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Present and future market trends of Indian ornamental fish sector

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Abstract

India possesses a great diversity of fishes several of which are very much suitable for ornamental purposes. However, India's contribution to the international ornamental fish trade is negligible standing at 1.6 million US\$ ranking 31st in the world (2016). Total world ornamental fish trade has been estimated to be more than US\$ 15 billion with the developing nations contributing to 60% of the exports. The industry is expected to grow by 8%, with the increasing demand for ornamental fishes supported by advances in filtration, aeration and various smart accessories. Indian ornamental fish sector has tremendous scope for development, considering its wide fish resources both the freshwater and marine fish species. With this in view, the current status and challenges for the development of ornamental fish culture and probable for future trends anticipated in the sector are discussed in this article. It could be concluded that, there is scope to increase production of ornamental fish varieties, and India can emerge as one of the leaders of the world ornamental trade in coming years.

Keywords: world ornamental fish trade; ornamental fish market; future trend; ornamental fish exporters

1. Introduction

Ornamental fish trade is a multibillion-dollar industry in which approximately more than 125 countries involved the trade. The global Ornamental fish trade is estimated to be more than US\$ 15 billion and more than 2 billion live ornamental fishes are traded ^[1]. The 99% of the global market is confined to hobbyist and less than 1% is used for public aquaria and research institute. Developing countries are the major producers and suppliers in the world supplying more than 60% of the ornamental fish. Over 2,500 species are involved in the global ornamental fish industry, of which over 60% are of freshwater origin and the rest are marine. Ornamental fish trade also involves larger numbers of wild caught fish and invertebrates, in addition to the much popular farm reared ornamental fishes. Neon tetras, angels, gold fish, danios and discus dominate the world ornamental fish trade, with guppy and zebra danio both together contributing to more than 14% in value of the fishes traded. The ornamental fish sector is primarily dependent on freshwater fish species, with nearly 15% of the total traded species being marine, contributed by wild collections.

The marine ornamental species have greater potential for export trade because of their most exquisite colours and attention-grabbing behaviour, but there are apprehensions pertaining their collection from the natural environment, biodiversity and sustainability perspectives ^[2]. The marine ornamental fish trade is operated from South-East countries Philippines, Indonesia, Sri Lanka, Maldives and major pacific Island countries like Solomon Island, Australia, Fiji and Palau. These countries together supply more than 98% of the total marine ornamental fishes involved in trade ^[3].

2. Overview of global exports

Global fish markets records were established in 1976 with just 28 countries were known to be exporting ornamental fishes, later reaching 105 in 2004; presently more than 125 countries are involved this trade ^[4]. The global exports market was rose steadily from 2000 valued at US\$177.7 million and reached a peak value of US\$364.9 million in 2011. The Export value for the global ornamental fish industry in 2016 (Fig.1) stood at US\$337.70 ^[5]

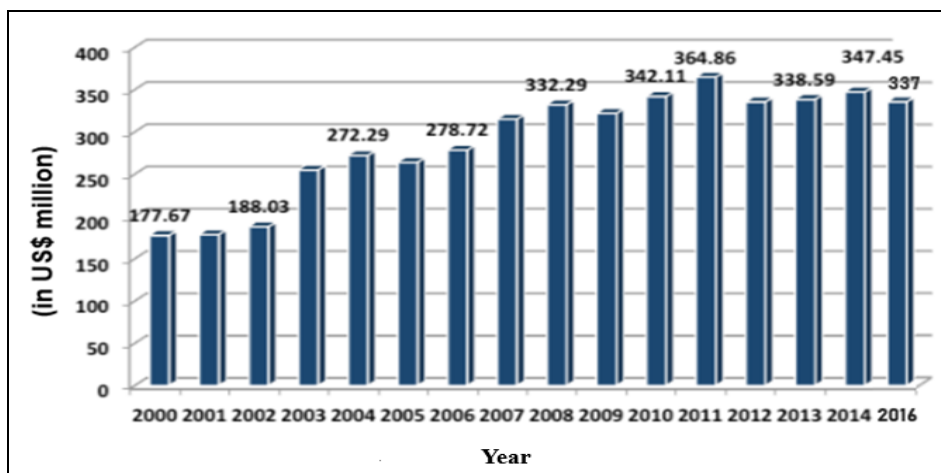


Fig 1: Global exports of ornamental fish, 2000 – 2016 (in US\$ million)

2.1 Region wise export market share in the world 2014

Asian Countries are the major source of ornamental fish in the world and the export value in 2014 was US\$197.7 million and

contributed to 57% of the total exports. Europe, South America, North America, Africa, Oceania, Middle East are the other major regions exporting ornamental fishes (Fig.2) ^[6].

