International Journal of Social Science and Economic Research

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

Growth Performance of Indian Fisheries Production and its Share to The World's Fisheries Production: An Economic Analysis

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DOI: 10.46609/IJSSER.2026.v11i03.021 URL: https://doi.org/10.46609/IJSSER.2026.v11i03.021

Received: 17 February 2026 / Accepted: 24 March 2026 / Published: 31 March 2026

ABSTRACT

The study analyses the growth performance of fisheries production in India with an attempt to evaluate India's contribution to the world's fish production. Compound annual growth rate and coefficient of variation are calculated to measure the growth trends and instability in fisheries production over the period 1981-82 to 2021-22 by using secondary data. The results exposed that fisheries production grew with a positive growth trend of 4.54 percent CAGR and 53.86 percent high CV in the years 1981-82 to 2021-22. However, marine fisheries' contribution was higher till 1990, but after that inland fisheries' share was high in the total fisheries production. India's growth rate was found higher than the world's growth rate. India's share increased continuously in the world's fisheries production since 1950.The study recommended that policymakers identify the potential harnessing of fisheries production so that India could become the world's prior nation in the fisheries sector.

Keywords: Fisheries production, Compound annual growth rate, Coefficient of variation

Introduction

In the Indian economy, fisheries and aquaculture are important agricultural allied sectors that provide agricultural diversification, food and nutrition security, foreign exchange revenue and a means of employment for about 30 million people in the country especially those of marginalized and impoverished communities. The fishery is an emerging sector in India and it has been growing very fastly growth rate. Fish production has risen from 7.52 lakh tonnes in the year 1950-51 to 175.45 lakh tonnes in 2022-23. At present the fisheries sector contributed over 6.72 percent to the agricultural gross value added (GVA) and about 1.09 percent to the gross

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

value added of the country (Ministry of Fisheries, Animal Husbandry & Dairying, 2023). At present fishing and aquaculture have developed into a significant commercial enterprise, from their beginnings as primarily subsistence ventures in the early 1950s, when India launched the first five-year plan (Nayak et al. 2022).

India has a wide scope for increasing this sector. India is endowed with surpassing ten percent of the world's biodiversity which promotes a large fishing sector in the country. It has a vast coastline area of 8118 kilometers (km) and an Exclusive Economic Zone (EEZ) stretching over 2.02 million square km and covering 0.53 square km continental shelf area providing room for boosting the capture fishery production. With 0.19 million km of rivers and canals, 2.41 million hectares of ponds and tanks, 3.15 million hectares of reservoirs and 1.24 million hectares of brackish water resources accessible in the country that encourage diversifying of fisheries production in India not only economic opportunities but also long term sustainability(NFBD, 2022). India has an abundance of water resources that sustain the country's extensive fishing sector (Lingamurthy, 2015). India contributes 8 percent of world fish production and is a leading producer country in the production of inland fish in 2021-22. In the financial year 1950-51, the total fish production was 7.52 lakh tonnes in which the shares of marine and inland fish were 5.34 lakh tonnes (71 percent) and 2.18 lakh tonnes (29 percent) respectively (Handbook on Fisheries Statistics, 2008)

But in recent years, the Indian fisheries production pattern has changed completely, now it has shifted from marine to inland fish production. However, both types of inland and marine fish are produced in India, but the proportion of inland production continues to increase with comparison to marine production analyzed by (Parthasarathi et al., 2021). In 2021-22 the marine sector's contribution is 25.40 percent while the inland sector's contribution is 74.60 percent in the total fish production (162.48 lakh tonnes) in the country. The fish production growth rate is calculated at 10.34 percent annually in the financial year 2021-22 (Handbook on Fisheries and Statistics, 2022). Although we see a global total fish production pattern, it comprises 63 percent of marine production and 37 percent of inland production (FAO, 2022). The sustainable growth of the fisheries sector has seen with 10.14 percent growth rate in the year 2017-18 and provides job opportunities to the numbers of people in the country (Das &Govindasamy, 2021). Fisheries are one of the significant contributors to foreign exchange earnings and five major fish-producing states in the country are Karnataka, West Bengal, Andhra Pradesh, Gujarat and Odisha in the year 2021-22. Now, aquaculture is being done in those states where it has no prior history, it is possible due to the establishment of commercial shrimp hatcheries and different technological projects implemented like the DBT project (for detection, monitoring, or preservation of disease of fish and shellfish farmed) and these are helpful to attain sustainable growth in India (Balasubramanian et al., 2018)

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

The fishery sector has continuously increased in the last three decades and it is among the most sunrise dynamic sectors for food production. The fisheries and aquaculture production has expanded from 19 million tonnes to 214 million tonnes during the period 1950 to 2020. However global human consumption also increased from 9.9 kilograms in the period 1960s to 20.2 kilograms in 2020. India ranks second in terms of fish and aquaculture producers at the global level after China and remains in the leading position with 1.8 million tonnes in inland production and got sixth position in marine production in 2020 (FAO, 2022). India is one of the top five fish-exporting countries in the world with an 8 percent contribution to global fish production and in the period 2021-22. India exported 13,69, 264 tonnes of fish products with a value of 57,586.48 crores calculated (Handbook on Fisheries and Statistics, 2022). These all indicate that India has a wide scope for acquiring more growth in the fisheries sector by using vast aquatic resources and implementing new technology. Keeping the importance of the fisheries sector in the Indian economy, the present study analyzed the growth trends and instability of fisheries production and India's share in the world's fish production in different periods.

