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# SUPPLY-DEMAND ANALYSIS OF FISH IN INDIA

N. ASWATHY \*, T.R.SHANMUGAM\*\*, AND K.R.ASHOK\*\*

## ABSTRACT

The economic growth, population pressure and changes in the dietary pattern have contributed to the increase in demand for animal origin foods in India. The fish prices had increased many times than all other food items over the years. An analysis of fish demand and supply situation in India is done and projections were made for the year 2020. Price and income elasticities of fish demand were estimated using exponential function. Export demand and tastes and preferences of consumers were not included in the demand analysis. The fish supply was projected using trend extrapolation method. Estimates of demand model showed that the household expenditure on fish in general as elastic. The study revealed that with the projected population and percapita income growth rates, fish demand in year 2020 will exceed the total fish supply from marine, inland and aquaculture sectors with the current production trend.

**Key words :** supply, demand, elasticity, growth rate model, projections

## I. INTRODUCTION

India occupies third position in world fish production and second in aquaculture. Out of the 7.62 million tonnes of fish produced in the country in 2008-09, 2.98 million metric tonnes (mmt) is contributed by the marine sector and the rest by the inland sector. The country had exported fish products to the tune of 6.78 lakh tonnes worth Rs.10,000 crores in 2009-10 (MPEDA,2010). The economic growth, population pressure and changes in the dietary pattern have contributed to the increase in demand for animal origin foods. During 1980 to 2000, the per capita consumption of milk increased from 43 kg to 63 kg, where as fish from 3.5 kg to 5.8 kg, and of meat and poultry from 5 kg to 6.8 kg (Paroda and Kumar, 2000). At global level also the consumption of fish has doubled since 1973 and the developing world has been responsible for nearly all of its growth.

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\*Scientist(SS,)Socio-Economic Evaluation and Technology Transfer Division(SEETTD), Central Marine Fisheries Research Institute (Indian Council of Agricultural Research), Post Box No. 1603, Cochin-682 018, Kerala, e-mail: aswathysaji@rediffmail.com , aswathy.icar@gmail.com

\*\*Professors, Department of Agricultural Economics, Tamil Nadu Agricultural University, Lawley Road P.O, Coimbatore-641 003, Tamil Nadu, India.

Besides being used as food, fish is also increasingly demanded for use as feed. Over the past 30 years, fish has become more expensive relative to other food items as fish demand primarily from relatively wealthy consumers in developing countries is outstripping the supply. Based on the International model for policy analysis of agricultural commodities and trade (IMPACT model) projections on global fish supply and demand, fish is highly likely to become more expensive to consumers when compared with other food products over the next two decades and the share of aquaculture in world wide fish production is projected to increase from 31 to 41 per cent in 2020 (Delgado et al, 2003).

Consumers have experienced a long term increase in the real prices of fish produced from aquaculture, marine and inland sectors in India. Rising cost of low value food fish to the poor is an important policy concern. An analysis of the fish supply and demand situation in the country is essential for developing future strategies and options. The ultimate outcome of supply, demand and trade patterns is manifested in the price of a commodity. Prices are the best indicators for incentives to both producers, consumers and have important implications for food security. The present study is proposed with an objective of analyzing the existing structure of fish production and consumption in India with a view to make supply-demand projections to 2020.

The specific objectives of the present study are as follows :

- i) to analyze the existing structure of fish production and demand in India
- ii) to estimate the demand elasticities for fish and;
- iii) to make projections on supply and demand for the year 2020 and to suggest appropriate policy measures

## II. MATERIALS AND METHODS

Fish supply and demand projections were made for the year 2020 using demand elasticities and fish production growth rates. The demand analysis is based on percapita fish consumption statistics published by National Sample Survey Organization (NSSO) for the period 1999-2000. Export demand and tastes and preferences of consumers are not included in the demand analysis. The supply analysis is based on time series data on quantity of fish production and average fish price for the period 2000-2008 collected from Basic animal husbandry statistics.

