Himachal Journal of Agricultural Research Vol. 32(1) : 108-112, 2006

Abridging the availability and requirement gap of inland fisheries in Himachal Pradesh

Ashok Kumar, S.K. Sharma and Atul Dogra
Department of Agricultural Economics
CSK Himachal Pradesh Krishi Vishvavidayala, Palampur - 176 062.

Abstract

In the present arena of stagnant productivity and increasing demand for food, fisheries are one of the sectors, which hold great relevance in creating avenues for gainful income, employment and decreasing malnutrition. The present study, based on secondary data, examined the fishery resources and trends of fish production in Himachal Pradesh and the consumption requirement, production and deficit of fish by the year 2010 A.D. in Himachal Pradesh vis-a-vis India. To work out the trend values and compound growth rates, an exponential function was fitted. The study showed huge deficit between demand for and supply of fish in Himachal Pradesh as well as in India. The study reflected a desired growth rate (56.32 and 21.79 per cent in H.P. and India, respectively) to meet the deficit by 2010 A.D. The major problems of fishery in the state are ineffective harvesting, problem of cold storage, inadequate transportation and acute shortage of fish seed of Indian major carps. The study revealed that in order to abridge the gap between production and requirement intensive efforts are needed to boost fishery production.

Introduction

It is high time to make people aware of challenges of increasing population, poverty, unemployment and malnutrition. Productivity of land is almost stagnant and the demand for food is consistently increasing. Since, land resources are limited, intensive efforts are needed to explore the water resources to cope with the situation.

Under such a condition, fisheries are one of the sectors, which hold great relevance in creating avenues for gainful income, employment and nutrition. It has been rceognised as a powerful income and employment generator as it stimulates growth of a number of subsidiary industries and is a source of cheap and nutritious food besides being a foreign exchange earner. At the same time, it is an instrument of livelihood for a large number of economically backward people of the country. The experience shows that growth in the fisheries sector stimulates development and thus, employment in the related industries, which contribute significantly to the total value added.

A key objective in the development of fishery resources is to raise income in the small-scale sector. Speaking broadly, fishing resources of India are either inland or marine. The principal rivers, canals, ponds, lakes, reservoirs comprise the inland fisheries. The marine resources comprise the two wide arms of Indian Ocean and a large number of Gulfs and Bays along the coast. The fish production in India during 2002-03 was 6.2 million tonnes and about 11 million people drew their livelihood from fisheries (Economic Survey, 2004-05). In the last 50 years, fish production has increased substantially, contributing significantly to the Gross Domestic Product (GDP) and export earnings. The fisheries sector contributed Rs. 1,37,180 million to the GDP during 2003-04 (at constant prices), which amounted to 4.42 per cent share in agriculture GDP and 0.96 per cent share in the total GDP. Similarly, the export of marine products amounted to Rs. 60,920 million during 2003-04, making it an important export commodity of the country (Yadava, 2005).

For development of this sector high priority was given in Fourth Five Year Plan onwards. During the Fifth Five Year Plan the Central Government sponsored Fish Farmers Development Agency to popularize fish farming in the tanks and ponds. In areas where paddy fields retain water for 3-8 months in a year, paddy-cum-fish culture could provide an additional supply of fish crop. Fish is considered to be most efficient in converting feed into nutritious food. Species of fish suited for fish culture farming are rohu (*Labeo rohita*), catla (*Catla catla*), mrigal

carp (*Cirrhinus mrigala*), grass carp (*Ctenopharyngodon idellus*), common carp (*Cyprinus carpio*), silver carp (*Hypothalmitcthys molitrix)*, catfish (*Clarius batrachus*), singi *(Heteropneustes fossilis)*, rainbow trout (*Onchorhynchus mykiss*) and giant river prawn (*Macrobrachium rosenbergii*).