Materials and methods

This study belongs to the fisheries production of India. India is located in Asia and surrounded by the Himalayas range in the north, the Indian Ocean to the south, the Bay of Bengal in the east and the Arabian Sea in the west, it is extended between 8°4′ and 37°6′ latitude north and 68°7′ and 97°25′ longitudes east. India is the seventh-largest country as per geographical areas and the fifth-largest economy in GDP (Gross Domestic Product) ranking in the world (KnowIndia, n.d.). Approximately 30 million rural people depend upon the fisheries sector for employment, provide nutrition security to millions of people and export earnings in the country. The secondary data has been collected from a number of sources such as published various reports by the government of India, published reports of the Indian Council of Agricultural Research (ICAR),Handbook of Fisheries Statistics, issued reports by Food Agriculture Organizations of the United Nations (FAO) 2022, sectoral papers of fisheries and aquaculture and other related articles have been used for analyzing the study. In this study, for analyzing the growth trends and instability of fisheries production in India using the time series data which have been taken from, 1981-82 to 2021-22. The entire periods have been divided into four sub-periods, the first three covering 10 years and the last for 11 years, 1981's (1981-82 to 1990-91),1991's (1991-92 to 2000-01), 2001's (2001-02 to 2010-11), 2011's (2011-12 to 2021-22) and the overall periods 1981-82 to 2021-22 and India's share in the world's total fish production is measured for the periods 1950 to 2020.The data taken from the secondary sources have been interpreted in the form of tables for easiness of understanding the results. Statistical tools have been used such as the compound annual growth rate (CAGR) and mean, standard deviation, and coefficient of variation (CV) for measuring the growth trends and instability in fisheries production

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

respectively. The percentage method is used to calculate India's contribution to the world's fish production.

Growth trends analysis: Compound Annual Growth Rate (CAGR) has been projected for analyzing the growth trends of fisheries production in different periods in India. For measuring the growth of cardamom, and fish and fish products this method has been used by (Dhungana et al., 2024; Parthasarathi et al.,2021) respectively. The following exponential growth trend method has been used for calculating CAGRs:

$Y = ab^{t}e$ (1)

Where Y = dependent variable (production of fisheries in lakh tonnes)

a= Constant ;b = regression coefficient; t = years (1,2,3,4,…n); e = error term

Further, the growth function in equation (1) has been extended as a log function:

Log Yt = Log a + t Log b

Finally, the compound annual growth rate in percentage form has been calculated by using the following formula:

Compound annual growth rate (r) = [(Antilog of log b)-1]$*$ 100

Instability analysis: Fish production has been seen widely fluctuating over different periods. We can not reach a general conclusion based on the mean, so the coefficient of variation (CV) has been computed to evaluate the variations in fisheries production in different periods. For measuring the variability of the fisheries sector the CV has been applied by(Guledagudda et al., 2020; Radhakrishnan et al. 2018).The following formula has been applied for computing the instability in fisheries production in India:

$$\text{Coefficient of Variation (CV)} = \frac{Standard\ Deviation\ (\sigma)}{\text{Mean}\ (\overline{X})} \times 100$$

Mean: It is calculated as the average value of fish production. The arithmetic mean can be calculated as follows:

$$\text{Mean}\ (\overline{X}) = \frac{\sum X}{N}$$

Where, $\sum X$ = summation of the values of the variables considered,

N= Number of observations

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

Standard deviation: The standard deviation is used for the measures of the absolute change of dispersion. The standard deviation is expressed as:

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(X - \overline{X})^2}{N}}$$

Where Standard Deviation = (**σ**), Observation of the series =X, Average of observations = $\overline{X}$, Number of observations = N

Results and discussion

The results and discussion portion of the study were classified into two sections: section I and section II. The first section analyzed the growth trends and instability in fisheries production while the second section measured India's shares in the world fish production.

Section I: Growth performance and instability of fisheries production in India:

The fisheries sector of India has been rising very fast rate in recent times and has reached 162.48 lakh tonnes in the year 2021-22 with a 10.34 percent per year growth rate. It is explicit from (Figure 1)that India's fish production has grown on an encouraging upward trend. The total fish production in India had increased by 38.36 lakh tonnes in 1991-92 compared to 24.44 lakh tonnes during the year 1981-82 and registered a compound annual growth rate(CAGR) of 5.27 percent indicated in (Table 1). The contribution of inland and marine fish production increased continuously in the period 1981-82 to 1990-91.In the total fish production, the shares of marine and inland production increased from 14.45 lakh tonnes to 23 lakh tonnes and 9.99 lakh tonnes to 15.36 lakh tonnes respectively during the period 1981-82 to 1990-91.The finding of the study indicated that the contribution of marine fish production (approximately 60 percent) was higher compared to inland fish production (approx. 40 percent) in the total fish production in this period.