***Demand model***

$$Y_t = b_0 P^{b_1} I^{b_2}$$

$Y_t$  - Quantity of fish consumption percapita over 30 days in kg

$P$  - Retail fish prices in rupees

$I$  - Income /expenditure in rupees

$b_1$  and  $b_2$  are price and expenditure elasticities respectively

***Demand projections under different scenarios***

Demand projections for 2020 were done using simple growth rate model

$$D = d_0 N_t (1 + y)^e \quad (\text{Dastagiri, 2004})$$

Where  $D$  is the demand for the commodity in year  $t$

$d_0$  is the percapita demand of the commodity in the base year

$y$  is the growth in per capita income

$e$  is the expenditure elasticity for the commodity

$N_t$  is the projected population in year  $t$

***Fish supply projections***

Supply of marine fish is affected by fish prices, fishing technology, quantities and prices of inputs and the inherent capacity of stocks of individual species. The inland fish production is affected by quantities and prices of inputs like fertilizer, labour and supply of fish seed. Since time series data on quantities and prices of inputs and outputs in marine and inland sectors are not available, the fish supply is projected with trend extrapolation method using compound annual growth rate during the period 2000-2008.

The projected fish supply for the year 2020( $Y_t$ ) is obtained from the following equation,

$$Y_t = Y_0 \times (1 + r)^t$$

Where  $Y_t$  is the year for which fish supply is to be projected

$Y_0$  is the initial year(2008)

and ' $r$ ' is the Compound Growth Rate(CGR)

**III. RESULTS AND DISCUSSION*****Changes in the structure of fish production in India***

Fish production in the country increased from 0.75 million tonnes in 1950-51 to 7.62 million tonnes in 2008-09 and there was a structural shift in the contribution from marine sector to inland sector during this period. The contribution of the marine sector showed a gradual decline from 75.86 per cent in 1960-61 to 39.11 per cent in 2008-09-08. The inland fish production increased from 0.22 million tonnes (29.33 per cent) in 1950-51 to 4.64 million tonnes (60.89 per cent) in 2008-09 (Table.1).

**Table 1 - Changes in the structure of fish production in India  
(in million tonnes)**

Year	Marine	Inland	Total
1950-51	0.53 (70.67)	0.22 (29.33)	0.75 (100)
1960-61	0.88 (75.86)	0.28 (24.14)	1.16 (100)
1970-71	1.09 (61.93)	0.67 (38.07)	1.76 (100)
1980-81	1.55 (63.52)	0.89 (36.48)	2.44 (100)
1990-91	2.3 (59.89)	1.54 (40.10)	3.84 (100)
1999-2000	2.83 (50.00)	2.83 (50.00)	5.66 (100)
2004-05	2.8 (44.00)	3.5 (56.00)	6.3 (100)
2005-06	2.8 (44.00)	3.7 (56.00)	6.6 (100)
2006-07	3.02(44.02)	3.84(55.98)	6.86(100)
2007-08	2.92(46.87)	4.2(53.12)	7.12(100)
2008-09	2.98(39.11)	4.64(60.89)	7.62(100)

(Source: Department of Animal Husbandry, Dairying and Fisheries, Government of India)

### ***Demand supply projections in India***

The results of the demand analysis showed that expenditure elasticity (1.0697) for fish in general is elastic. The price elasticity of fish demand (-1.3068) was negative (Table 3). The projected population in the year 2020 is 1,342 million (Expert group on population projections, Government of India, 1996). At a moderate GDP growth of 5 per cent with a population growth of 1.3 %, the per capita income growth in the country will be 3.7 per cent (Table 2). The fish demand for 2020 projected using the growth rate model, under the assumptions of a GDP growth of 5% and atleast 50 % of the population consuming fish will be 13.30 million tonnes. Madan Mohan Dey et al (2004) projected the expenditure elasticity of fish demand in India as 1.6 using the

Asia Fish model. Kumar and Dey (2004) analysed the responsiveness of demand for fish to changes in price and income across income classes, regions and urbanization in India. The results showed that own-price elasticity of demand for fish is high and has not shown any signs of decline during the last 15 years. Kumar *et al* (2005) projected the domestic demand for fish by 2015 at 6.7-7.7 million tonnes and the estimated price and income elasticities of demand vary across species and income classes. The own-price elasticities by species have been found negative and near to unity.

