period. Thus, it may be noted that the Indian marine products were being sold at almost the same price over the years, while the unit value increase in rupees was mainly due to depreciation of the Indian currency. In 2003-04, the unit value realisation for export from Visakhapatnam port was Rs. 314.46 per kg while in dollar terms it was \$ 6.82 per kg. This was 2.13 times more than that realised at all India level, which was to the tune of Rs. 147.68 and \$3.20 per kg of product exported. Visakhapatnam port contributes 5.94% in terms of quantity and 12.66% in terms of value to the total marine products exports from the country (Fig. 2).

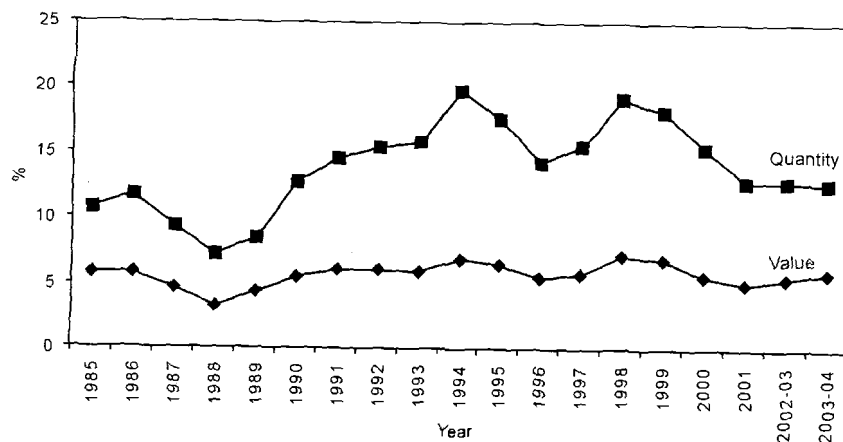


Fig. 2. Contribution of Visakhapatnam port to the marine products exports from India

Providing modern facilities at fisheries harbours and fish landing centres, improving quality standards in fish handling, processing and transportation, implementing HACCP procedures, diversification of markets, value addition and introducing modern marketing strategies, could ensure higher unit value both at export and domestic markets.

Several technologies have been developed at Central Institute of Fisheries Technology for fish based value added products. Presently, Japan is depending to a large extent on Vietnam for raw and value added products from *Penaeus monodon*. Since Andhra Pradesh is one of the largest producers of this species in India, there is very good scope for production of value added products like centre peel shrimp, cooked centre peel shrimp, easy peel shrimp, cooked easy peel shrimp, shrimp skewer, butterfly shrimp ('sushi'), stretched shrimp ('nobashi'), breaded 'nobashi', barbecue, shrimp vegetable kebab, etc. Training programmes for the production of these value added products were also conducted by CIFT in collaboration with MPEDA and INFOFISH in 1999. There is also much scope for export of frozen fish and live fish for export and for domestic market. Products like fish cutlets, coated balls, sausages and burgers could be developed from meat of freshwater fish, especially carps, for domestic markets. Export market for these products also need to be explored as part of new marketing strategies.

Based on a linear model fitted to the quantity exported, the forecast for 2020 will be to the tune of 52,576 t. Even though, the estimate may appear to be ambitious, this target can be achieved by raising the present productivity level in the culture sector to the level of the early 1990s. By enhancing the capacity utilisation to about 33%, the optimum capacity would be 1,55,500 t per annum, which is 1.23 times the present installed capacity, and requires only about 23% more investments at the present level.

Capital formation

The capital formation in the fisheries sector has been steadily increasing over the years and it was Rs. 6674 million in 2001-02. This has registered an increase of 506.51% during the last five years. The plan expenditure has been showing an increase over the plan periods (Fig. 3). During the first two years of the X plan, the expenditure has been Rs. 103.4 million. The state investment in the sector, however, has not kept pace with the development parameters in the sector like the capital formation, production or exports. It can be inferred that the development attained so far may be attributed largely to private sector initiative and investments.

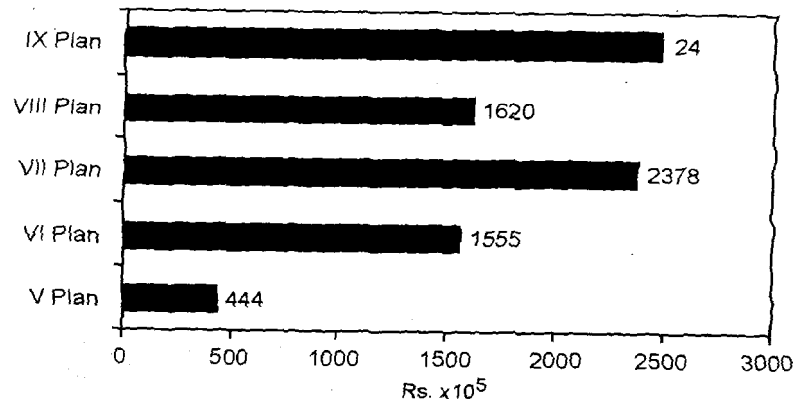


Fig. 3. Plan expenditure in the fisheries sector of Andhra Pradesh

Source: GOI (2000); Directorate of Economics and Statistics, Govt. of Andhra Pradesh