Table 1.Fisheries production in India for the period 1981-82 to 1990-91

(In lakh tonnes)

Year	Fisheries production		
	Marine	Inland	Total
1981-82	14.45	9.99	24.44
	(59.12)	(40.87)	(100)

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

1982-83	14.27 (60.29)	9.40 (39.71)	23.67 (100)
1983-84	15.19 (60.61)	9.87 (39.39)	25.06 (100)
1984-85	16.98 (60.62)	11.03 (39.38)	28.01 (100)
1985-86	17.16 (59.67)	11.60 (40.33)	28.76 (100)
1986-87	17.13 (58.23)	12.29 (41.77)	29.42 (100)
1987-88	16.58 (56.03)	13.01 (43.97)	29.59 (100)
1988-89	18.17 (57.65)	13.35 (42.35)	31.52 (100)
1989-90	22.75 (61.87)	14.02 (38.13)	36.77 (100)
1990-91	23.00 (59.96)	15.35 (40.04)	38.36 (100)
Mean	17.57	11.99	29.56
S.D.	3.07	1.96	4.92
CV*	17.47	16.35	16.64
CAGR**	5.14	5.44	5.27

Source: Handbook of Fisheries and Statistics 2020,

Department of Animal Husbandry and Dairying and Fisheries, Government of India

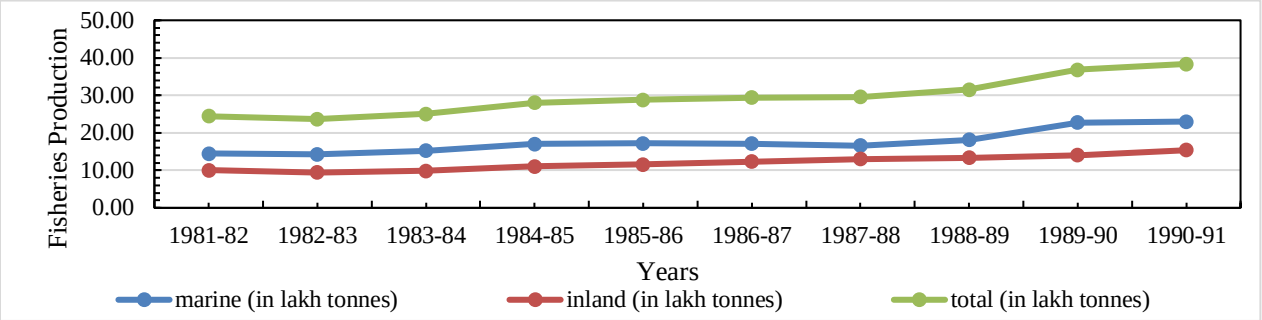
Note: The figures in the parentheses are the percentage shares of marine and inland in the total fish production

*CV and **CAGR have been presented in percentage form

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

Figure 1.Growth trend of India's fisheries production for the period 1981-82 to 1990-91



It reflected in the growth behavior of fish production under consideration that the CAGR of inland and marine was 5.14 percent and 5.44 percent during the period 1981-82 to 1990-91. In the decade 1980s there was noted sustainable growth in fisheries production in India, especially in marine fisheries in the World Bank Report owing to the motorization of the artisanal fleet, the extension of fishing grounds, increased use of fishing ring seines, development of shrimp trawling and the beginning of seasonal closure of fisheries (Salagrama & Staples, n.d.). Marine fish production increased continuously in India with an average growth rate of 12.9 percent throughout the period 1981 to 1985 by using different technological equipment in capturing fisheries and diversifying fishing efforts discussed by (James, 1988). There were large scopes for increasing fisheries production in coming periods through the development of fishing activities in the country. As far as the mean value and coefficient of variation (CV) were concerned, there was a slight difference in the values of coefficient of variation marine, inland and total fish production which were 17.47 percent, 16.35 percent and 16.64 percent respectively during 1981-82 to 1990-91. The fishing industry was developed by the traditional communities of Indian coastal people but since the 1960s, individuals as well as corporations involved in capture fisheries occupation. On the contrary, the people were less interested in inland fisheries activity because they were facing marketing and cost problems (Kalawar& Dandekar, 1988).

The trends in fisheries production are presented in (Figure 2) for the period 1991-92 to 2000-01 and find that the fisheries production of both types of fish inland and marine increased continuously. The total amount of fish production increased from 41.57 lakh tonnes in 1991-92 to 56.56 lakh tonnes in 2000-01 with a 3.51 percent CAGR analyzed in (Table 2).It was observed that the contribution of marine and inland fish production was 58.86 percent (24.47 lakh tonnes) and 41.14 percent (17.10 lakh tonnes) in the year 1991-92 to increase 49.70 percent (28.11 lakh tonnes) 50.30 percent (28.45 lakh tonnes) in2000-01 respectively. Fish production started to intensify in the year 1990s after the commercialization of the fisheries sector as different commercial hatcheries were set up in the private sector and intensive farming started in the country with the help of foreign technology(Balasubramanian et al., 2018).A very impressive

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

picture emerged in this decade that inland fish production continued to rise while marine fish production declined continuously and reached a marine contribution of 49.70 percent in the total fisheries production in 2000-01 which was 58.86 percent in 1991-92.There was found annual fluctuations in the marine sector resulted in the lead to low investment in this sector. Environmental degradation, overcrowding of farms and declined marine production by coastal poor communities due to lack of capitalization in fishing deep sea subsequently led to slow down growth in the marine sector. On the other side, there was a spectacular growth in inland fisheries production from1991-92 to 2000-01 because intensive fish culture started not only in traditional regions but also in those parts where it had no prior history such as Tamil Nadu, Haryana, Andhra Pradesh, Uttar Pradesh and Punjab (Kumar et al., 2003). The compound annual growth rate (CAGR) was investigated at 1.47 percent, and 6.00 percent for marine and inland production from the period 1991-92 to 2000-01in India. The changes in fisheries production arose due to the execution of new fisheries policies in favor of inland fisheries and diversification in inland culture accelerated growth in inland fisheries production in India (Krishnan & Birthal, 2002).

