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Export performance of Indian ornamental fish - an analysis of growth, destination and diversity

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ABSTRACT

Ornamental fish trade is a multibillion dollar industry globally,with an annual turnover of more than 6 billion US$. India still remains a sleeping giant with a contribution of less than 1% of the global ornamental fish trade. The present study examines the export performance of Indian ornamental fish trade based on the data pertaining from 1991 to 2009. Fisheries exports form a lion's share (51% on an average) of GDP in fisheries sector. The share of ornamental fish exports to the total value of fisheries export has increased from 0.04% in 1991 to 0.15% in 2008. Indian ornamental fish export registered a higher positive compound growth rate of 14.4% in terms of export value, 12.1% in terms of quantity exported and 2.1% in terms of unit value. India can be considered as one of the gold mines for ornamental fishes considering the existing potential. One hundred eighty seven species are traded from India, of which 85% are collected from the wild. The new schemes of the Marine Products Export Development Agency (MPEDA) and research support can soon make India a major player in international ornamental fish trade thereby, greatly increasethe foreign exchange earnings, employment and rural livelihood.

Keywords: Compound growth rate, Export performance, India, Ornamental fish trade

Introduction

Globally, India is acknowledged as one of the richest and most diversified source for piscine fauna. With reference to ornamental fishes in India, the lagoons and coral reefs of Lakshadweep and Minicoy islands, Andaman and Nicobar islands, Okha- pin tan, Gulf of Kutch complex, coast of Kerala around Cape Comorin, Gulf of Mannar and Palk Bay is abound with highly attractive and varied species of ornamental fishes. India possesses at least 150 commercially important ornamental fish species.

Aquarium keeping as a hobby in India is nearly 70 years old and it began with the British who ruled India until 1947(Ayyappan*et al*., 2006).The concept of entrepreneurship development through ornamental fish farming is gaining popularity (Ayyappan*et al*., 2006).Therefore, more people are entering this lucrative business of culturing and breeding ornamental fishes. The cities like Kolkata, Mumbai and Chennai are the major breeding centres for freshwater ornamental fishes. Recently, Andhra Pradesh, Odisha, Kerala, Assam, Bihar and other states have also started producing ornamental fishes (Singh *et al*., 2008). Major chunk of these fishes is exported globally and it is the wild catches that form bulk of exports rather than the cultured ones. The overall domestic trade in this field cross ₹ 1000 lakhs and is reportedly growing at the rate of 20% per annum (NABARD). An estimate carried out by MPEDA shows that there are one million fish hobbyists in India (Ghosh*et al.,* 2003). Kolkata along with adjoining districts has become the major ornamental fish producing zones of India and a major export centre. About 90% of Indian exports are from Kolkata followed by 8% from Mumbai and 2% from Chennai. (Ghosh *et al.,* 2003). Ornamental fish industry in India seems to be rapidly growing and hence requires periodical evaluation of the export performance in order to boost its growth with appropriate policies. Hence this study was attempted to assess the export pattern of ornamental fish in India and also to analyse the performance of Indian ornamental fish trade in international market.

Materials and methods

Source of data

This study is based on the time series data pertaining to the period 1991 to 2009 compiled from various sources. All the values of export and imports are in US dollars to negate the effects of changes in exchange rate.

The data on toatl trade with respect to world, India as well as other top ranking countries werecollected from WTO statistical database published by World Trade Organisation (WTO). Data on ornamental fish trade was

collected from United Nations Commodity Trade Statistics Data Base (UN COMTRADE). Data for GDP (Gross Domestic Product) was collected from Department of Agriculture, Government of India.

Export pattern and performance

The export performance was calculated on the basis of methodology described by Kumar **(**2010). The performance of ornamental fish exports was calculated as it's percentage share to total fisheries exports, total agricultural exports and to total merchandise exports. The share of ornamental fish exports to fisheries GDP, agricultural GDP and total GDP; its share to agricultural exports as well as to total exports; and the share of agricultural exports to total exports were analysed in a similar manner for a period from 1991 to 2009.

