

Trends in Fisheries Production with emphasis on Aquaculture Fish Production: A Comparative Analysis of India and China

Mathews Plamoottil^{1*} & Pradeep Kumar B.²

1. Dept. of Zoology, Government College, Kottayam, Kerala, India
2. Post-Graduate and Research Department of Economics, Maharaja's College (Government Autonomous), Ernakulam

*Corresponding Author: mathewsplamoottil@gmail.com

ARTICLE INFO

Article History:

Received: Oct. 11, 2021

Accepted: March 19, 2022

Online: May 29, 2022

Keywords:

Fish Production,
Aqua Culture,
FAO,
Growth Rates,
Blue Revolution

ABSTRACT

China's hegemony in global fish production remains unquestioned. This paper tries to analyze the trend in the production of fish production in India and China giving emphasis to aquaculture fish production. In aqua production in the 2000s, India appears to have made a turnaround compared to the position of China. In the 2010s, India registered a growth rate of 78 percent almost the same as in the 2000s while China's decadal growth rate went down to a little over 50 percent. The variation difference in the growth trend of total fisheries production in India has been much more pronounced compared to that of China. The difference in variation of the growth has also been discernible in the Aquaculture production as well. While China's long-term growth has been steadier and steeper during the period under the study, India has shown relatively much-pronounced volatility, particularly in the second half of the 1990s and the first half of the 2000s. But in the later part of the 2010s, the volatility in the growth trend in respect of aqua production in India seems to have disappeared.

INTRODUCTION

World over fisheries economy has gained indomitable importance in recent times thinks mainly to increasing food requirement and nutritional awareness among the consumers across the world. It is obvious that there has been a silent competition among the leading countries to secure control over the production and marketing of fish products especially valued added products. Indeed, the fish economy apart from meeting the food requirement of the growing population also plays an important role in providing income and livelihood to a large segment of population in each country. Therefore, fisheries have occupied an important place in the policy framework of governments of many countries. World's demand for fish products does not seem that have been showing any signs of a decline in the last years. In fact, from 1990 to 2018, global capture of fish showed an increase to the tune of 14 percent whereas aquaculture production went up phenomenally by 527 percent.

In response to environmental changes, Fisheries sector has undergone revolutionary transformations in recent times in terms of sources of products, method of catching and value addition. Apart from the traditional sources of fish production viz. sea and inland fishing, aquaculture has also gained importance in recent years. In fact, it has been observed that in many countries particularly in emerging economies like China, the aquaculture has in fact exceeded the sea fisheries (**FAO, 2020**). The declining sea food wealth and the commensurate growth in the demand for fish products might have led to the increasing volume of aquaculture production in the world. It is estimated that world today produces more than 100 million tons of aquaculture fish, which was barely 17 million tons in 1990. Global fish production broadly covers fish from two sources: wild catch and aquaculture (**Ritchie, 2019**). It is interesting to note that global fish catch from wild sources has not shown any perceptible hike over the last years, while fish farming/fish production from aquaculture has grown exponentially, showing the unquestionable importance that aquaculture occupies in the global fish map. It has now been accepted that the increase in the percapita demand for fish products could be met only with the production from the source of aquaculture.

India and China are two dominant players in the realm of fisheries industry at the international level. China's is a key player in the production, consumption, and trade in fish food products (**FAO, 2018**). China has not only marched ahead of other comparable countries in the production of food stuffs, but in consumption of fish items, it has come to occupy an unquestionable place. According to the first seafood consumption footprint, China leads the world in fish consumption with 65 million tones, followed by European Union with 13 million tones, Japan with 7.4 million tones, and Indonesia with 7.3 million tones, and US with 7.1 million tones (**Club, 2018**). Surprisingly, in consumption too, the difference between China and the second consuming country is quite interesting. It is estimated that by 2030, China is likely to enter into a scenario, where its seafood consumption outstrips its production (**Beatrice Crona, 2020**). Studies have shown that China and India come first and second, respectively in the case of countries having the largest fish catch yield in the world (**Telegraph, 2021**). China produces one third of the total global fish production. The main reason for the success of China in this field has been the continuous institutional support especially from the part of the government towards aquaculture fish production. It needs to be mentioned here that China has a fish production six times higher than that of India. The highest ranks that India and China occupy in global fish production become a matter of in-depth analysis, and in this study, an attempt has been made to analyze the trend in the production of fish production in both countries giving emphasis to aquaculture fish production. The paper is structured as follows: The foregoing session introduces the discussion point of the paper including the context in which the paper is intended to have been placed. The second session discusses available literature on the field. The third discussion presents data sources and the why

such data is used for analysis. The penultimate session analyses the data and attempts to provide a brief discussion and the final session concludes with findings and suggestions.