Table 2. Fisheries production in India for the period 1991-92 to 2000-01

(In lakh tonnes)

Year	Fish production		
	Marine	Inland	Total
1991-92	24.47 (58.86)	17.10 (41.14)	41.57 (100)
1992-93	25.76 (59.01)	17.89 (40.99)	43.65 (100)
1993-94	26.49 (57.04)	19.95 (42.96)	46.44 (100)
1994-95	26.92 (56.21)	20.97 (43.79)	47.89 (100)
1995-96	27.07 (54.70)	22.42 (45.30)	49.49 (100)
1996-97	29.67 (55.48)	23.81 (44.52)	53.48 (100)
1997-98	29.50 (54.75)	24.38 (45.25)	53.88 (100)

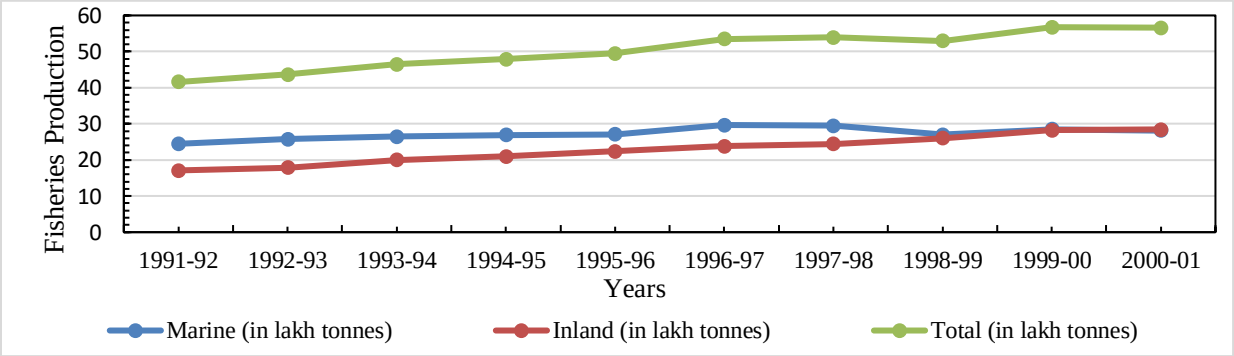
ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

1998-99	26.96 (50.89)	26.02 (49.11)	52.98 (100)
1999-00	28.52 (50.26)	28.23 (49.74)	56.75 (100)
2000-01	28.11 (49.70)	28.45 (50.30)	56.56 (100)
Mean	27.35	22.92	50.27
S.D.	1.63	3.99	5.29
CV*	5.96	17.41	10.52
CAGR**	1.47	6.00	3.51

*Source:*Handbook of Fisheries and Statistics 2020,
Department of Animal Husbandry and Dairying and Fisheries, Government of India
Note: The figures in the parentheses are the percentage shares of marine and inland in the total fish production,
*CV and **CAGR have been presented in percentage form

Figure 2.Growth trend of India's fisheries production for the period 1991-92 to 2000-01



It was investigated that the average value of inland (27.35 lakh tonnes) increased two times compared to the previous period consequently the overall average production also increased double from 1991-92 to 2000-01. Different fishing acts and policies were implemented by the Indian government such as the Deep-Sea Fishing Policy 1991, and the Marine Fishing Regulation Act 1980 to boost the marine sector. The inland sector developed in India after the execution of the New Economic Policy 1991 that helped to commercialize shrimp culture and flexibility of aquaculture operational areas.The government also emphasized increasing the scale of investment in the fisheries sector in the country (Kumar, et al., 2003).

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

The volume of total fish production grew by 59.56 lakh tonnes in the year 2001-02 to 82.31 lakh tonnes in 2011-12 revealed in (Table 3). Looking at the scenario of fisheries production in (Figure 3), it was evident that the contribution of inland production (60.52 percent) was larger compared to marine production (39.48 percent) in the total fisheries production from the period 2001-02 to 2010-11.Initially, the volumes of inland fish production were low, but with time, it took an upward trend sharply and became higher than marine fish production from the year 2001-02.

