

# Inflation in Marine Fish Price in India: Analysis Using Ex- Vessel Price Indices

Aswathy.N\* and R. Narayanakumar

Socio-Economic Evaluation and Technology Transfer Division

Central Marine Fisheries Research Institute, Kochi-18, Kerala, India 682 018.

\*Corresponding author email id: aswathy.icar@gmail.com

**Abstract** – Inflation in general and food inflation in particular greatly affects the poor as they spend a large share of their income on food. Analysis of food inflation helps to develop strategies for improving the supply- demand situation. The inflation in marine fish prices were analyzed by developing an aggregate marine fish price index based on the ex-vessel prices of 22 marine fish groups for the period 1995-2014. The growth in landings and value of marine fish in India for the period 1995 to 2014 was also analyzed using compound annual growth rates. The aggregate price index showed the highest increase during 2005-2014 period (129.42%) when compared to 1995-2004 period (106.16%). The compound annual growth rate of marine fish landings was 0.68 % during 1995-2004 period and 5.43 % during 2005-2014 period. The gross value of marine fish deflated based on wholesale price indices (WPI) showed that the growth in real values of marine fish was higher during 2005-2014 period when compared to 1995-2004 period.

**Keywords** – Compound Growth Rate, Ex-vessel price index, Inflation, Real value, Nominal value

## I. INTRODUCTION

The marine fish landings in India had increased from 2.16 million tonnes in 1990 to 3.74 million tonnes in 2014 and the country had exported 10.5 lakh tonnes of marine products worth USD 5.5 billion in 2014-15. Fifty six percent of the population are fish eaters in India (Planning commission, Government of India, 2001)[14] and the per capita availability of fish to the fish eating population is 8.49 kg only when compared to the global average of 19.2 kg.

Global food prices witnessed a very sharp increase from the year 2007 onwards. Seafood contributes 15% of animal protein consumption to three billion people in the world and the global seafood prices also showed continuous increase over the years with growing demand, urbanization and reductions in supply. Fish was not included under the food price index calculation of FAO and to overcome this lacuna, FAO has developed a global fish price index based on the trade statistics of different countries. The global fish price index rose by 15 points in 2013 when compared to 2012 and the major contributors to this rise were tuna, shrimps and salmon (FAO, 2013)[7]. An abnormal and persistent increase in real food prices is one of the major indicators of food crisis in an economy. The rise in food prices will have an impact on poor people in the developing countries as the poor spend a large share of their income on food. As per NSSO report (2011) [13] an average household in India spends almost half of its expenditure on food, and poor around 60%.

In India also the food prices showed a continuing

Inland and marine fishes recorded the maximum price rise among the non-vegetarian items. Food price inflation occupies a significant role in general inflation level in India. (Anand *et al.*, 2014[1]; Walsh, 2011[21]). In India, the wholesale price index (WPI) is the main measure of inflation. The items included in the WPI were Primary Articles (20.1 % of total weight), Fuel and Power (14.9 %) and Manufactured Products (65 %). Among the individual food items, milk (3.23), rice (1.79) wheat (1.11) and marine fish (0.72) occupy the highest weights.

Several studies pointed out the deficiencies of wholesale price index (WPI) calculations used in India and suggested to improve the indices by converting wholesale price index to producer price index. The WPI used in India is neither a producer price index nor a consumer price index (Misra and Roy, 2011[12], Bhattacharya and Gupta, 2015[3]). Wholesale price index calculations in India are based on a mix of wholesale, retail and producer prices. In this context, the present study attempted to develop a Marine Fish Price Index (producer price index) based on the ex-vessel prices received by the fishermen for different species of fishes at landing centres to analyze the inflation in marine fish in the country. Growth trends in production and real value of marine fish at landing centre level were also worked out. The fish price index will help to analyze the rate of inflation in marine fish and to develop policies for fish production, pricing and trade.

### Food price index

The FAO Food Price Index is a measure of the monthly change in international prices of a basket of food commodities. It consists of the average of five commodity group price indices (representing 55 quotations), weighted with the average export shares of each of the groups for 2002-2004 (FAO, 2013)[13].

The Fish price index (FPI) developed by Tveteras *et al* used Paasche index based on the import prices of different seafoods traded internationally. The Fish price index showed less volatility and fewer price spikes than other food price indices including oils, cereals, and dairy (Tveteras *et al*, 2012)[20].

