


Aquaculture Production and Consumption of Fish in India

Dhanya Sai Das

*Ph. D Research Scholar, Department of Economics
Bharathiar University, Coimbatore, Tamil Nadu, India*

R. Govindasamy

*Assistant Professor, Department of Economics
Bharathiar University, Coimbatore, Tamil Nadu, India*

 <https://orcid.org/0000-0003-3688-4146>

OPEN ACCESS

Manuscript ID:
ECO-2021-10014443

Volume: 10

Issue: 1

Month: December

Year: 2021

P-ISSN: 2319-961X

E-ISSN: 2582-0192

Received: 15.09.2021

Accepted: 25.11.2021

Published: 01.12.2021

Citation:

Das, Dhanya Sai, and R. Govindasamy. "Aquaculture Production and Consumption of Fish in India." *Shanlax International Journal of Economics*, vol. 10, no. 1, 2021, pp. 21–26.

DOI:

<https://doi.org/10.34293/economics.v10i1.4443>



This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Abstract

Aquaculture and fisheries emerged as an important source of food, protein, nutrition, livelihood and employment for the majority of the rural population. The fisheries sector has registered a sustainable and astounding growth rate over the last decade. The sector offers an attractive and promising future for employment, livelihood and food security. The study is based on the available secondary data from different aspects of fishery statistics published in Handbook on Fisheries Statistics 2020 by the Government of India and other related articles. Data for the time series analysis was taken from 2001-02 to 2017-18. It is found that the world per capita apparent consumption of fish has been increased by 10.4 kg from the 1960s (i.e., 9.9 kg) to 2016 (i.e., 20.30 kg). By analysing the time-series data, it is evident that the total fish production, including both marines and inland, has shown an astounding growth with a Compound Growth Rate of 4.58. The regression equation was $Y = 5.182X - 12267$, R^2 value was 0.9414 where Y is the total fish production (dependent variable) and X is the total fish seed production (independent variable). There exists a positive relationship between fish seed and fish production in the country. It can be concluded that aquaculture plays a significant role in the country's GDP rate and food security.

Keywords: Aquaculture, Fish Production, Per Capita Fish Consumption, Employment

Introduction

Aquaculture and fisheries emerged as an important source of food, protein, nutrition, livelihood and employment for the majority of the rural population. Aquaculture production can be classified into production from both inland and marine sectors. The percentage contribution of inland fish production in India during the year 2017-18 was 71 per cent, whereas marine was 29 per cent. Fish is considered to be an affordable as well as one of the rich sources of animal protein and the healthiest choice to weaken the problems of hunger and nutrient deficiency. As the world's population increases rapidly, especially in Asia, the demand for variety in protein intake and health concerns is expected. Fisheries and aquaculture provide the essential source of livelihood and high-quality proteins which is easily accessible to the poor. It provides nutritious food with high-quality proteins with essential fats like long-chain omega-3 fatty acids, essential proteins with amino acids, minerals like iodine, iron, calcium, zinc etc. All these positive aspects will tend to increase its demand and thereby its production.

It's about seven decades; the nation has made an exemplar shift in the availability of food and transformed from a begging bowl to a sufficient breadbasket. The fisheries sector has registered a sustainable and astounding growth rate over the last decade. The sector offers an attractive and promising future for employment, livelihood and food security (Syam. S. Salim, 2016). During 2018-19, the contribution of the fisheries sector to the Indian economy's

Gross Value Added (GVA) was around Rs. 212915 crores about 1.24 per cent. The share of direct human consumption out of the overall fish production in the world has been raised from 67 per cent in the 1960s to about 87 per cent in 2014. Global food fish consumption increased at an average annual rate of 3.1 per cent from 1961 to 2017, a rate almost twice that of annual world population growth (1.6 per cent) for the same period and higher than that of all other animal protein foods (meat, dairy, milk, etc.), which increased by 2.1 per cent per year. Per FAO report 2020, per capita food fish consumption grew from 9.0 kg (live weight equivalent) in 1961 to 20.5 kg in 2018, by about 1.5 per cent per year.