Compound growth rate

Using Statistical Package for Social Science (SPSS) version16.0, based on the R square value, standard error of estimate and regression analysis by ANOVA, it was found that compound regression model gave the best fit not only to Indian ornamental fish exports but also to world ornamental fish exports and many other top ornamental fish exporting countries. Hence compound regression model was selected for the estimation of compound growth rate (Salim and Biradar, 2009).

The equation for compound regression model is:

$Y = b_0 * (b_1 * t)$ or $\ln(Y) = \ln(b_0) + (\ln(b_1) * t)$.

where, Y=estimated parameter

b_0=intercept

b_1= regression coefficient.

T= time variable

Compound growth rate (CGR) = $(b_1 - 1) * 100$.

Market destination

Top ten destination markets were selected based on mean performance and standard deviations for only seven years during the period 2003-2009, due to unavailability of data for all the analysed countries was used. Percentage market share of each of the top ten destinations were then calculated.

Results and discussion

Production and trade performance

Since 2001, there was a marked improvement in the export of ornamental fishes from India. In 2007, the export value was nearly US$ 3.8 million and marked the highest export value in the two decades spanning 1991-2009. The year 2009 recorded an export value of US$ 1.06 million. The fluctuations in export performance of ornamental fishes in India are shown in Table 1. The decadal performance through 2001-2009 shows improved export performance of ornamental fishes wherein the export values have always crossed US$ 1 million for all the years when compared to the preceeding decade *i.e.*, throughout the years 1991-2000.

Indian ornamental fish export accounted for about US$ 0.24 million in 1991 and US$ 2.10 million in 2008; whereas the total value of fisheries exports as a whole was US$ 579.3 million and US$ 1.3 billion in the respective years. Nevertheless, the share of ornamental fish exports to total value of fisheries export has increased from 0.04% t in 1991 to 0.15% in 2008, indicating a four fold increment as shown in Table 2. Even though there is a healthy growth in Indian ornamental fish exports, its contribution to the world ornamental fish export basket is less than 0.1%. There has been very less imports of ornamental fishes in India. The reasons may be due to the rich indigenous diversity of ornamental fish species meeting the domestic demands. At the same time fear that the introduction of exotic aquatic species will have some impacts like genetic contamination, disease introduction and ecological interaction with possible threat to native germplasm might have lead to fewer imports (DAHDF, 1999). For most of the years from 1991-2009, the trade balance resembled the export values, as imports were not reported or were negligible.

Even though the shares of ornamental fish exports to total exports, agricultural exports and fisheries exports are very small, it generally showed an increasing trend through the years from 1991-2009. The share of agricultural exports and fisheries exports to total exports is increasing at the rate of 5.63 times and 8.35 times respectively. Thus fisheries GDP is growing at a faster rate than total GDP and agricultural GDP. The share of agricultural GDP to total GDP is declining, whereas the share of fisheries GDP to agricultural GDP and thereby to total GDP is showing an increasing trend as shown in Fig. 1. Fisheries exports mainly contribute to fisheries GDP and this contribution is very much dissimilar when compared to total exports and agricultural exports with relevance to their respective GDPs. Total imports of India showed an increasing trend during 1991-2009 as per Table 1. However, the share of ornamental fish imports to total imports, agricultural imports, and fisheries imports is found to be negligible except for the year 1993, when India imported ornamental fishes worth US$ 1.17 million and it is reported as the highest ornamental fish import till date.

Growth rate in export of ornamental fish

The compound growth rate computed for ornamental fish exports of India, world and other top ten ornamental fish exporting countries in terms of export value, quantity and unit value are summarised in Table 3. World ornamental

Table 1. Pattern of ornamental fish imports and exports in India 1991-2009

Year	Ornamental fish exports (US$)	Ornamental fish imports (US$)	Trade balance (US$)
1991	240506	-	240506
1992	143894	4752	139142
1993	730337	1172035	-441698
1994	236950	94188	142762
1995	329035	33259	295776
1996	244175	7073	237102
1997	503932	-	503932
1998	590366	219	590147
1999	524931	360	524571
2000	641539	17438	624101
2001	1183592	2549	1181043
2002	1477617	-	1477617
2003	1950539	-	1950539
2004	1740368	-	1740368
2005	1162459	10656	1151803
2006	1119101	-	1119101
2007	3788391	24	3788367
2008	2108652	2756	2105896
2009	1065881	4533	1061348