The Ministry of Commerce and Industry, Government of India publishes the monthly wholesale price index (WPI) for all commodities in India, based on Laspeyres index in which the base year is revised every five to ten years (Ministry of commerce and industry, Government of India, 2012)[11]. The WPI measures the changes in wholesale prices of a representative basket of goods whereas the producer price index measures the changes in prices received by the domestic producers for their output. In the present study the aggregate marine fish price index (producer price index) is developed based on the annual

average ex-vessel prices at landing centres using Paasche index. The ex-vessel price refers to the price received by the harvester for fish, shellfish, and other aquatic plants and animals.

## II. METHODOLOGIES

The secondary data on species wise prices and values of marine fish for the period 1995 to 2014 were used for the analysis. Data were obtained from various publications of CMFRI (Sathiadhas, 1998[16], Sathiadhas and Kanagam,[18] 2000, Sathiadhas and Hassan[17], 2002, Sathiadhas et al, 2012[19], CMFRI annual reports 2012-13[4], 2013-14,[5] 2014-15[6]). The species wise landings of marine fish obtained from annual reports of CMFRI. The growth in quantities and values of marine fish landings were estimated for the period 1995 to 2014 using compound annual growth rate. The real values of marine fish production was computed by deflating nominal values using wholesale price index (2004=100) published by Govt. of India.

The Compound Annual Growth Rate (CGR) is worked out from the equation,

$$Y = ab^t \quad (1)$$

Where Y denotes year wise landings / value of landings t is the time in years

$$CGR = (\text{antilog } b - 1) * 100 \quad (2)$$

The inflation in marine fish price was analyzed by constructing price index. Price index consolidates price and quantity information of several commodities into a single number (FAO, 2013[13]). The producer price index refers to price received by the producer for the total quantity produced or sold. The producer price indices are important for economic analysis and policy decisions.

The weighted aggregate price index for marine fish was worked out for the period 1995 to 2014 using Paasches price index. The marine fish production consists of a multi species catch and hence the annual average prices of individual species were used to arrive at the aggregate price index of marine fishes. Following standard criteria for selection of base year, the year 2004 was chosen as base year. The marine fish varieties were grouped into 22 items consisting of sharks, rays, catfishes, croakers, oilsardines, other clupeids, mackerels, seerfishes, pomfrets, rockcods, snappers, pigfacebreams, threadfinbreams, goatfishes, barracudas, tunnies, ribbonfishes, lizard fishes, silverbellies, penaeid prawns, non penaeid prawns, cephalopods which contribute 80% of the total marine fish catch was used for developing the price index. The weighted aggregate ex-vessel price index (producer price index) for marine fish production using Paasche index is constructed as follows.

$$I_P = \frac{\sum_{i=1}^n P_{it} Q_{it}}{\sum_{i=1}^n P_{i0} Q_{it}} \quad (3)$$

Where  $I_p$  is the value of the Pasche price index at time period  $t$   $i=1, 2, 3 \dots n$

$n$  = number of items under consideration

$Q_{it}$  is the quantity of item  $i$  at time period  $t$

$P_{it}$  is the price received by the fishermen for commodity  $i$  at time period  $t$

$P_{i0}$  is the price of the commodity  $i$  at the base period

The time period selected was 1995 to 2014 with 2004 as base year.

## III. RESULTS AND DISCUSSION

### 1. Growth in marine fish landings, nominal and real values of fish production

The total marine fish production in India increased from 2.25 million tonnes in 1995 to 2.29 million tonnes in 2005 and then to 3.74 million tonnes in 2014. Decadal variation in growth in marine fish landings showed that the growth was less during 1995-2004 period (0.68%) when compared to 2005 to 2014 period (5.43 %). Species wise analysis of growth showed that oilsardines, threadfin breams and ribbon fishes showed the highest growth in landings during 1995-2004 period whereas lizardfishes, silver bellies barracudas, mackerels and cephalopods showed highest growth in landings during 2005-14 period (Table I). The growth in nominal and real values of marine fish worked out for different periods during 1995 to 2014 are presented in Table II. The growth in value of marine fish landings was more during 2005 - 2014 period when compared to 1995-2004 period. The value of marine fish landings showed a CGR of 9.42 % in nominal terms and 4.39% in real terms during 1995-2004. During 2005-14 period the growth was 11.95% in nominal terms and 4.8 % in real terms (Table II). Most of the resources showed positive growth in real value during 2005-14 period whereas growth was negative for sharks, rays, silverbellies, mackerels pigfacebreams and cephalopods during 1995-2004 period. The growth in real terms was highest for oilsardines(24.11%) during 1995-2004 whereas threadfinbreams(19.87%) recorded the highest growth in real value during 2005-14.