Indian Fish Production

The output from the aquaculture activities is mainly meant for consumption or other purposes, i.e., for ornamental purposes. Production of fish in India has risen from 0.75 million tonnes in 1950-51 to 12.59 million tonnes in 2017-18. The mean annual growth rate of total fish production in India has been showing a tremendous increase from 2.31 per cent (1950s) to 10.14 per cent (2017-18), which was very low during 1980s, i.e., 0.08 per cent. India is considered the second-largest producer of fish after China in the inland fisheries sub-sector and aquaculture. The contribution of the marine sector was 36.88 lakh tonnes (29 per cent) and that of inland was 89.02 lakh tonnes (71 per cent) to the total fish production during 2017-18.

Consumption of Fish in India

The challenges in fish food security entirely depend upon the performance of culture and the capture sector. In India, fish contributes extensively towards domestic food security and it has registered a per capita consumption of more than 6 kg per annum. In addition to the nutritional security provided it also helps in bringing more livelihoods to the rural households. Aquaculture has been regarded as the fastest growing sector. For the first time ever, the world's population consumed more farmed fish than wild-caught fish (Sectoral paper on Fisheries and Aquaculture, NABARD). The main reason behind this is that momentous quantities of wild-caught fishes are mainly used for another purpose such as fish oil and fish meal (Asche et. al., 2008).

Literature Review

Ghosh et.al., (2017) made clear that inland fishery resources were abundant in West Bengal, which decides the employment rate and subsistence level of fisheries over there. It was clear from the analysis using the tool of regression that there exists a positive relationship between the production of fish seeds and inland fisheries, i.e., $Y = 1.9173 + 0.0007X$ and R^2 was 0.6785 where Y indicates dependent variable and X indicates independent variable which was pointed out as inland fish production and fish seed production respectively. They also found the regression values of demand and supply of fish which estimated the R^2 values such as 0.9967 and 0.0606, respectively.

Panigrahy and Vahoniya (2017) here, the authors have studied the consumer behaviour and their consumption pattern towards the inland fish consumption, which has been analysed through the multiple regression analysis. They inferred that as the income of the consumer increases, there were exist a shift from low priced fish consumption to higher price segment. It was clear from their analysis that as and when income rises, the percentage of inland fish consumption decreases and the number of fish consumption increases. Marketing of inland fish mainly depended upon place, product and time of fish consumption.

Objectives of the Study

The present study has attempted to attain the following objectives;

- To analyse the trend and relationship between total fish and fish seed production in India.
- To determine per capita fish consumption in India and its important states.

Methodology

Source of Data: The present study is based on the available secondary data from various sources such as Handbook on Fisheries Statistics 2020 by Government of India, Food and Agricultural Organization (FAO) report 2020, sectoral paper on fisheries and aquaculture, NABARD and other related articles.

Period of Study: Data for the time series analysis was taken from 2001-02 to 2017-18.

Tools of Analysis: The data from the secondary source is then considered for analysis which has been interpreted and demonstrated in the form of charts, tables and graphs for easiness to understand the results. Various statistical tools such as

Compound Growth Rate (CGR)

In this study, the exponential function was used to estimate growth rate by taking time as the independent variable and fish production dependent variable. This exponential trend equation gives the constant rate of increase or decreases per unit of time and they are termed as ‘Geometric’ or ‘Compound Growth Rate.

The compound growth rate is estimated by fitting exponential trend equation of the following types;

$$Y = a + bt \tag{1}$$

Where,

Y = Total Fish or Fish Seed Production

t = time variables in year

And a = constant

Where b = (1 + i)

The equation (1) takes the following linear form by taking logarithms of both sides if the equation;

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

$$\text{Compound Growth Rate (CGR)} = (\text{Antilog} (\log b - 1) * 100$$

Linear Regression Analysis

Linear regression attempts to model the relationship between two variables. One variable is considered to be explanatory and the other considered to be the dependent variable. A linear regression line equation of the form;

$$Y = a + bX$$

Y = Total fish production (dependent variable)

X = Total fish seed production (explanatory or dependent variable)

The slope of a and b is intercepted.