Table 3. Fisheries production in India for the period 2001-02 to 2010-11

(In lakh tonnes)

Year	Fish production		
	Marine	**Inland**	**Total**
2001-02	28.30 (47.52)	31.26 (52.48)	59.56 (100)
2002-03	29.90 (48.23)	32.10 (51.77)	62.00 (100)
2003-04	29.41 (45.96)	34.58 (54.04)	63.99 (100)
2004-05	27.79 (44.08)	35.26 (55.92)	63.05 (100)
2005-06	28.16 (42.85)	37.56 (57.15)	65.72 (100)
2006-07	30.24 (44.02)	38.45 (55.98)	68.69 (100)
2007-08	29.20 (40.97)	42.07 (59.03)	71.27 (100)
2008-09	29.78 (39.10)	46.38 (60.90)	76.16 (100)
2009-10	31.04 (38.81)	48.94 (61.19)	79.98 (100)
2010-11	32.50 (39.48)	49.81 (60.52)	82.31 (100)

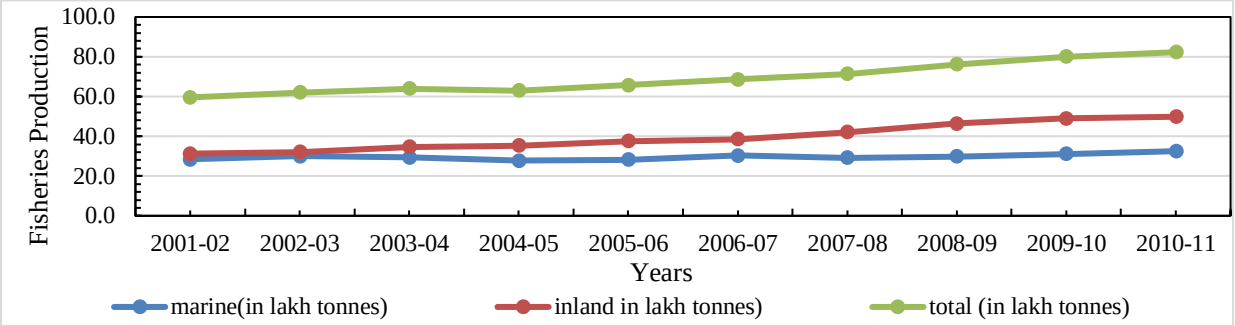
ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

Mean	29.63	39.64	69.27
S.D.	1.42	6.82	7.91
CV*	4.79	17.2	11.42
CAGR**	1.09	5.71	3.69

*Source:*Handbook of Fisheries and Statistics 2020,
Department of Animal Husbandry and Dairying and Fisheries, Government of India
Note: The figures in the parentheses are the percentage shares of marine and inland in the totalfish production, *C.V. and **C.A.G.R. have been presented in percentage form

Figure 3. India's fisheries production growth trend for the period 2001-02 to 2010-11



There was analyzed dynamic growth in inland production as opposed to marine production with CAGR of 5.71 percent and 1.09 percent respectively and an overall CAGR was 3.69 percent. For enhancing inland fish production various programs were implemented in the several states of the country such as infrastructural development, subsidies support programs, marketing facilities and more involvement of farmers, more areas came under freshwater and brackish water aquaculture through Fish Farmers Development Agencies and National Fisheries Policy 2004 were responsible for the faster growth in the inland sector (Das et al., 2024). In India, there was a lot of scope for further expansion of production and productivity per unit area in aquaculture reported in their study by (Katiha et al., 2005).Marine fish production increased erratically and almost constantly due to the depletion of marine resources particularly inshore and near shore areas. The migration of labour, the high cost of fishing, the energy crisis, and global warming decreased the growth rate and productivity of captured fish led to the degradation of this sector (Kumar et al., 2015).

The CV value in marine fisheries and inland fisheries was found 4.79 percent and 17.2 percent respectively during the years 2001-02 to 2010-11. However, low instability in marine fisheries can not be considered a positive sign because it is due to the static growth in marine production. Similar results were also found by (Sharma, 2017) &(Kumar et al., 2010).(Welcomme et al.,

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

2010) also discussed the decline in the capture fisheries production in Europe, Asia and North America because of the formulation of management policy,loss of diversity and overfishing.

It is assessed in (Figure 4)that fisheries production has grown rapidly with positive growth trends. The total production of fish continued to increase in India from 86.66 lakh tonnes in the year 2011-12 to 162.48 lakh tonnes in the year 2021-22examined in (Table 4).The positive growth trend of fisheries production in India is also stated by (Saikia& Das 2023)&(Radhakrishnan, et al., 2018). It was significant to find that the CAGRs of marine, inland and total fish production were1.49 percent, 8.93 percent and 6.56 percent respectively in the period2011-12 to 2021-22. After the year 1990s, the share of inland fisheries continually kept increasing and reached 74.60 percent whereas the marine fish production's share was 25.40 percent in 2021-22, which was 61.87 percent in 1989-90. This points out the depletion of resources in the marine sector of Indian fishery as 86

Table 4. Fisheries production in India for the period 2011-12 to 2021-22

(In lakh tonnes)

Year	Fish production		
	Marine	Inland	Total
2011-12	33.72 (38.91)	52.94 (61.09)	86.66 (100)
2012-13	33.21 (36.74)	57.19 (63.26)	90.40 (100)
2013-14	34.43 (35.53)	61.36 (64.47)	95.79 (100)
2014-15	35.69 (34.79)	66.91 (65.21)	102.60 (100)
2015-16	36.00 (33.45)	71.62 (66.55)	107.62 (100)
2016-17	36.25 (31.71)	78.06 (68.29)	114.31 (100)
2017-18	37.56 (29.57)	89.48 (70.43)	127.04 (100)
2018-19	38.53	97.20	135.73