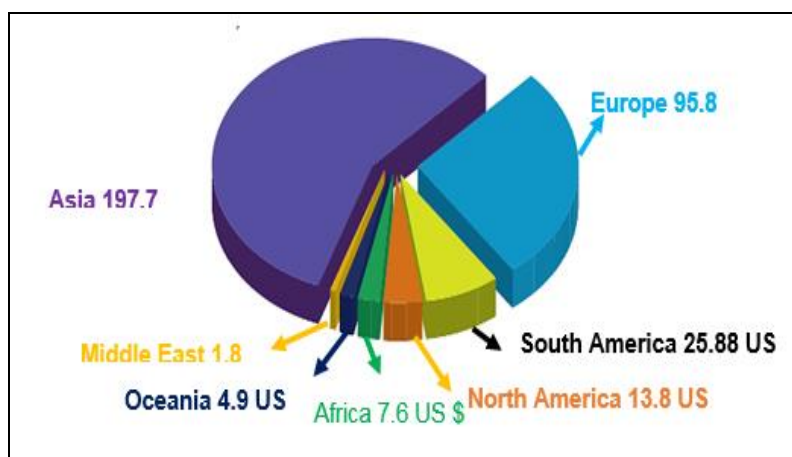


Fig 2: Region wise export market share in the world (in US\$ million)

2.2 Top 10 exporting countries in the world 2016

Singapore has been the ornamental fish capital of the world with an export value is US\$42.97 million, contributing to 12.7% of the total exports (5). Till today it remains the main trading hub in Asia, with more than 30% of the fish exported having been sourced from other countries. The second

position was occupied by the Spain with exports worth US\$39.56 million, followed by Japan US\$33.10 million, Burma US\$32.05 million, Indonesia US\$24.64 million, Czech Republic US\$19.89 million, Malaysia US\$14.09 million, Netherlands US\$13.16 million, Sri Lanka US\$12.61 million and Colombia US\$10.68 million. (Fig.3) ^[5].

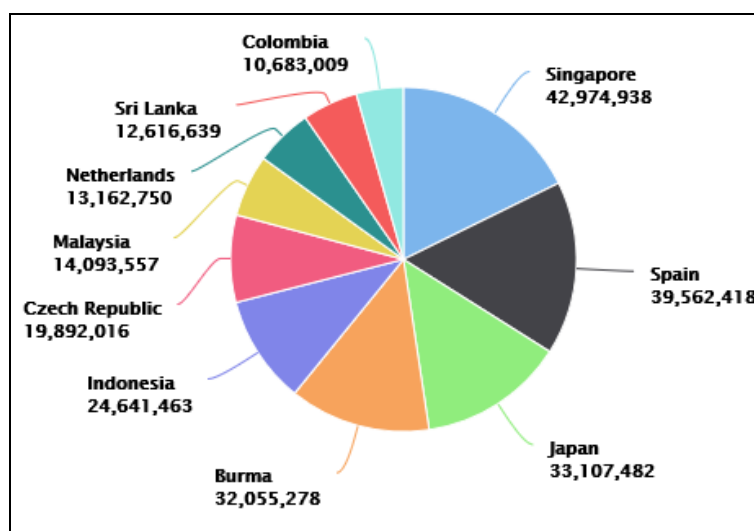


Fig 3: Top 10 Exporting Countries in the world 2016 (in US\$ million)

3. Overview of global imports

The global import of ornamental fishes began with a list of only 32 countries in 1976, later their numbers increased significantly and reached 130 in 2001; presently now more than 150 countries are involved this trade (4). Global import

market rose steadily from 2000 with a value of US\$177.7 million and reached a peak value of US\$402.1 million in 2008. The import value for the global ornamental fish industry stood at US\$287 million in 2016. (Fig.4) (5)