Table 2. Share of ornamental fish exports to agricultural GDP and fisheries GDP

Year	Ornamental fish exports (US$)	Agricultural GDP (%)	Fisheries GDP (%)
1991	240506	0.0003	0.0212
1992	143894	0.0002	0.0102
1993	730337	0.0010	0.0433
1994	236950	0.0003	0.0121
1995	329035	0.0004	0.0148
1996	244175	0.0003	0.0074
1997	503932	0.0005	0.0108
1998	590366	0.0006	0.0137
1999	524931	0.0005	0.0112
2000	641539	0.0007	0.0173
2001	1183592	0.0012	0.0261
2002	1477617	0.0015	0.0260
2003	1950539	0.0017	0.0409
2004	1740368	0.0014	0.0226
2005	1162459	0.0008	0.0167
2006	1119101	0.0007	0.0488
2007	3788391	0.0019	0.0160
2008	2108652	0.0011	0.0203
2009	1065881	0.0005	-

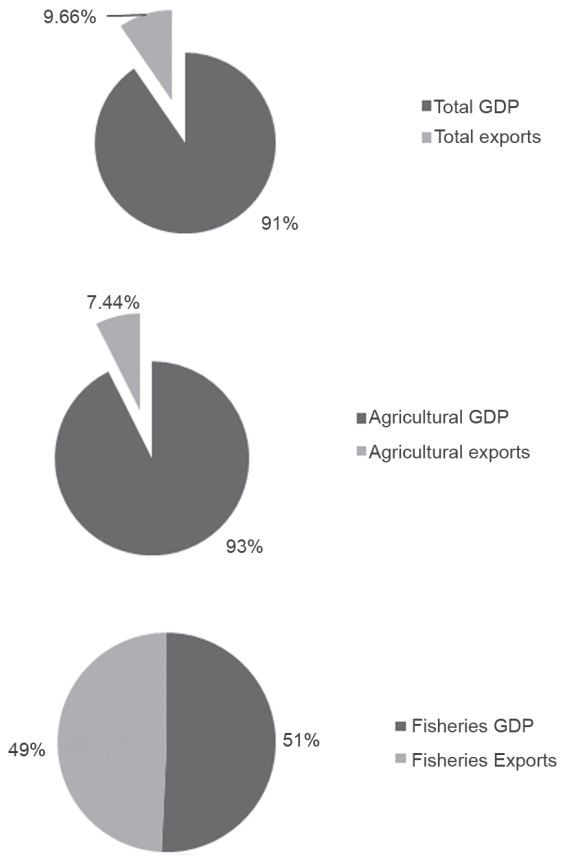

Fig.1. Share of total exports to total GDP, share of agricultural exports to agricultural GDP and share of fisheries exports to fisheries GDP during 1991-2008

fish export has grown by 6.1% in value, 15.5% in terms of quantity and diminished by 8.1% in terms of unit value per year during 1991-2009. Increased exports in terms of quantity rather than value around the world may be the reason for lesser unit value. Compared to the growth of world ornamental fishes exports, Indian ornamental fish export registered a higher positive growth rate of 14.4% in terms of export value, lower growth rate of 12.1% in terms of quantity exported and a higher growth rate of about 2.1% in terms of unit value. There has been a consistent increase in ornamental fish exports by India during the decade 2001 - 2009 and this could be the reason for higher growth rate for the period (1991 to 2009).

Over the last two decades there has been a twist in unit value of ornamental fish trade. In 1991, unit value was very high (23.56 US$ kg^{-1}) in world trade, which later on decreased steeply to 5.10 US$ kg^{-1} in 2000. Major exporters faced a decline in their unit value except Japan which had regained its unit value to 88.694 US$ kg^{-1} in 2000. This shows that the world ornamental fish trade faced lack of stability in supply of ornamental fishes during 1991-2000.

But comparatively there has been less fluctuation in the unit value during 2001-2009. This can be attributed to export of high (quality) value fishes rather than the quantity exported.Top exporting countries such as Singapore, Germany, Indonesia, USA, Spain and India seems to have concentrated more on exporting high value fishes fetching higher unit value.