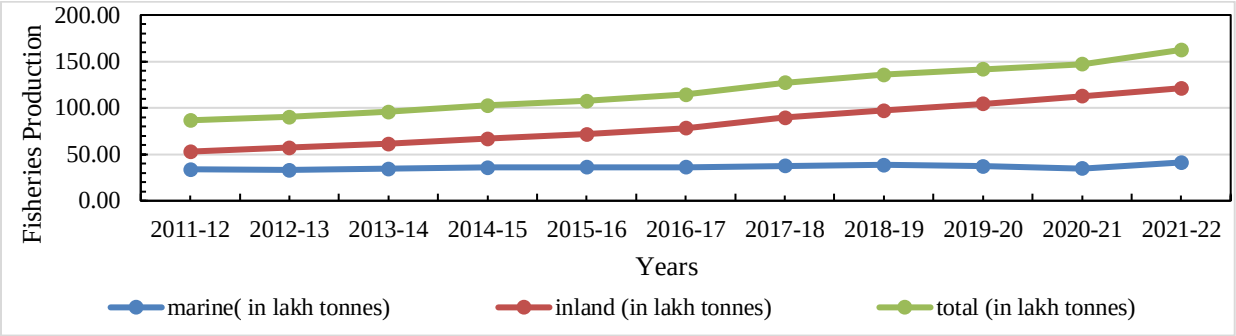
ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

	(28.39)	(71.61)	(100)
2019-20	37.27 (26.31)	104.37 (73.69)	141.64 (100)
2020-21	34.76 (23.63)	112.49 (76.37)	147.25 (100)
2021-22	41.27 (25.40)	121.21 (74.60)	162.48 (100)
Mean	36.24	82.98	119.23
S.D.	2.34	23.41	25.24
CV*	6.46	28.21	21.17
CAGR**	1.49	8.93	6.56

*Source:*Handbook of Fisheries and Statistics 2022,
Department of Animal Husbandry and Dairying and Fisheries, Government of India
Note: The figures in the parentheses are the percentage shares of marine and inland in the totalfish production,
*CV and **CAGR have been presented in percentage form

Figure 4. India's fisheries production growth trend for the period 2011-12 to 2021-22



percent of marine resources are fully exploited in the depth range of up to 100 meters, so going to the depth range of 200 meters there is a need for capital-intensive technology (NABARD, 2018). However, the higher value of CV in inland fish production (28.21 percent) implied a high growth rate whereas low fluctuation in marine fish production (6.46 percent) was due to slowdown growth. Instability and growth rate are found directly correlated in the present study. However, the low fluctuation in the marine sector could not be regarded as a positive indicator. The low instability in marine production was also examined by (Radhakrishnan, et al., 2018) & (Siby & Arunachalam, 2020).

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

The overall growth trends of fisheries production in India showed in (Table 5)that it grew with an annual growth rate of 4.54 during the entire period 1981-82 to 2021-22. Marine and inland fisheries production grew with a positive trend in the overall period of 1981-82 to 2021-22 in India illustrated in (Figure 5). It is evaluated that marine fish production (59.96 percent) shared higher than inland fish production (40.04 percent) in the period 1981s but after that, there were significant transitions from capture-to-culture in the fisheries sector in India that opened the way for enhancing the inland fisheries production.

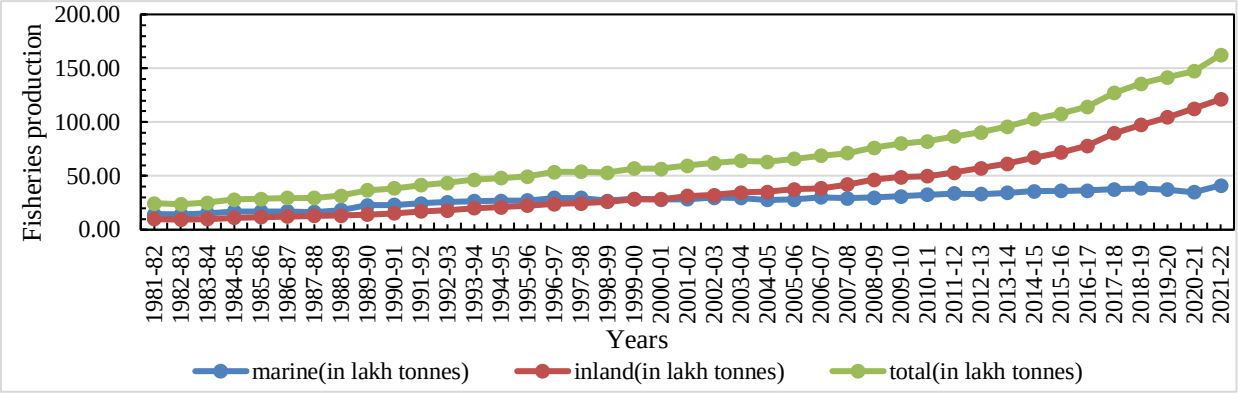
Table 5. Fisheries production in India for the overall period (1981-82 to 2021-22)

(In lakh tonnes)

Year	Fish production		
	Marine	Inland	Total
Mean	27.91	40.45	68.35
S.D.	7.16	30.48	36.81
CV*	25.65	75.35	53.86
CAGR**	2.26	6.41	4.54

*Source:*Handbook of Fisheries and Statistics 2020&2022,
Department of Animal Husbandry and Dairying and Fisheries, Government of India
Note: The figures in the parentheses are the percentage shares of marine and inland in the totalfish production,
*CV and **CAGR have been presented in percentage form