A BRIEF REVIEW OF PREVIOUS STUDIES

At the outset, it would be imperative to note that fisheries do have a treasure of literature sourced from a large number of studies, touching upon many facets. Fisheries do not confine itself to the boundaries of zoological science, but transcends boundaries and aligns itself with subjects like economics and sociology. In a way, it could be said that fisheries as a domain possess all characteristics of being a superior subject of multidisciplinary status. Looking from this perspective, numerous studies could be found pertaining to the area of the focus of this paper, but given the scope of the paper, it would be worthwhile to throw light on some of the typical studies that have recently come up.

Many comparative studies have come to the forefront on the subjects relating to the trend in fisheries production particularly aquaculture fisheries over the last years. One of such studies focuses on the aquaculture in Africa (**Adeleke *et al.*, 2017**) In this paper authors attempt to make a comparative analysis among Egypt, Nigeria, Uganda and South Africa. This study found a twenty fold increase in aquaculture production in the region, and observed that most of this increase in production owed to inland freshwater systems, ponds and tanks.

Yan & Gao presented the status and development of China's fisheries in the 12th five-year period using data from FAO. The study found that China's aquatic products accounted for more than 35% of global aquatic production while its aquaculture products accounted for more than 60% of global aquaculture production (**Yan & Gao, 1996**).

One remarkable study (**Zheng *et al.*, 2020**) tracked the historical account of China's fishery insurance since 1982. Generally, the China's fishery insurance program has evolved through three stages: commercial fishery insurance (before 1994), fishery mutual insurance (1994–2008) and policy fishery insurance (2008-present).

Ayyappan & Krishnan (2004) studied the challenges facing fisheries development in India and found that Non-governmental agencies have been in the forefront to exploit the scope of fisheries as a provider of income and employment.

DATA SOURCE

Only time serious data from the World Bank have been used in the present study. Simple statistical tools like average, trend and ratio have been used for the analysis.

DISCUSSION

As said at the outset, this paper looks into the trends in fish production with special emphasis on aquaculture fish production in both China and India, the two leading Asian nations with highest number of population and of course the promising markets in the

world. First, we consider the trend in overall fish production by focusing only on the volume of production measured in Metric Tons. It is quite undeniable that during the period 1960 to 2018, the volume of fish production in China had been pretty higher than that of India. For instance in 1960 China produced 3173600 Metric tons of fish, whereas India just produced only 1161400 Metric tons, almost one by third of what China produced (Fig. 1). Interestingly, 1960s was a turbulent decade for the Chinese economy (Yan & Gao, 1996). On the other hand, India had stepped into certain overhauling of economic system mainly by ushering in Green Revolution, leading to quantum jump in agricultural production. Yet, China had made leaps in the production of fish for which many reasons might be attributable. But, it is curious to note that the difference in food production between leading Asian economies has got widened since the beginning of 1980s. In 1980, China had to its credit around 6252312 Metric tons of fish production whereas India had just 2445337 Metric tons. Further in 2000, 44573574 metric tons of fish products were produced by China while India could just produce 5668958 tons of fish output. This increasing difference between China and India in respect of fish production might not be surprising given the difference in the GDP of both countries. As the figure shows in 1980s, 1990s and 2000s, India appeared to be nowhere comparing China in the case of total fish production. Unsurprisingly in 2018, it could be noticed that China's fish production stood at 80966370 metric tons while India had to contend with a much less volume of just 12414190 metric tons.