Singapore being the largest exporter of ornamental fishes in world shows highest growth rate in unit value when compared to the top ten exporters of ornamental fishes followed by China (5.8%), Thailand (5.3%) and USA (5.2%). But the quantity of ornamental fishes exported by Singapore shows a negative growth rate of 0.03% for the period from 1991 to 2009. This clearly reflects that Singapore may be exporting less quantity but high valued ornamental fishes and this would have led to its positive growth rate in terms of exports value and unit value. However, India surpasses the growth rate of Singapore in terms of export value, export quantity and world exports in terms of export value and unit value respectively (Fig. 2). However, it should be noted that, in absolute terms, Singapore is far ahead of India. Spain recorded the maximum growth rate of about 41.3% in terms of quantity exported followed by Thailand (23.2%) and Malaysia (20.6%) for the period 1991-2009.

Market diversity of Indian ornamental fish trade

Markets for Indian ornamental fishes have never been consistent, since the geographical spread of the markets has exhibited an ever changing hue. Singapore, USA, China Hong Kong SAR (Special Administrative Region), Malaysia and Japan are India's favourite top five market destinations and accounts for about 70% of total exports from India (Fig. 3). India's favourite market destination is Singapore accounting for almost 42.85%, followed by Japan (13.88%) and Malaysia (9.97%). USA and China Hong Kong SAR both accounting for 7.5% each. Others include Germany, United Arab Emirates, United Kingdom, Thailand and Netherlands.

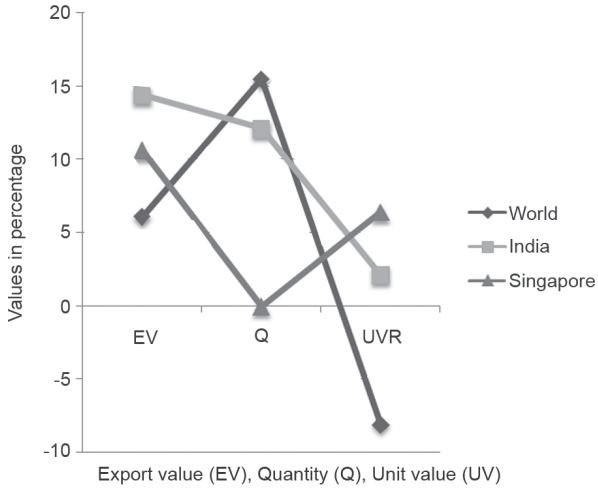

Fig. 2. Compound growth rates for world, India and top ornamental fish exporting countries of the world during 1991-2009

Table 3. Compound growth rates for world, India and top ornamental fish exporting countries of the world during 1991-2009 (values in US$, quantity kg)

Rank	Country	Export value (EV) (%)	Quantity exported (Q) (%)	Unit value realisation UVR (%)
-	World	6.1* (0.155)	15.5* (0.432)	-8.1* (0.428)
	India	14.4* (0.474)	12.1* (0.640)	2.1*(0.424)
1	Singapore	10.6* (0.158)	-0.03* (0.206)	6.4*(0.214)
2	Malaysia[1]	14.4* (0.283)	20.6* (0.532)	-8.8* (0.532)
3	Japan	7.1* (0.220)	6.8* (0.203)	0.3*(0.120)
4	Spain	39.2* (1.019)	41.3* (1.577)	-1.5*(0.743)
5	USA[2]	-3.1* (0.259)	0.2* (0.171)	5.2* (0.165)
6	Czech republic[3]	70.6* (0.119)	9.4* (0.462)	-1.7* (0.464)
7	Indonesia	3.5*(0.565)	-0.9* (0.7)	4.5* (0.241)
8	China, HK, SAR[4]	-7.3* (0.580)	-12* (0.073)	5.8*(0.034)
9	Thailand	29.7* (0.241)	23.2* (0.433)	5.3* (0.296)
10	Germany	-2.4* (0.436)	-5.6* (0.174)	3.3* (0.471)
11	Peru[5]	4.9*(0.446)	-0.2* (0.146)	5.1*(0.391)

Figures in parenthesis indicate the standard errors of the estimates;
[1] -Quantity and UVR calculated for years 1997-2009.
[2] -EV from 1992-2009 and Q, UVR from 2000-2009.
[3] -EV from 1993-2009.
[4] -EV from 1993-2009 and Q, UVR from 2005-2009.
[5] -EV from 1994-2009 and Q, UV from 2000-2009.
*denotes at 1% level of significance.