Infrastructure in fisheries

In the harvest sector, there were 8,642 mechanised crafts, 4,164 motorised and 53,853 traditional crafts in Andhra Pradesh in 1999, including approximately 8,000 traditional inland crafts operating mainly in Nizamabad, Kurnool, Nalgonda and Adilabad districts (GOI, 2000). The state has the largest fleet of traditional crafts in the country, though motorisation has not been widely adopted. The mechanised fleet includes 1,738 trawlers and 6,043 FRP beach landing boats. The trawlers range from 10 to 20 m in length and are engaged in fishing trips lasting one to 50 days depending on the size. Owing to technological advancements, the crafts have grown in both size and capacity. There are one major and three minor harbours for mechanised crafts in Andhra Pradesh. Apart from modern fishing harbours, there are 379 fish landing centres, spread over the entire 974 km coastline of Andhra Pradesh. In tune with the development in fisheries, a large number of ice plants, boat building and repairing yards, net making plants, net mending and repairing facilities, fuel outlets, refrigerated trucks and other carriers, also have come up in the coastal belt.

Employment generation

The number of active fishermen in Andhra Pradesh has risen from 47,700 in 1960-61 to 1,43,000 in the fishermen population of 8,72,000 in 1992. Besides this, there are 1,32,000 fishermen engaged in part-time fishing activities and 2,10,000 persons who are engaged in allied activities like marketing, processing, repair of nets, etc. It is estimated that the number of active fishermen in 2000 was 1,92,000 in a total fishermen population of 9,59,000. It has also been

estimated that 14,05,000 persons are directly and indirectly employed in the sector. The per capita daily income of fishermen has increased from Rs. 50.95 in 1993-94 to Rs. 113.02 in 2003-04.

Vision for the future

The share of agriculture and allied products in India's export has shown a declining trend by the end of 2003. This decline is attributed mainly to the fall in the export of marine products. The issue of non-tariff barrier in the form of anti-dumping petition by the Ad Hoc Trade Action Committee, a group of shrimp producers in the USA, had affected the exports in the sector. There is also a need to look for alternative marketing options including the development of domestic markets so that the long term interests of the industry are protected. It has also been observed that *Penaeus vannamei*, a variety of shrimp cultured in China and Thailand, which is priced lower than Indian cultured shrimp could be a threat to Indian shrimp exports. The high rate of increase in fuel prices in India due to the increase in world crude oil prices has also adversely affected the fishing industry in the country. Table 12 shows the forecast for 2020 in the fisheries sector.

Table 12. The present and future of fisheries sector in Andhra Pradesh

	Present scenario	Forecast for 2020
Fish production (x10 ³ t)	547	989
Area of culture (ha)	79,600	79,600
Shrimp aquaculture production (t)	51,230	97,510
Export quantity (t)	21,343	52,576
Processing capacity (x10 ³ t)	238	587

It is evident from the study that the contribution of the fisheries sector to the economy of Andhra Pradesh has been very substantial and also the growth trend is positive. The impact of the fisheries sector is much more wider, considering the overall development it has brought to the common man. It has contributed directly or indirectly to the development of transportation facilities, electricity, water supply and improved communication facilities and other social amenities in the rural areas.

To attain the targets forecast for 2020 on the present baseline scenario, the state need to enhance the fishing and fish processing capacities judiciously. On the fishing side, eco-friendly fishing techniques and new generation, fuel-efficient vessels should be introduced to minimise the operational costs and also to ensure

sustainable production. Modern and responsible fishing techniques should be adopted for efficient harvesting of the riverine and reservoir resources. On the processing side, more stress on value added products would ensure better return for the exports. Diversification of export markets and products must be explored. Utilisation of freshwater fish could be enhanced by making consumer friendly products to serve the domestic and export markets. Modern technology for packaging and long distance transportation is to be widely propagated to ensure the quality of fish at the different destinations in the country. The standards of harbours, landing centres, pre-processing centres and domestic markets should be improved and modernised. The fishing and processing capacity may be so regulated taking into consideration the idle capacities and the future requirements by appropriate fishery management interventions. Another aspect to be taken into consideration is the adoption of eco-friendly technologies in aquaculture for increasing productivity. Modern management and marketing strategies have to be adopted and human resource development should also be simultaneously strengthened to tackle the future challenges in the fisheries sector.

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