R2 value measures the trend line reliability. The closer R2 is to one means the better.

Result and Discussion

Relationship between India’s Total Fish Seed Production and Total Fish Production

The production of fish and its yield is undoubtedly depending upon the production of fish seed. So, there will be a direct and positive relationship among these variables. It is proven from the following analysis;

Table. 1: Growth Rate of Total Fish Seed Production and Total Fish Production in India during 2000-01 to 2017-18

Year	Total Fish Production (In Thousand Tonnes)	Indices (Base Year – 2000-01)	Total Fish Seed Production (Million Fry)	Indices (Base Year – 2000-01)
2000-01	5656	100	15608	100
2001-02	5956	105.30	15758	100.96
2002-03	6200	109.62	16333	104.65
2003-04	6399	113.14	19231	123.21
2004-05	6305	111.47	20791	133.21
2005-06	6572	116.20	21988	140.88
2006-07	6869	121.45	23648	151.51
2007-08	7127	126.01	24144	154.69
2008-09	7616	134.65	32177	206.16
2009-10	7998	141.41	29313	187.81
2010-11	8231	145.53	34111	218.55
2011-12	8666	153.22	36566	234.28
2012-13	9040	159.83	34922	223.74
2013-14	9579	169.36	41450	265.57
2014-15	10260	181.40	39350	252.11
2015-16	10762	190.28	41824	267.97

2016-17	11431	202.10	42804	274.24
2017-18	12590	222.60	52262	334.84
CGR	4.58	-	7.29	-
MEAN	8180.94	-	30126.67	-
SD	2052.759	-	10963.558	-

Source: Ministry of Agriculture, Govt. of India

Table 1 depicts the trends in total fish seed and fish production in India for more than one and half decades i.e., from 2000-01 to 2017-18. By analysing the time-series data, it is evident that the total fish production, including both marines and inland, has shown an astounding growth with a Compound Growth Rate of 4.58. As there was a slight fluctuation in the growth of fish seed production, it also resulted in a nearly increasing trend. It registered a growth rate of 7.29 during the reference period of analysis.

Table 2: Regression Analysis on the Relationship on Total Fish Seed Production and Fish Production

Multiple R	0.9702
R Square	0.9414
Adjusted R Square	0.9377
Standard Error	512.3275

Source: Calculated Values / Data

It is very well evident that fish seed is a vital input for successful aquaculture. It is clear from table. 2 and fig. 1 that the regression equation was $Y = 5.182X - 12267$, R^2 was positive at 94 per cent where Y is the total fish production (dependent variable) and X is the total fish seed production (independent variable). There exists a positive relationship between the fish seed and fish production in the country.

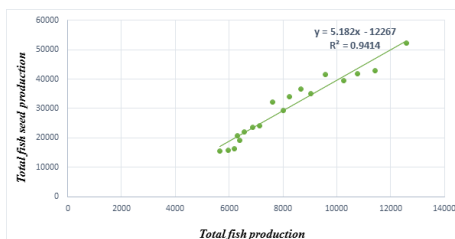


Figure 1 Trends in Fish Production in India

Human Fish Consumption in the Global and Indian Scenario

Table 3: Region-Wise and Economic Group-Wise Total and Per Capita Apparent Fish Consumption (2017)

Economic Grouping	Total Food Fish Consumption (Million Tonnes)	Per Capita Food Fish Consumption (Kg Per Year)
Developed Countries	31	24.4
Leased Developed Countries (LDC)	12.4	12.6
Other Developing Countries	109.5	20.7
Low-Income Food Deficit Countries	23.6	9.3
Region		
World	152.9	20.3
World (Excluding China)	97.7	16
Africa	12.4	9.9
North America	8.1	22.4
Latin America and the Caribbean	6.7	10.5
Asia	108.7	24.1
Europe	16.1	21.6
Oceania	1	24.2

Source: SOFIA 2020 – State of Fisheries and Aquaculture in the World Handbook on Fisheries Statistics – 2020

Table 3 shows the region-wise and economic group-wise data on the overall and per capita fish food consumption in the world. The per capita fish food consumption during the year 2017 was highest in developed countries and it was 24.4 kg per year, as in region-wise classification Oceania has registered highest per capita consumption of 24.2 kg per year which was followed by continent Asia (24.1 kg per year). As in the case of total food fish consumption, the developing countries stood first with 109.5 million tonnes out of 152.9 million tonnes in the world.