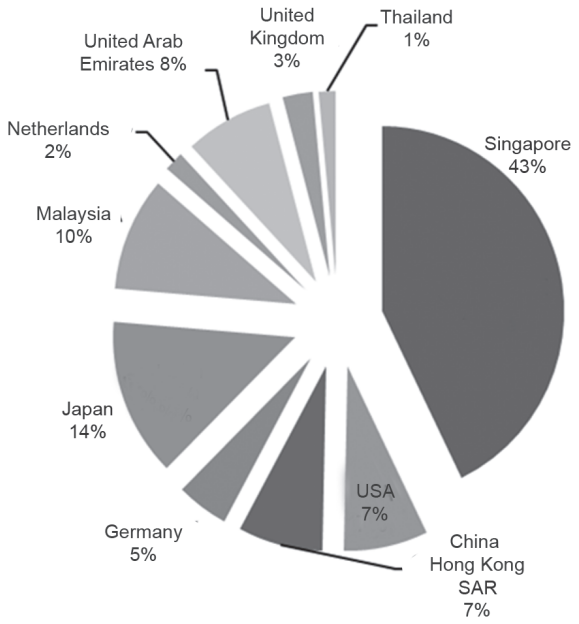

Fig. 3. Top destinations for India's ornamental fish exports (% Share) during 2003-2009

Species diversity of Indian ornamental fish trade

Indian ornamental fisheries sector is small but it constitutes one of the vibrant sub-sectors of fisheries and aquaculture. One hundred and eighty seven species are traded from India, of which 85% are wild fishes. The major share of export of ornamental fishes is from the wild, particularly from the eastern and north-eastern states of our country. West Bengal is the hub for ornamental fish trade. Mumbai mainly attributes angel and tetra breeding centre, whereas Chennai farmers devote much of their time to mollies and gold fish breeding and culture. Due to the proximity to sea, collection of sea angels and other allied species have become popular in Chennai. Loaches, gouramis, barbs, danios, eels, catfishes, air breathing fishes and glass fishes are the common indigenous fishes which are being traded significantly. India is actively involved in trading cultured ornamental fish varieties like molly, guppy, platy, sword tail, barbs, cichlids, angels, siamese fighter, tetras, gold fish, manila carps and sharks (Ghosh*et al*., 2010). The major breeding centres are located across Kolkata, Mumbai and Chennai as these metros have become major export points.

India shows positive sign of growth as it ranks fifth in the world, in terms of growth rate in export value of ornamental fishes, ranks fourth in terms of growth rate recorded by quantity of ornamental fishes exported and ranks eighth in terms of growth rate recorded by unit value of ornamental fishes exported. However, the Indian ornamental fish export trend is uneven, unstable and inconsistent, that clearly depicts lack of professionalism in the sector and is faced by many constraints. The existing export business is not sustainable since the present trade is completely dependent on wild collection. Non-availability of quality broodstock from certified hatcheries, lack of infrastructure facilities and high freight charges are other important constraints in this sector. Lack of appropriate information in terms of breeding, brood stock management, rearing, grow-out, harvesting, limited technical expertise, disease diagnostics and improper knowledge about the financial aspects such as investments, risks and uncertainties involved are the other constraints that needs to be addressed in order to have a sustainable growth as there are limited sources of literature available for the same (Ghosh*et al*., 2010). Thus, there is an immediate need of a shift from capture based sector to culture sector. Adoption of highly intensified scientific breeding system is the core area for development in ornamental fish trade. Research has to be encouraged in culture and economics of ornamental fishes, so that more new species can be bred successfully which in turn can reduce the pressure on wild ecosystem, thus ensuring quality trade and sustainability. Government support for ornamental fish culture in the form of subsidies, opening ways for entrepreneurship development in the sector and also promoting trade by widening up the destinations for Indian ornamental fish are some of the policy suggestions brought out based on the study.

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