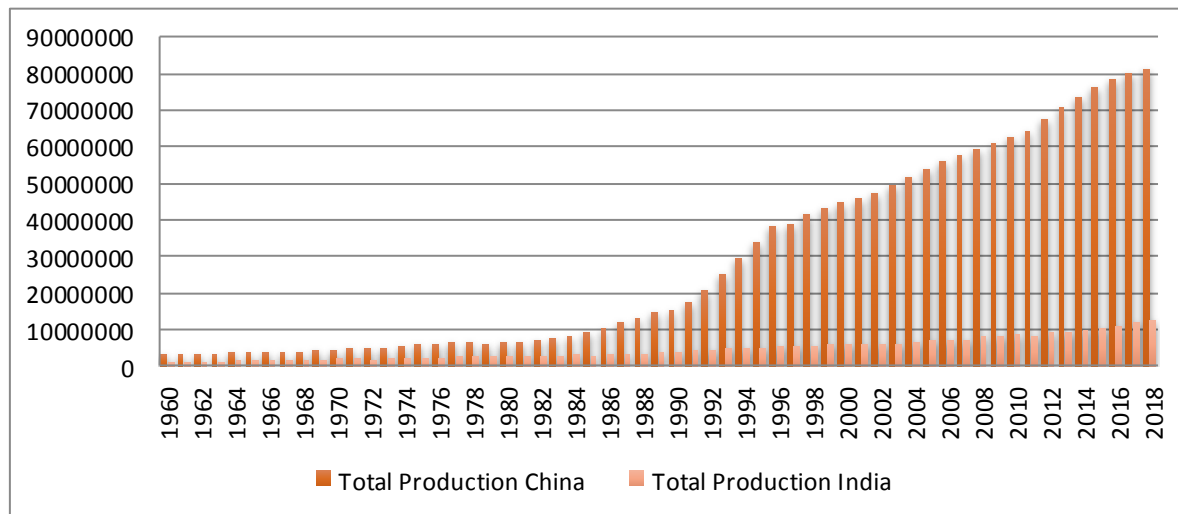


Figure 1. Total Fisheries Production in MT in China and India: A Comparison

The differences and changes in fish production in both countries could be made more comprehensible by looking at the average decadal trend (Table 1). In 1960s, the average fish production in China stood at 3579820MT whereas in India it was just 1269320 MT. But by 1970s, fish production in China picked up to 5392588 MT while in India it went up to 2088028 MT (Fig. 2). This quantum jump that India had made in fish production compared to China owed much to the increasing importance that India had been attaching to the agriculture sector including fisheries under the much proclaimed Green Revolution. India adopted Blue Revolution in the 7th Five year Plan (1985-1990) which accounted for sustaining the remarkably highest growth in both inland and marine

fish production in 1980s as well. Further, it is interesting to observe that 1990s registered a 50.64 percent growth rate in fish production in India while China made only 64.50 percent growth rate. Nonetheless, in absolute size, China's average production went up to 4976466 MT while India's stood at just 630712 MT in 1980s. In China, the real twist in fish production took place in 1990s when it registered a record decadal growth of over 221 per cent while India's growth rate plummeted to the level of 71 per cent. In 2000s, China witnessed a fall in the growth rate of fish production from 221 percent in 1990 to 74 percent while India also made downhill ride from 71 percent in 1990s to just 36 percent in 2000s. Absolutely speaking, China's fish production stood at 37859689 MT and India recorded production to the tune of 2829923 MT. When it comes to 2010s, India appears to have made a turnaround compared to the growth rate of China. It is obvious that in 2010s, India registered a growth rate of 50 percent 14 percent up from the figure in 2000s while China's decadal growth rate went down further to a little over 38.5percent (Fig. 2). In short, although China has had a little edge over India in the fish production during the period 1960-2018, India has made remarkable accomplishment over China in recent times.