Figure 5.Trends of fisheries production in India for the overall period (1981-82 to 2021-22)



The development of aquaculture (which produced brackish water and freshwater species), commercial farming and standardized technology-induced inland production resulted in the contribution of the inland sector reaching 74.60 percent in 2021-22 with a CAGR of 6.41

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

percent. However, the marine sector's share was 25.40 percent in 2021-22 with a CAGR of 2.26 percent. (Saikia& Das, 2023; Ahmed & Ahmed, 2022) also shed light on the trends of fish production in India. Late 1990s marine production reached its plateau as it faced problems like the influx of sewage water, frequent cyclones, top-down governing methods, social inequality and depletion of resources. Looking at the instability of the fisheries production, it was noted that the CV values for inland, marine and total fisheries production were 75.35 percent, 25.65 percent and 53.86 percent respectively in the overall period.

Section II: India's contribution to the World's fish production:

In recent years, fisheries production has experienced fast growth and played a crucial role in providing nutrition and food security globally. In the year 2020, 17 percent of all animal protein consumed comes from fish (FAO, 2022). In global fish production, India is the position as third largest fish-producing country, and second in aquaculture production in 2021-22 (Handbook on Fisheries and Statistics, 2022).In 2020, India ranked first in inland fisheries production contributing 16 percent (1.8 million tonnes) and sixth in marine fish production with a 5 percent (3.71 million tonnes) contribution worldwide (FAO, 2022). India's share in the world's fish production increased from 3.83 percent in 1950 to 8.22 percent in 2020 analyzed in (Table 6).India's share increased regularly in the world's fisheries production as shown (Figure 7).

Table 6. Contribution of India to the World's Fisheries production in the selected years

(In MMT)

Year	World's fish production			India's fish production			India's share*		
	Total	Marine	Inland	Total	Marine	Inland	Marine	Inland	Total
1950	19.31	17.08	2.24	0.74	0.53	0.21	2.74	1.09	3.83
1955	27.96	24.30	3.66	0.84	0.60	0.24	2.15	0.85	3.00
1960	35.54	31.49	4.05	1.16	0.88	0.28	2.48	0.78	3.26
1965	49.67	44.55	5.13	1.33	0.82	0.51	1.65	1.03	2.68
1970	65.38	59.31	6.07	1.76	1.09	0.67	1.67	1.02	2.69
1975	65.47	58.51	6.96	2.27	1.48	0.79	2.26	1.20	3.46
1980	71.94	64.19	7.76	2.45	1.55	0.90	2.15	1.25	3.4
1985	86.28	75.48	10.80	2.84	1.73	1.11	2.00	1.29	3.29
1990	97.74	82.57	15.17	3.80	2.19	1.61	2.24	1.65	3.89
1995	116.75	94.60	22.14	4.92	2.66	2.27	2.28	1.94	4.22
2000	125.94	96.88	29.06	5.61	2.76	2.85	2.19	2.26	4.45

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

2005	136.78	98.25	38.53	6.66	2.87	3.79	2.10	2.77	4.87
2010	147.99	95.87	52.13	8.48	3.28	5.19	2.22	3.51	5.73
2015	168.70	108.70	60.00	10.82	3.64	7.18	2.16	4.25	6.41
2016	166.10	106.80	59.40	11.40	3.60	7.80	2.17	4.70	6.87
2017	172.70	111.20	61.50	12.60	3.70	8.90	2.14	5.15	7.29
2018	178.93	115.36	63.57	13.60	3.90	9.70	2.18	5.42	7.60
2019	177.83	112.40	65.43	14.20	3.80	10.40	2.14	5.84	7.98
2020	179.00	112.00	67.00	14.73	3.50	11.23	1.95	6.27	8.22
CAGR**	12.16	9.37	22.73	19.53	11.94	27.24	-	-	-

*Source:*Handbook of Fisheries and Statistics 2018, 2020&2022,
Department of Animal Husbandry and Dairying and Fisheries, Government of India
Note: *India's share in the World's production (in percentage)
**CAGR has been presented in percentage form