In Himachal Pradesh where the average size of holding is 1.16 hectare and has 84.5 per cent of marginal and small farmers, emphasis is needed for the betterment of these farmers. The income and nutritional security can be improved by taking fishery as a supplementary enterprise. In one of the studies, the net income from fish pond of one hectare in Himachal Pradesh has been estimated as Rs. 31,100 and the benefit-cost ratio was worked out to be 1.85:1 (Sharma, 1989). The fisheries resources of Himachal Pradesh are only inland. The state has a riverine network of 3,000 km length, out of which about one fourth fall in the trout zone. With Government taking initiative of popularizing fisheries among people, the fish production during 2002-03 was 7,244 tonnes. Also the state has the distinction to be the first in the country to introduce and popularize trout farming in the private sector. The trout farming is being done at *Barot, Patlikuhl, Sangla, Nagni, Chirgaon, Mahili, Deoli, Kangra and Nalagarh* areas of Himachal Pradesh. Fish farming, if combined with the prevalent integrated farming system, can help in enhancing income to great extent.

With this background in view, the present study has been undertaken with the following specific objectives.

1. To examine the fishery resources and trends of fish production in Himachal Pradesh.
2. To project the consumption requirement, production and deficit of fish by the year 2010 A.D. in Himachal Pradesh vis-à-vis India.
3. To study the problem and constraints of fish production in the state and to suggest means for improvement.

Material and Methods

The data for the fish resources of Himachal Pradesh were obtained from the various offices and publications of the Government of Himachal Pradesh. To work out the trend values and compound growth rates, an exponential function of the following form was fitted.

(i) $Y = ab^t$

or $\text{Log } Y = \text{Log } a + t \text{ Log } b$

Where,

Y= Production of fish in tonnes

a= Constant term

b= Regression Coefficient

t= Number of years

(ii) Compound Growth rates (C.G.R) = (b-1) x 100

(iii) Standard error of C.G.R

$$S.E\,(r) = \frac{100b}{0.4342}\sqrt{\frac{\Sigma \log y^2 - (\log b)(\Sigma x \log y)}{(n-2)\,\Sigma x^2}}$$

(iv) Desired Compound growth rates were computed using the following algorithm

$r = [(Pt / P_o)^{1/t} - 1]\,100$

P_t = Requirement of fish by 2010 A.D.

P_o = Production of fish in base period

r = Compound growth rate

t = Number of years

The time series data for working out the trend in fish production were obtained from different issues of Statistical Outline of Himachal Pradesh. The data for working out compound growth rates pertained to agricultural years, 1969-70 to 2002-03.

Results and Discussion

The results of this study have been discussed under five sub-heads.

(A) Fishery Resources of Himachal Pradesh

Fishing resources of Himachal Pradesh are only inland. Himachal Pradesh is blessed with vast and variegated fishery resources in the shape of rivers, streams, tributaries, sprawling reservoirs, natural lakes and ponds etc. The varying topography and diverse climate of the state provides ample opportunities for scientific exploration of these natural waters.

The state has a number of perennial streams flowing in the valley areas where water can be tapped to establish running water ponds for fish farming. The existing water resources of Himachal Pradesh are presented in Table 1.

Table 1. Existing Water Resources of Himachal Pradesh

Sr. No.	Particulars	Estimated area
1.	Natural water	
	a) River length	3,000 km
	b) Lakes	100 ha
	c) Reservoirs	48,000 ha
2.	Ponds	65 ha

The state has five perennial rivers *Chenab, Ravi, Sutluj, Beas* and *Yamuna* flowing through its territory together with their reservoirs and lakes. They have vast potential for the development of mirror carp fish in the confined water of sub-mountainous regions and trout fish in the running water of mountainous region. Out of 3,000 km riverine network an estimated length of 600 km fall within the trout zone. It is unfortunate that the scope of trout has still remained restricted to meet the requirement of sport fishery alone rather than transforming it into commercial fishery. Large areas in *Chamba* and *Kangra* districts have the requisite physicochemical properties and afford good potential for the development of rainbow trout fishery.

Gobind Sagar, Pong dam and Pandoh reservoirs constitute the reservoir fishery resources of the state. The reservoirs of Himachal Pradesh have the distinction of highest per hectare fish production i.e. 112-120 kg. Gobind Sagar has a water spread of about 16,362 hectares and alone produces about 1000 tonnes of fish. Pong dam has a water spread of about 24, 000 hectares and produces about 1500 tonnes of fish annually. Pandoh reservoir can be explored for the cold-water fisheries. The present yield of 40-70 kg per hectares of reservoirs can be increased to about 100 kg per hectares by judicious fish stocking, maintenance of appropriate species, combination and regulation of fish stock and population.