Table 1 Total Fish Production in India and China: A Decadal Trend

Decades	China	India
1960s	3,579,820	1,269,320
1970s	5,392,588	2,088,028
1980s	9,363,420	2,840,653
1990s	30,127,677	4,864,326
2000s	52,669,072	6,652,748
2010s	72,709,608	9,990,979

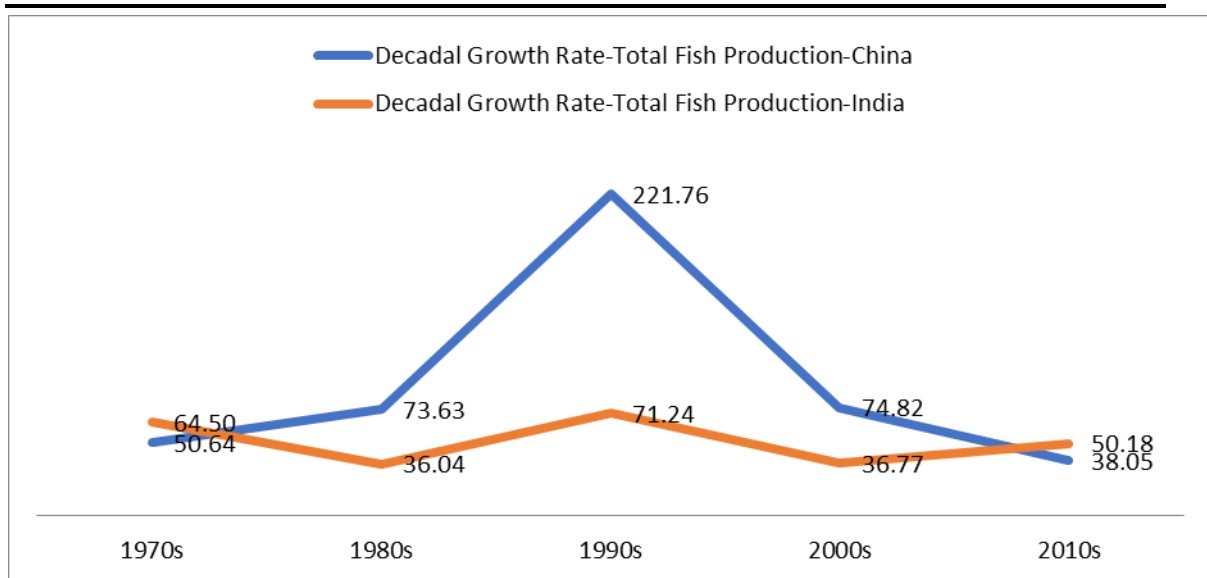


Figure 2. Decadal Growth Rate in Total Fish Production in China and India

Trends in Aquaculture Fish Production in India and China

The aquatic fish production has become popular in both India and China. Both countries have made enviable rapid strides over the last years in the field of aquaculture. The growing demand of fish products and the inability of marine fish catch to meet it; the increasing interests of people in inland and farm fish production, the favorable policy changes have all in fact given a fillip to the progress of aquatic fish production in both countries. India became the second largest country producing aquatic fish in the world (**Gopakumar, 2003**). The share of aquatic sources of fish production in total production went up from 46 percent in India to nearly 85 percent, pointing towards the indomitable importance that aquatic fish production has received in the country. The same is the story of China as well. It is interesting to note that in China “fisheries are known as “Capture and Aquaculture Industries”, and it is regarded as an ancient business of the Chinese people (**Zhao & Shen, 2016**).

For a quick understanding of the difference in aquaculture fish production in China and India, now we turn to analyze the decadal growth rate in both countries (Table 2). In 1960s, the average aqua fish production in China stood at 1096768MT while in India it was just 72491 MT. But by 1970s, fish production in China picked up to 2199909MT while in India it went up to 211755 MT. It could be observed that 1990s registered a 197 percent growth rate in aquaculture production in India while China made only 126 percent growth rate (Fig. 3). In 1990s China registered a record decadal growth of over 273 per cent while India’s growth rate came down to the level of 152 per cent, down from 197 percent decadal growth rate in 1980s. In 2000s, China witnessed a fall in the growth rate of fish production from 273 percent in 1990 to 103 percent while India also made downhill ride from 152 percent in 1990s to just 78 percent in 2000s. Obviously, China’s fish production stood at 37859689 MT and India recorded production to the tune of

2829923 MT. When it comes to 2010s, in aqua production India appears to have made a turnaround relative to the growth rate of China. It is obvious that in 2010s, India registered a growth rate of 78 percent almost the same as in 2000s while China's decadal growth rate went down further to a little over 50 percent (Fig. 3).