**Table 2 Population and percapita income growth rates**

Scenario	GDP growth (%)	Population growth (%)	Percapita income growth (%)
Low	4	1.3	2.7
Moderate	5	1.3	3.7
High	7	1.3	5.7

**Table 3 Estimates of demand function**

Particulars	Estimates
Intercept	2.8929
Expenditure elasticity	1.0697**
Own price elasticity	-1.3068**

R<sup>2</sup>- 0.77

(\*\* - significant at one per cent level)

The compound annual growth for marine fish production during the period 2000-2008 was 2.40 per cent and for inland sector was 3.07 per cent. The overall fish production in the country showed an annual compound growth rate of 2.79 per cent. The Maximum Sustainable Yield (MSY) of the fish stocks from the Indian EEZ has been assessed as 3.91 million tonnes (Sudarsan *et al.*, 1990). The projected fish production in inland sector, assuming a constant technological growth is at 5.44 mmt. With the current rate of production growth in marine fisheries sector, the Maximum Sustainable Yield of 3.91 million tonnes will be reached before 2020 itself. The overall fish production in the country in 2020 projected with the current growth in inland sector and the marine fish production at the MSY level will be at 9.35 million tonnes (Table 4). The results hence show a supply deficit of 3.95 million tonnes in 2020 when compared to the projected demand of 13.30 million tonnes.

**Table 4 Fish supply projections**

Particulars	CGR(per cent)		
	Marine	Inland	Overall fish production
CGR	2.40	3.07	2.79
Projected fish production(2020)	3.91	5.44	9.35

The supply -demand gap may cause fish prices to rise in the future unless fish supply situation in the country is improved through appropriate measures. As potential for harvesting from marine sector is almost reaching a plateau, measures to increase fish production through development and promotion of aquaculture and mariculture technologies is essential. Development of economically viable and sustainable production technologies together with investment in culture fisheries through public- private participation, promoting responsible and sustainable harvest strategies in the marine sector and efficient domestic value chain management are required for meeting the fish consumption demand in the future.

#### IV. CONCLUSION

According to projection made for 2020, the demand for fish is growing but there is supply deficit. Efforts have to be made to increase the aquaculture production as the prices of fish are likely to grow up in the future. The supply has to come necessarily from productivity as well as from aquaculture. The fish supply should be made available at all the centres of consumption so that the prices of fish would not increase.

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#### REFERENCES

- Dastagiri, M.B. (2004). "Demand and Supply Projections For Livestock Products in India". NCAP Policy Paper, 21. National Centre For Agricultural Economics and Policy Research, New Delhi.
- Delgado, C.L., Nicholas Wada, Mark. W. Rosegrant, Siet Meijer and Ahmed, M., (2003). *Outlook For Fish to 2020 - Meeting Global Demand. A 2020 Vision for Food, Agriculture and the Environment Initiative*. International Food Policy Research Institute, Washington DC, USA and World Fish Centre, Penang, Malaysia.
- Government of India, (1996). *Population Projections For India and States. Report of Technical Group on Population Projections*. Planning Commission, New Delhi.
- Kumar Praduman, M. Dey Madan and J. Paraguas Ferdinand, (2005). "Demand For Fish by Species in India: Three-stage Budgeting Framework". *Agric. Econ. Res. Rev.*, 18 (2):167-188.
- Kumar Praduman and M. Dey Madan, (2004). A Study on Modeling of Household Demand for Fish in India. *Indian J. Agric. Econ.*, 59(3): 465-475.



Madan M. Dey, U-Primo Rodriguez, Roehlano M. Briones, Chen Oai Li, Muhammad Sirajul Haque, University of Chittagong, Luping Li, Praduman Kumar, Sonny Koeshendrajana, Tai Shzee Yew, Athula Senaratne, Ayut Nissapa, Nguyen Tri Khiem and Mahfuz Ahmed, (2004). "Disaggregated Projections on Supply Demand and Trade For Developing Asia- Preliminary Results From Asia Fish Model". IIFET 2004 Japan Proceedings.

Paroda and Kumar, (2000), Food Production and Demand in South Asia, *Agric. Econ. Res. Rev.*, 13(1):1-24.

Sudarsan, D., M.E. John, and V.S. Somvanshi, (1990). "Marine Fishery Potential in the Indian Exclusive Economic Zone" - An Update. *Bull. Fish. Surv. India*, 20: 1-27. (Unpub) [www.mpeda.com](http://www.mpeda.com)