Figure 6. Contribution of India to World Fisheries Production

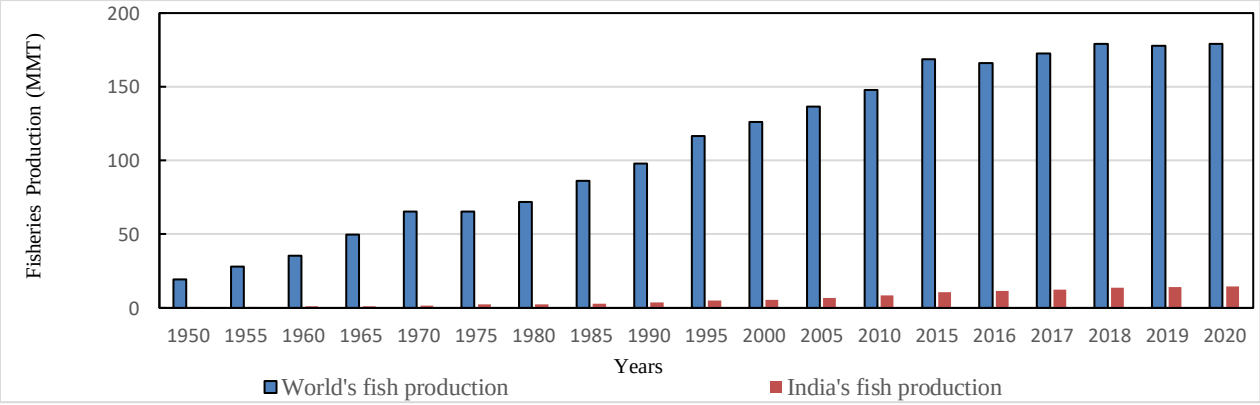
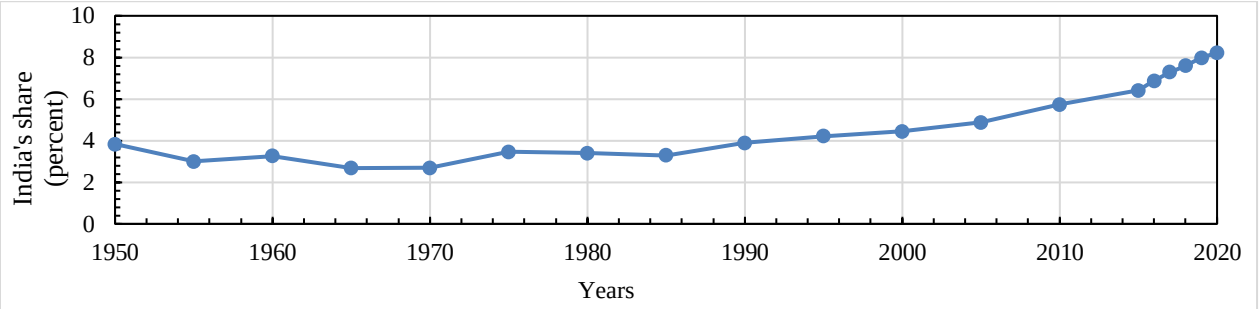


Figure 7. India's shares in the world's fisheries production (in percent)



ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

However, the growth trend of India as well as the world exhibited positiveas depicted in (Figure 6). Similar studies (Kumar et al., 2010;Kumar et al., 2015;Khanal& Deb, 2022) pointed out the positive trends of the world and Indian fisheries production. The CAGR indicated that India's production increased faster growth rate (19.53 percent) than the world's growth rate (12.16 percent). In India, the faster growth of fisheries production was mainly because of increased the volume of inland fish production. It was found that global fish production increased 8.27 times whereas India's fish production increased 18.91 times for the year 1950 to 2020. Marine fisheries production of 112 MMT (62.57 percent) contributed higher than inland fisheries production of 67 MMT (37.43 percent) in global fish production in the year 2020.On the contrary, inland production contributed more than marine production in India's total fish production which was 11.23 MMT (76.24 percent) of inland production and 3.50 MMT (23.76 percent) of marine production in 2020. India's marine production was higher than inland production in the world production till 1995 but after that marine production reached a plateau in India due to undeterred mechanized trawling, financial constraints and technological lag whereas India's inland share continued to increase in the world's production. Sustainable growth in the maritime sector can be achieved in India through modernized coastal fisheries, diversification in species, commercialization of hatcheries, trained fishermen and a sound Monitoring, Control and Surveillance (MCS) system.

Conclusions

The fisheries sector being a major contributor to India's economy plays a prominent role in foreign exchange earnings, providers of nutrition food and employment generation. This sector has wide scope for increasing the farmers' earnings in the coming years. The positive growth trend of fisheries production has been analyzed in different periods in the study. The fish production increased from 24.44 lakh tonnes in 1981-82 to 162.48 lakh tonnes in 2021-22 with a compound annual growth rate (CAGR) of 4.54 percent in which the marine production increased at the rate of 2.26 percent whereas the growth rate of inland production was 6.41 percent. The findings revealed that in the total fish production, marine production contributed 59.96 percent higher than inland production 40.04 percent in the first period (1981-82 to 1990-91). There were some structural and qualitative changes in the fisheries sector in India and the proportion of inland fish production continuous to increase whereas marine production continuous to decrease and reached 74.60 percent share of inland production and 25.40 percent share of marine production in the total fish production in 2021-22. In the first period, marine production increased with a 5.14 percent growth rate but in the following periods, the rate of growth in marine production became stagnant due to the depletion of resources, particularly inshore and near shore areas where maximum harvesting has occurred. The higher value of CV in inland production (75.35 percent) than in marine production (25.65 percent) in India indicated that

ISSN: 2455-8834

Volume:11, Issue:03 "March 2026"

instability is directly related to the growth rate. In 2021-22, India is in third place with an 8 percent contribution among the world's fish-producing countries. The CAGR of India's fish production was 19.53 percent higher than the world's growth rate which was 12.16 percent in the selected years. India has a wide scope to increase fishing production, especially in the inland sector. The study advocates for formulating new technology, enhanced investment, organized marketing structure, diversification in fisheries, development of infrastructure facilities, increasing public-private investment, intensive farming and implementing schemes more effectively which will help to achieve sustainable growth in fisheries production in India. For making the Indian fisheries product more competitive at the international level in terms of quality has to be formulated on (Hazard Analysis Critical Control Point) HACCP principles.

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