Table 2 Aquaculture Fish Production in India and China: A Decadal Trend

Decades	China	India
1960s	1,096,768	72,491
1970s	2,199,909	2,11,755
1980s	4,976,466	6,30,712
1990s	18,574,702	1,589,924
2000s	37,859,689	2,829,923
2010s	57,061,151	5,038,997

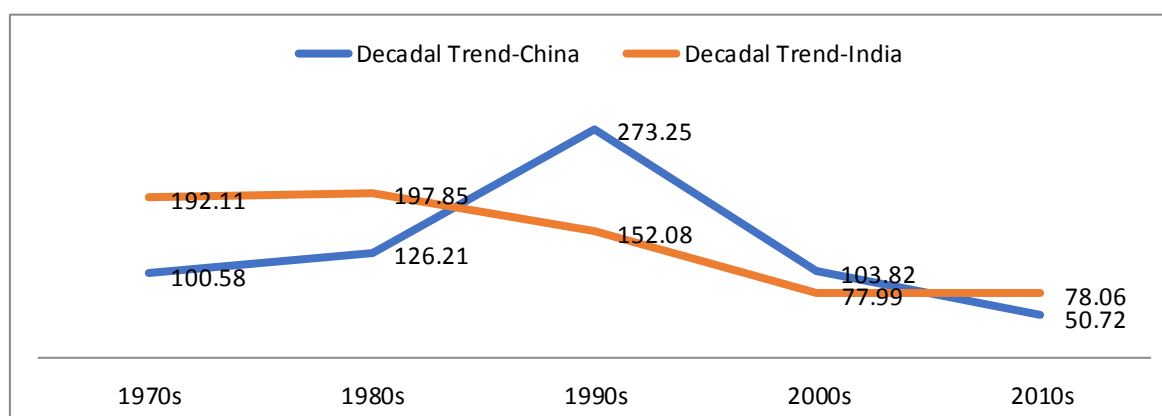


Figure 3. Decadal Growth Rate in Aqua Fish Production in China and India

Turning to the growth trend-year wise in aquatic fish production in China, it is obvious that the growth rate had been slow during the early period from 1960 to 1980 (Table 3). Thereafter, it has starting gaining momentum, and of course, according to the latest information, China has become the world leader in it(Fig. 4). It is fascinating to note that since 1980 China has registered a steady and continuously increasing trend in the production of Aquatic fish.

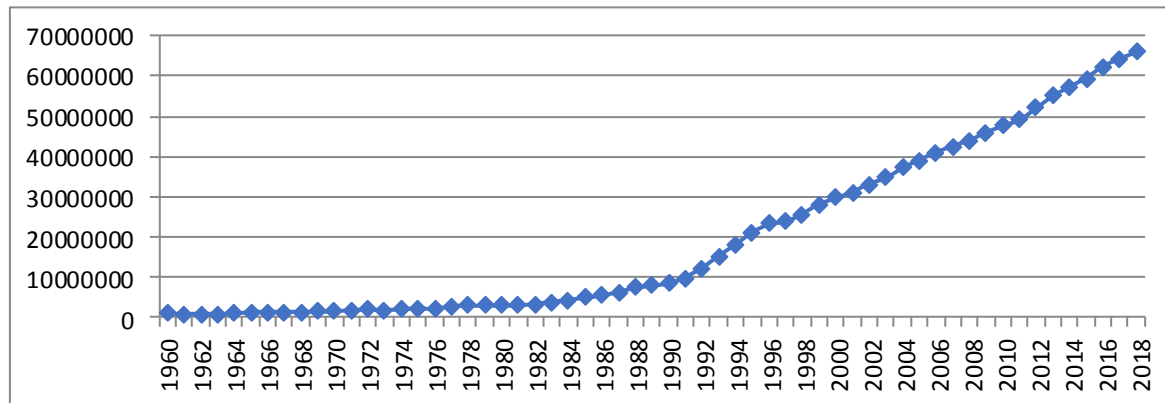


Figure 4. China (Aqua Production in MT)

Coming to the case of India, it would be interesting to observe that although India has started recording an increasing trend in Aqua fish production since 1974, there has been volatility in its growth rate (Fig. 5). Nonetheless, overall trend has still been that of increasing one for India as well. In fact, there is little surprising in it as China and India have been the global leaders with first and second position respectively in the realm of aqua fish production.