Table I. Species wise growth in marine fish landings and value(CGR%)

Name of fish	Growth in landings		Growth in real value	
	1995-2004	2005-2014	1995-2004	2005-2014
Sharks	-3.07	-3.04	-0.73	0.28
Rays	-0.93	3.32	-7.88	10.42
Catfish	4.31	4.49	2.32	10.06
Croakers	-4.64	4.20	2.77	11.69
Oil Sardines	19.68	6.28	24.11	9.66
Mackerel	-8.72	4.61	-0.23	9.47
Other clupeids	-1.57	5.43	2.07	8.78
Seer fish	1.83	-1.22	7.51	2.36
Pomfrets	-1.07	0.58	4.68	4.95
Reefcod	5.24	8.97	6.64	11.71
Snappers	4.20	4.26	6.95	5.90
Pigface breams	-0.48	3.37	-2.32	13.94
Threadfin breams	5.89	7.51	7.57	19.87
Goat fishes	3.05	2.98	3.24	5.46
Barracudas	0.52	8.45	0.98	11.17
Tunnies	3.12	4.84	0.96	13.90
Ribbon fishes	5.29	1.62	7.59	11.64
Lizard fish	1.33	8.36	5.76	14.03
Silver bellies	-2.77	9.18	-2.55	16.07
Penaeid prawns	0.01	2.56	6.39	0.65
Non penaeid prawns	-1.83	3.62	3.18	3.03
Cephalopods	-0.07	7.02	-1.86	7.99

Table II. Growth in catch, nominal and real values of marine fish in India 1995 – 2014  
CGR (%)

Particulars	1995-2004	2005-14
Growth in landings	0.68	5.43
Value at landing centre (Nominal value)	9.42	11.95
Value at landing centre (Real Value)	4.39	4.80

## 2. Marine fish price index

The aggregate marine fish price index (producer's price index) is influenced by both quantities and prices of different species of fishes. The inflation in marine fish prices was higher during 2005-14 (129.42%) than 1995-2004(106.16%) period. The inflation in fish prices even with growth in fish production during 2005-14 indicated the existence of supply-demand gap in the marine sector in the country.

In India, the general food price inflation was the maximum during the 1990<sup>s</sup> when the country had a balance of payment crisis. Thereafter the food prices showed the highest rise from 2006 onwards. Misra and Roy (2011)[12] reported that fish is included under the top five contributors of food inflation in India from 1998 onwards. The analysis of food inflation by Chand *et al* (2011)[15] also indicated that the food prices were spiraling up from mid 2008 onwards in India. The shortages in food supply, rising international prices, large price spread of high value commodities, increased money supply and structural changes in demand patterns were cited as the main reasons of food inflation. Gulati and Saini(2013)[9] reported that the food inflation in India averaged at 10 % from 2008 to 2012 and the pressure on prices is more on protein foods (pulses, milk and milk products, eggs, fish and meat) as well as fruits and vegetables, than on cereals and edible oils, during 2004 to 2012.

The trade reforms initiated in the 1990<sup>s</sup> has favoured the external trade of marine products. The frozen finfish export from India increased from 1 lakh tonnes in 1995-96 to 3.09 lakh tonnes in 2014-15(www.mpeda.gov.in). The marine fish once considered as the poor man's food is now a highly priced item in the Indian market. Varieties like pomfrets and seer fishes having high consumer preference moved to the high valued chains and became dearer to most of the domestic consumers in the country. Apart from this, the increased demand for non- food uses like fish meal and feed for aquaculture sector resulted in the price rise for low value fishes also (Aswathy *et al*, 2011[2], Sathiadhas *et al*, 2012[19]).