Due to hilly terrain the pond resources of the state are limited and constitute about 65 hectares. These are largely scattered near the plains. However, if water from stream or canals is diverted in certain selected areas through pond built on either bank it would serve as ideal running water ponds for marine carp culture.

(B) Trends in Fish production

Production of fish and trend values for fish production from 1969-70 to 2002-03 in Himachal Pradesh have been presented in Table 2. The fish production which was merely 700 tonnes in 1969-70 increased to 7,244 tonnes in 2002-03, showing an increase of about 935 per cent. The compound

Table 2. Production of Fish in Himachal Pradesh

Sr. No.	Years	Production (Mt)	Trend value
1	1969-70	700	757.2735
2	1970-71	660	820.5778
3	1971-72	710	889.174
4	1972-73	740	963.5045
5	1973-74	800	1044.049
6	1974-75	806	1131.326
7	1975-76	950	1225.899
8	1976-77	1,000	1328.378
9	1977-78	1,860	1439.424
10	1978-79	2,200	1559.753
11	1979-80	2,250	1690.14
12	1980-81	2,300	1831.428
13	1981-82	2,535	1984.526
14	1982-83	2,870	2150.423
15	1983-84	2,630	2330.187
16	1984-85	2,700	2524.979
17	1985-86	2,950	2736.055
18	1986-87	2,460	2964.776
19	1987-88	4,095	3212.616
20	1988-89	4,375	3481.175
21	1989-90	4,620	3772.184
22	1990-91	5,132	4087.52
23	1991-92	5,800	4429.216
24	1992-93	6,390	4799.476
25	1993-94	6,630	5200.689
26	1994-95	5,285	5635.441
27	1995-96	6,002	6106.535
28	1996-97	6,265	6617.011
29	1997-98	6,685	7170.161
30	1998-99	6,786	7769.55
31	1999-00	6,995	8419.046
32	2000-01	7,020	9122.837
33	2001-02	7,215	9885.461
34	2002-03	7,244	10711.84

Source: Statistical Outline of Himachal Pradesh 1969-2003.

growth rate for fish production was worked out to be 8.36 per cent per annum and standard error for growth rate was 1.0433. The estimated equation from the data was

$$\text{Log } Y = 6.549 + 0.080t$$

OR

$$Y = (698.853)\,(1.084)^t$$

(C) Projection of Production and Demand for Fish

The projected fish demand and supply for Himachal Pradesh and India by 2010 A.D. has been shown in Table 3. A perusal of the table showed that the total demand for fish by 2010 A.D. will be 1.65 and 288.15 Lakh tonnes in Himachal Pradesh and India respectively. Thus, deficit will be to the extent of 1.46 in H.P. and 183.01 Lakh tonnes in India. To meet the requirement the desired growth for H.P. was worked out to be 56.32 per cent. Whereas, an annual growth rate of 21.79 per cent is required to meet the deficit at country's level.

(D) Problems and Constraints

Problems and constraints in fish production in the state can be put under two subheads.

(i) Problems and Constraints in Reservoir Fisheries

The major constraint in reservoir fish production is lack of effective harvesting. The reservoir being deeper and vast in size, the conventional method of fish catch proves inefficient. Therefore, scientific method needs to be designed to locate the ideal fishing grounds, the zones of fish aggregation, patterns of species etc. Modern gadgets like the echo sounder and the electrical fishing may prove useful in improving fish catch.

Cage culture for additional exploitation has a tremendous future. A production level of 40-80 kg per meter square by large-scale cage culture of carps from reservoir can easily be obtained. The problems of cold storage and transportation need to be tackled.