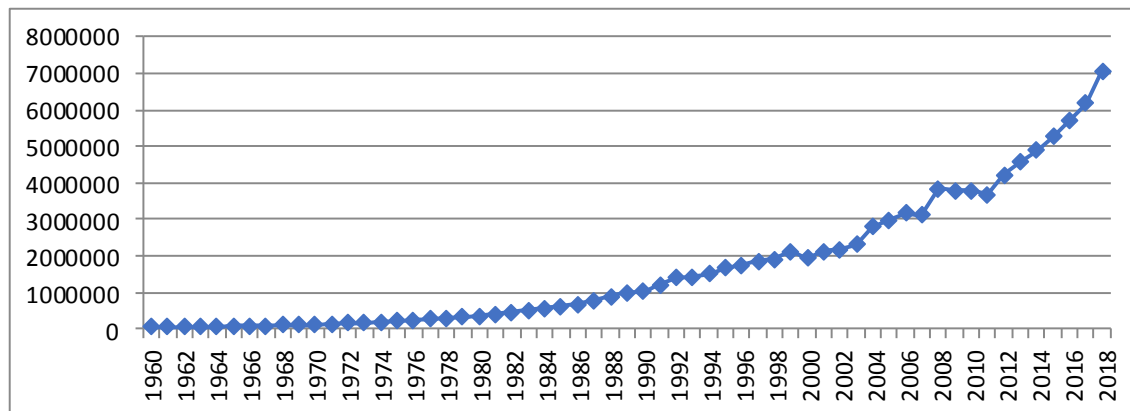


Figure 5 India (Aqua Production in MT)

The difference in variation in the growth trend of total fisheries production in India has been much more pronounced compared to that of China. It could be observed that from mid 1980s to mid-1990s, China exhibited a relatively stable and continuous jump in fisheries production whereas India showed much variation in the long term trend. Further, it is worthwhile to note that the variation in the growth trend has been there in India ever since 1960, the starting period of the present study (Fig. 6). In fact, the variation in growth has intensified in recent times albeit the existence of a pretty persistent increasing trend. Since government policies, socio-economic circumstances and climate change influence the volume of fish catch, it is obvious that the variation in the growth trend of fisheries production in both countries could well be due to these factors. Nevertheless, a search into such factors does not come under the purview of the discussion of this paper.

Table 3 Aqua Fish Production in India and China During the period 1960-2018

Year	China (Aqua Production)	India (Aqua Production)	Year	China (Aqua Production)	India (Aqua Production)
1960	9,58,506	44,843	1990	8,392,965	1,017,136
1961	7,77,762	49,359	1991	9,695,110	1,225,261
1962	7,41,121	54,368	1992	12,185,159	1,395,444
1963	8,56,931	59,927	1993	15,221,669	1,416,702
1964	1,017,083	66,096	1994	18,213,586	1,519,528
1965	1,159,540	72,947	1995	21,152,498	1,658,807
1966	1,320,775	80,561	1996	23,465,788	1,758,739
1967	1,315,911	89,022	1997	23,747,400	1,864,322
1968	1,306,208	98,471	1998	25,671,892	1,908,485
1969	1,513,849	1,09,321	1999	28,000,956	2,134,814
1970	1,480,670	1,21,671	2000	29,749,708	1,942,531
1971	1,790,968	1,36,697	2001	31,102,502	2,120,634
1972	1,987,611	1,53,958	2002	33,160,272	2,189,445
1973	1,823,366	1,73,080	2003	34,891,716	2,316,947
1974	1,975,622	1,92,321	2004	37,172,412	2,804,362
1975	2,157,727	2,13,817	2005	38,943,268	2,973,126
1976	2,106,125	2,38,123	2006	40,911,092	3,182,817
1977	2,788,044	2,64,948	2007	42,530,160	3,114,762
1978	2,987,334	2,94,854	2008	44,072,888	3,855,763
1979	2,901,626	3,28,082	2009	46,062,876	3,798,842
1980	3,105,342	3,65,180	2010	47,789,756	3,790,021
1981	3,033,775	4,06,622	2011	49,147,608	3,677,584
1982	3,258,008	4,52,939	2012	52,082,584	4,213,980
1983	3,657,489	5,04,733	2013	55,029,056	4,555,209
1984	4,271,240	5,72,000	2014	57,320,504	4,893,002
1985	5,026,016	6,33,250	2015	59,368,940	5,263,002
1986	5,606,227	6,86,260	2016	62,318,376	5,702,002
1987	6,325,967	7,88,310	2017	64,358,480	6,184,869
1988	7,376,299	8,93,330	2018	66,135,060	7,071,302
1989	8,101,298	1,004,500			