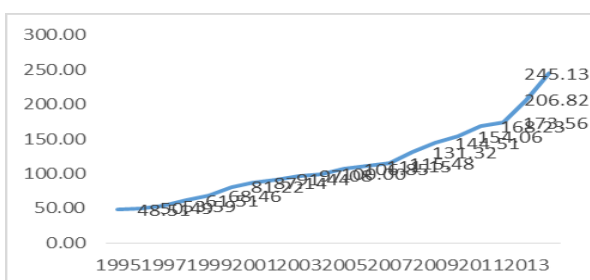


Fig. 1. Growth in aggregate marine fish price index in India during 1995-2014

## IV. CONCLUSION

The aggregate fish price index is influenced by the quantities and prices of different species of fishes. The price of marine fish is very much depended on its demand. The peak in marine fish inflation during 2005-14 period as evidenced from the fish price indices may be due to the shifts in consumption towards high protein foods with economic progress in the country. The inflation during 2005-2014 period even with overall growth in total landings indicated the demand- supply gap existing in the sector. The aggregate marine fish price index (producer price index) is an indicator of the inflationary pressures on fish eaters in the country. As many of the marine fish varieties are now exported, it also indicates the inflationary pressures on fish importing countries. As there is limited scope for increasing the capture fisheries production, the marine fish price inflation necessitates the need for augmenting marine fish production through mariculture activities to bridge the demand- supply gap to meet the growing demand from domestic and export markets.

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## REFERENCES

- [1] Anand, Rahul, Ding Ding, and Volodymyr Tulin. "Food Inflation in India: The Role for Monetary Policy," IMF Working Paper 14/178. 2014 (Washington: International Monetary Fund).
- [2] Aswathy, N., Sathiadhas, R, Narayanakumar, R and Shyam, S Salim, *Marketing and utilization of marine by catch: Problems and prospects. J. of Fish. Econ. and Development*, 2011, 12 (2). pp. 1-8.
- [3] Bhattacharya, R and Abhijit Sen Gupta, *Food Inflation in India: Causes and Consequences Working Paper No.151*, June 2015 National Institute of Public Finance and Policy New Delhi Available: www.nipfp.org.in.
- [4] CMFRI annual report 2012-13, Central Marine Fisheries Research Institute, Kochi. 2013
- [5] CMFRI annual report 2013-14, Central Marine Fisheries Research Institute, Kochi. 2014
- [6] CMFRI annual report 2014-15, Central Marine Fisheries Research Institute, Kochi. 2015
- [7] FAO, *Food outlook, Biannual report on global food markets*. Trade and markets division, Food and Agriculture Organization of the United Nations. 2013, 139 pp.
- [8] FAO, *Manual on agricultural price index numbers*. FAO economic and social development paper 74, Food and Agriculture Organization of the United Nations. 1988, 45 pp.
- [9] Gulati, A and Shweta Saini, *Discussion Paper No. 4, Taming food Inflation in India*. Commission for agricultural costs and prices, Department of Agriculture & Co-operation, Ministry of Agriculture, Government of India.2013, 32 pp.
- [10] Joshi, P. K., Pratap Singh Birthal and Nicholas Minot, *Sources of Agricultural Growth in India: Role of Diversification towards High Value Crops. MTID Discussion Paper No. 98*. 2006. Washington, D.C., International Food Policy Research Institute.
- [11] Ministry of Commerce and Industry, *Manual on wholesale price index*. Office of the economic advisor, Government of India.