Table 3. Projection of Production and Demand for Fish by 2010 A.D. in Himachal Pradesh and India

Sr. No.	Particulars	Unit	Quantity	
			H.P.	India
A.	*Requirement of fish*			
1.	Population as per 2001 census	Crores	0.61	102.52
2.	Growth rate as per 2001 census	Per cent	1.75	2.13
3.	Estimated population by 2010 A.D.	Crores	0.71	123.93
4.	Non-Vegetarian population by 2010 A.D. (assuming 25 per cent population vegetarian)	Crores	0.53	92.95
5.	Per capita recommended annual fish consumption for balanced diet	kg	31.00	31.00
6.	Total requirement of fish by 2010 A.D.	Lakh tonnes	1.65	288.15
B.	*Production of Fish*			
1.	Fish production by 2010 A.D.	Lakh tonnes	0.19	105.13
C.	*Gap in Production*			
1.	Deficit (6-7)	Lakh tonnes	1.46	183.01
2.	Compound growth rate to meet the deficit	Per cent	56.32	21.79

The Estimated equation for fish production in India was $Y = (2.966)\,(1.0592)^t$

Cold storage warehouses near the fish landings centers and refrigerated vans can go a long way in minimising losses during storage and transport.

(ii) Problems and Constraints in Inland Fisheries

Government of India has set two pioneering fisheries institute under Indian Council of Agricultural Research (ICAR) namely, Central Inland Fisheries Research Institute (CIFRI), Barrackpore and Central Inland Fisheries Education (CIFE), Bombay. But they are mainly conducting research for the needs and problems of fisheries of plains and thus, research needs of the hills have largely gone unattended. However, the other major problems of the state include acute shortage of fish seed of Indian major carps.

(E) Suggestions for Improvement

On the basis of present study, the following recommendations are suggested for the sound development and promotion of sustainable aquaculture in the potential areas of Himachal Pradesh:

I. To meet the domestic requirement of fish seed, producing the fish seed indigenously is an urgent necessity.

II. To evolve comprehensive package of cultural practices on composite fish farming should be given priority.

III. Raising disease resistant species for trout farming also needs intensified research.

IV. It is important to accelerate the trout seed production in the state for effective stocking of rivers and streams for establishing a base for commercial trout farming.

V. It is also essential to replace the conventional feeds by commercial dry pellets diet from locally available raw materials.

VI. The yield potential of streams and rivers could be improved by taking suitable measure of conservation and protection like stopping reckless poaching, dynamiting and poisoning combining with control of over fishing, regulation of the mesh size of the nets and illegal fishing methods. Moreover effective technology of runoff water especially for aquaculture is also needed.

VII. There is considerable damage of fish during transport from the producing centers to the retail centers. Good roads and quick transport vehicles including insulated vans needs to be provided.

Conclusion

The study revealed that fish production in Himachal Pradesh from 1969-70 to 2002-03 has increased by about 935 per cent and the compound growth rate for the same period was 8.36 per cent. The gap in production and requirement by 2010 A.D. was estimated as 1.46 lakh tonnes and 183.01 lakh tonnes for Himachal Pradesh and India, respectively. The major problems of fishery in the state are ineffective harvesting, problem of cold storage, inadequate transportation and acute shortage of fish seed of Indian major carps. The study revealed that in order to reduce the gap between production and requirement intensive Research and Development efforts are needed to boost fishery production.

References

Anonymous1969-2003. *Statistical Outline of Himachal Pradesh*. Directorate of Economics and Statistics, Government of Himachal Pradesh, Shimla.

Chauhan, S.K. 2004. The Institutional management of reservoir fisheries in the hinterlands of Western Himalayas: A case study of Pong dam in Himachal Pradesh. *Indian Journal of Agricultural Economics*. 59 (3): 494 – 95.

Economic Survey 2004-05. Ministry of Finance, Government of India: pp. 176.

Shah, Deepak 2004. Lesson from fisheries development in Maharashtra. *Indian Journal of Agricultural Economics* 59 (3): 481 – 82.

Sharma, A.K. and Moorti, T.V. 1988. Economics of fisheries (with special emphasis on Himachal Pradesh). Department of Agricultural Economics, HPKV, Palampur. *Agricultural Economics Publication* No.47.

Sharma, A.K. and Moorti, T.V.1989. Fish farming in the development of the hilly areas. *Punjab Fishery Bulletin* 13 (1): 15-20.

Yadava, Y. S. 2005. Making impressive strides. Survey of Indian Agriculture. *The Hindu* pp.130-32.