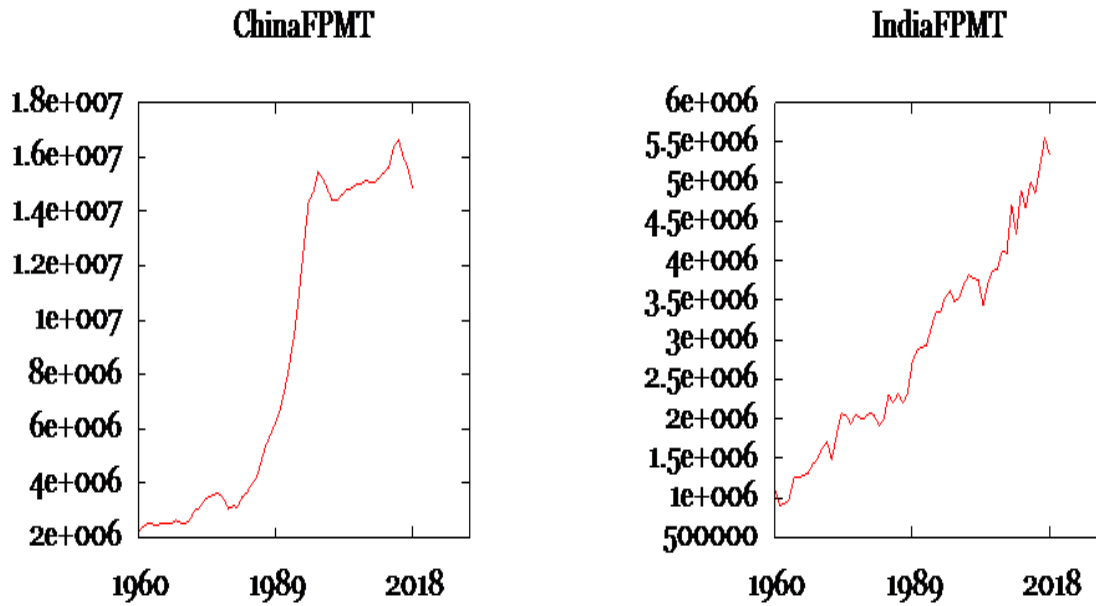


Figure 6 Trend in Fisheries Production in Metric Ton in both India and China

Further, the difference in variation of the growth has also been discernible in the Aquaculture fish production as well. While China's long term growth has been steadier and steeper during the period under this study, India has shown relatively much pronounced volatility particularly in the second of the 1990s and first half of the 2000s. But in later part of the 2010s, the volatility in growth trend in respect of aqua production in India seems have been disappeared (Fig. 7).