- 2012, 4 pp.
- [12] Mishra, Prachi and Roy, Devesh, Explaining Inflation in India: The Role of Food Prices: IMF and IFFPRI, Washington, D. C.2011
- [13] NSSO, Key Indicators of Household expenditures in India, 2009-2010, NSS 66th Round, National Sample Survey Organization. Central Statistical Organization. Ministry of Statistics and program Implementation, Government of India, New Delhi, 2011
- [14] Planning Commission, *Report of the Working Group on Fisheries for the Tenth Five Year Plan*, Government of India. 2001; 185pp (<http://planningcommission.nic.in>).
- [15] Ramesh Chand, Ashok Gulati, Shinoj, P. and Kavary Ganguly, Managing food inflation in India: Reforms and policy options. *Policy Brief No. 35*, National Centre for Agricultural Economics and Policy Research, New Delhi. 2011; 6 pp.
- [16] Sathiadhas, R., *Marine Fisheries in Indian Economy*. In: Balachandran, K. K Iyer, T. S. G., Madhavan, P. Joseph, J., Perigreen, P. A., Raghunath, M .R. and Varghese, M. D.,(Eds.) *Advances and priorities in fisheries technology*. Society of Fish Technologists (India), Kochi. 1998; pp. 463-472.
- [17] Sathiadhas, R and Hassan, F, Product diversification and promotion of value added sea food products. *Seafood Export Journal*. 2002; 33 (8 & 9): 27-42.
- [18] Sathiadhas, R and Kanagam, A, *Distribution problems and marketing management of marine fisheries in India*. In: Pillai, V N and Menon, N G, (Eds.), *Marine Fisheries Research and Management*. CMFRI; Kochi. 2000; pp. 858-875.
- [19] Sathiadhas, R Narayanakumar, R and Aswathy, N, *Marine Fish Marketing in India*,. CMFRI, Kochi, 2012; 276pp.
- [20] Tveteras S., Asche F., Bellemare M.F., Smith M.D., Guttormsen A.G., Audun Lem, Kristin Lien and Stefania Vannuccini, Fish is Food - The FAO's Fish Price Index. *PloS one*. 2012, 7(5) ([www.plosone.org](http://www.plosone.org)).
- [21] Walsh, James, "Reconsidering the Role of Food Prices in Inflation," IMF Working Paper 11/71. 2011 (Washington: International Monetary Fund).

**Fields of research:** Fisheries / Agricultural Production economics, Natural Resource Economics, Valuation of Ecosystems, Marketing and price analysis, Resource use efficiency analysis in marine fisheries

**Major publications:**

1. Valderrama, Diego and Junning, Cai and Hishamunda, Nathanael and Ridler, Neil and Neish, Iain C and Hurtado, Anicia Q and Msuya, Flower E and Krishnan, M and **Narayanakumar, R** and Kronen, Mechthild and Robledo, Daniel and Gasca-Leyva, Eucario and Fraga, Julia (2015) The Economics of Kappaphycus Seaweed Cultivation in Developing Countries: A Comparative Analysis of Farming Systems. *Aquaculture Economics & Management*, 19 (2). pp. 251-277.
2. **Narayanakumar, R.** and M.Krishnan, 2011. Seaweed mariculture: An economically viable alternate livelihood option (ALO) for fishers" *Indian Journal of Fisheries*, 58 (1): 79-84.
3. **Narayanakumar, R** and Krishnan, M (2013) Socio-economic assessment of seaweed farmers in Tamil Nadu - A case study in Ramanathapuram District. *Indian Journal of Fisheries*, 60 (4). pp. 51-57

## AUTHOR'S PROFILE



**Dr. Aswathy Natarajan**

Place, DOB: Kochi, 21.05.1974

**Educational qualification:** Ph.D (Agricultural Economics), Tamil Nadu Agricultural University, Coimbatore (2009), Tel. 91-484- 2394867.

**Present position:** Senior Scientist, Socio Economic Evaluation and Technology Transfer Division,

Central Marine Fisheries Research Institute, Kochi-18, Kerala, India

**Fields of research:** Marine fisheries / mariculture economics, Total factor productivity, Marketing and price analysis, Resource use efficiency and bio economic analysis in marine fisheries

**Major publications:**

1. **N. Aswathy, R. Narayanakumar** and N. K. Harshan, ICAR-Central Marine Fisheries Research Institute, Kochi - 682 018, Kerala, India, Performance of marine fishing industry in Karnataka : An analysis using total factor productivity, *Indian J. Fish.*, 63(1) : 89-94, 2016
2. **Aswathy, N** and Narayanakumar, R and Harshan, N K (2014) Marketing costs, margins and efficiency of domestic marine fish marketing in Kerala. *Indian Journal of Fisheries*, 61 (2). pp. 97-102.
3. Sathiadhas, R and Narayanakumar, R and **Aswathy, N** (2012) *Marine Fish Marketing in India*. CMFRI Kochi, Ernakulam. ISBN 978-81-901219-8-9



**Dr. Narayana Kumar Ramani**

Place, DOB: Palanganatham, Madurai, India, 30.05.1965

**Educational qualification:** Ph.D (Agricultural Economics), University of Agricultural Sciences, Bangalore (1999)

**Present position:** Principal Scientist and Head-in-Charge, Socio-Economic Evaluation and Technology Transfer Division, Central Marine Fisheries Research Institute, Kochi-18, Kerala, India