Table 4: Top Ten Indian States in Per Capita Fish Consumption during 2019-20

States	Yearly Fish Consumption (Per Capita/Kg)
Assam	11.72
Gujarat	9.55
Jharkhand	10.32
Kerala	19.41
Manipur	14.1
Meghalaya	10.98
Odisha	13.79
Tamil Nadu	9.6
Tripura	29.29
Uttar Pradesh	10.89
Union Territories (UTs)	
A & N Island	59.47
Puducherry	30

Source: Department of Fisheries, State Government/UTs Administration
Handbook on Fisheries Statistics – 2020

From table 4, it is evident that the annual per capita consumption of fish was very high in the nation's union territories than in its states. Among UTs, Andaman and Nicobar Island have registered 59.47 per capita per kg, which was followed by Puducherry, i.e., 30 per capita per kg as those were surrounded by and also nearby coastal area respectively and contributes much to capture fishery. While in the case of States, Tripura stood first in per capita fish consumption with 29.29 kilograms, followed by Kerala with 19.41 kilograms per head.

Conclusion

It can be concluded that aquaculture plays a significant role in the country's GDP rate and food security. The study found that the overall production of fish in the nation has shown a tremendous increase and the fish seed production had a non-excludable role in the country's fish production. It was also found that per capita fish consumption and its demand increasing day by day. So, it is essential to bring sustainable growth in fish production and satisfy the increasing desire of the rural population, thereby increasing food security which assures nutritious food intake for a better future.

References

- Ghosh, Ambalika, et al. "Relationship between Fish Seed Production and Inland Fish Production of West Bengal, India." *SM Journal of Biometrics & Biostatistics*, vol. 2, no. 2, 2017.
- Handbook on Fisheries Statistics 2018*. Ministry of Fisheries, Animal Husbandry & Dairying, Government of India, 2019, <https://dof.gov.in/sites/default/files/2020-08/HandbookonFS2018.pdf>
- Handbook on Fisheries Statistics 2020*. Ministry of Fisheries, Animal Husbandry & Dairying, Government of India, 2020, https://dof.gov.in/sites/default/files/2021-02/Final_Book.pdf
- India stat*, <https://www.indiastat.com>
- Panigrahy, Shakti Ranjan, and Dilip Vahoniya. "Multifaceted Consumer Behaviour and Factors Influencing in Inland Fish Consumption in Anand District, Gujarat." *Journal of the Inland Fisheries Society of India*, vol. 49, no. 2, 2017, pp. 63-69.
- Sectoral Paper on Fisheries and Aquaculture*, NABARD, 2018, <https://www.nabard.org/auth/writereaddata/file/Fisheries%20and%20Aquaculture.pdf>
- Sharma, Hemant. "Growth and Instability of Inland Fish Production in India." *Fishery Technology*, vol. 54, no. 3, 2017, pp. 155-161.
- Belton, Ben, and Shakuntala Haraksingh. "Fisheries in Transition: Food and Nutrition Security Implications for the Global South." *Global Food Security*, vol. 3, no. 1, 2014, pp. 59-66.
- Deng, Gatriay Tut. "Assessment of Factors Affecting

Fish Production and Marketing in Gambella Region, Ethiopia.” *Scientific World Journal*, 2020.

Seetharaman, G. “Fish Farms to Produce Nearly Two Thirds of India’s Fish Supply by 2030.” *The Economic Times*, 2018.

Author Details

Dhanya Sai Das, *Ph. D Research Scholar, Department of Economics, Bharathiar University, Coimbatore, Tamil Nadu, India, Email ID: bhagyayogasidhirastu@gmail.com*

R. Govindasamy, *Assistant Professor, Department of Economics, Bharathiar University, Coimbatore, Tamil Nadu, India, Email ID: govindhphd@gmail.com*