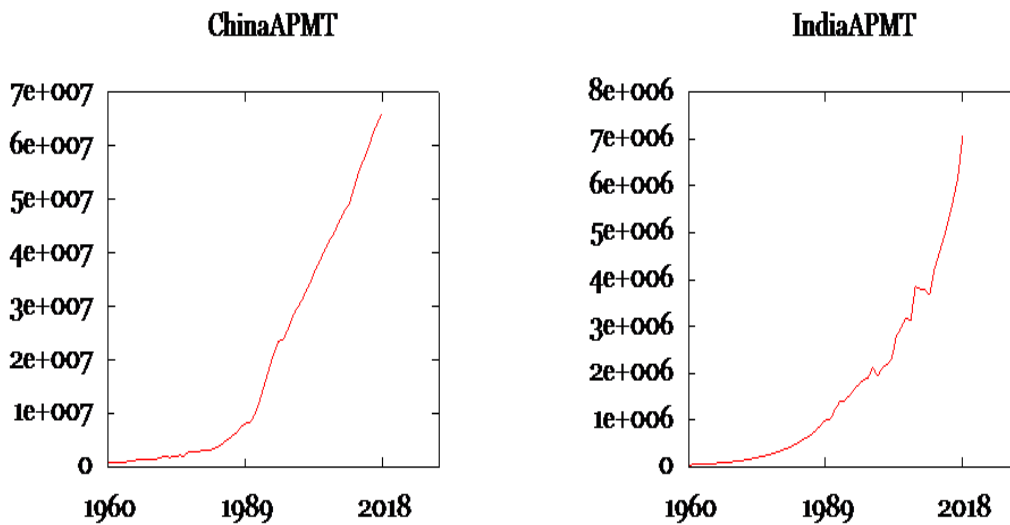


Figure 7. Trend in Fisheries Production in Metric Ton in both India and China

CONCLUSION

The China's hegemony in fish production remains unquestioned. This is evident from the fact that although growth wise there has been a little variation, China continues to have a better position in the case of total fish production particularly aquaculture production. The difference in fish production between India and China got widened in 1980s and 1990s but in 2000s and 2010, it narrowed down. Although China has had a little edge over India in the fish production during the period 1960-2018, India has made remarkable accomplishment over China in recent times. When it comes to 2010s, in aquaculture production India appears to have made a turnaround relative to the growth rate of China. It is obvious that in 2010s, India registered a growth rate of 78 percent almost the same as in 2000s while China's decadal growth rate went down further to a little over 50 percent. However, the difference in variation in the growth trend of total fisheries production in India has been much more pronounced compared to that of China. The difference in variation of the growth has also been discernible in the aquaculture production as well. While China's long term growth has been more steady and steep during the period under this study, India has shown relatively much pronounced volatility particularly in the second of the 1990s and first half of the 2000s. But in later part of the 2010s, the volatility in growth trend in respect of aqua production in India seems have been disappeared.

Acknowledgments: The first author is thankful to DST- SERB, Government of India for sanctioning Core Research Grant for funding this research work.

REFERENCES

- Adeleke, B. ; Robertson-Andersson, D., Moodley, G. and Taylor, S.** (2020). Aquaculture in Africa: A Comparative Review of Egypt, Nigeria, and Uganda Vis-À-Vis South Africa. *Reviews in Fisheries Science & Aquaculture*, pp.167-197.
- Ayyappan, S. and Krishnan, M.** (2004). Fisheries Sector in India: Dimensions of Development. *Indian Journal of Agriculture Economics*, pp.391-412.
- Beatrice Crona, E. W.** (2020). China at a Crossroads: An Analysis of China's Changing Seafood Production and Consumption,. *One Earth*.
- Club, E. S.** (2018). EU Science Club. Retrieved July 13, 2021, from How much fish do we consume? First global seafood consumption footprint published: <https://ec.europa.eu/jrc/en/news/how-much-fish-do-we-consume-first-global-seafood-consumption-footprint-published>
- FAO.** (2018). *Globefish: Monthly Trade Statistics*. GLOBEFISH.
- FAO.** (2020). *The State of World Fisheries and Aquaculture*. Rome: FAO, United Nations.

- Gopakumar, K.** (2003). Indian Aquaculture. *Journal of Applied Aquaculture*, 1-12.
- Ritchie, H.** (2019, September 13). Our World in Data. Retrieved July 12, 2021, from <https://ourworldindata.org/rise-of-aquaculture>
- Telegraph.** (2021, July 12). India ranks No. 2 in fish production - but No. 1 China is ten times bigger. *The Telegraph Online*.
- Yan, J. and Gao, G.** (1996). *Turbulent Decade: A History of the Cultural Revolution*. Hawaii: University of Hawaii Press.
- Zhao, W. and Shen, H.** (2016). A statistical analysis of China's fisheries in the 12th five-year period. *Aquaculture and Fisheries*, 41-49.
- Zheng, H.; Shang, M. and Zhao, X.** (2020). Chinese policy on fishery insurance: Evolution, characteristics and challenges. *Marine Policy*.