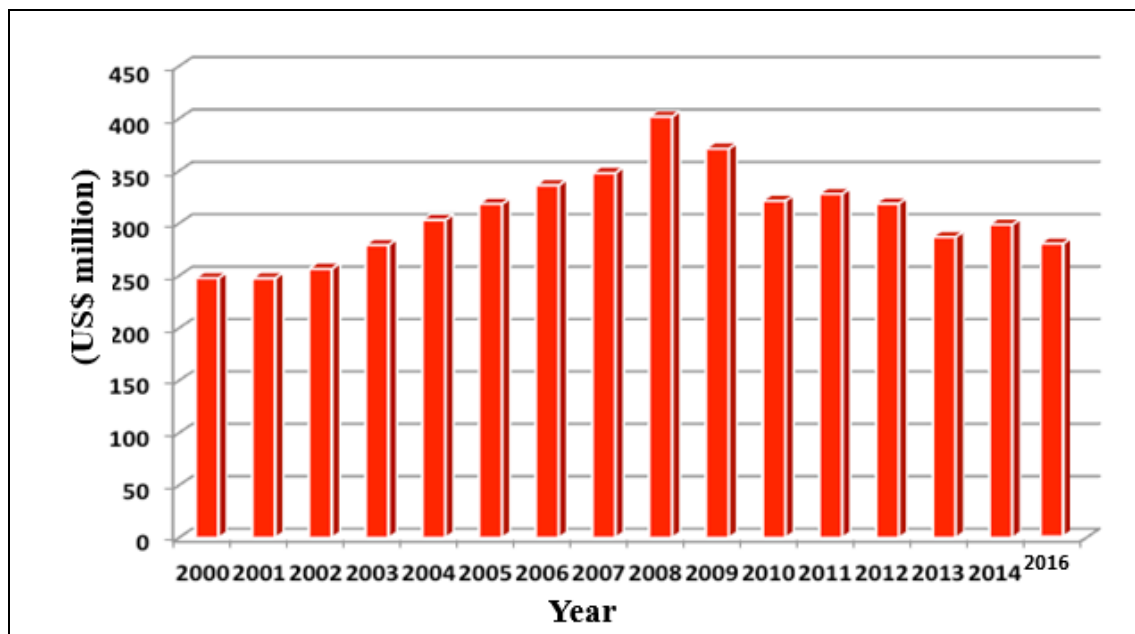


Fig 4: Global imports of ornamental fish, 2000 – 2016 (in US\$ million)

3.1 Top 10 Importing Countries in the World 2016

Among the top 10 importing countries USA was the single largest importer of ornamental fish with an import value of US\$56.57 million, contributing to 19.7% of the total imports in 2016. The UK occupies the second position with imports worth US\$23.02 million, followed by Germany at US\$ 18.61 million, Japan US\$ 15.98 million, Netherlands US\$ 14.83

million, Singapore US\$ 13.58 million, China US\$ 12.62 million, France US\$ 12.52 million, Hong Kong US\$ 10.70 million, Italy US\$ 9.06 million. (Fig.5). These 10 countries together shared over 83% of the global imports. Singapore, Germany (Frankfurt) Hong Kong, Malaysia and the Netherlands (Amsterdam) are the important trading hubs, re-exporting a major portion of their imports to these countries ^[5].

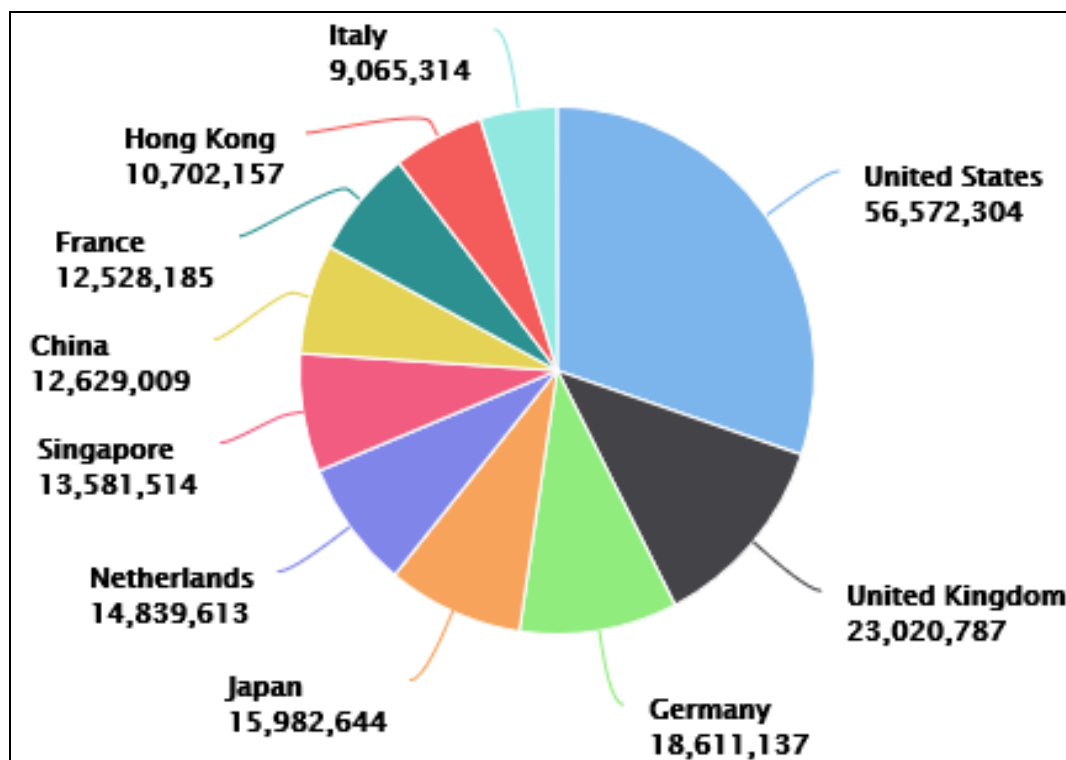


Fig 5: Top 10 Importing Countries in the world 2016 (in US\$ million)

3.2 Status of USA import market

USA is the world's largest single market for ornamental fish, where fish keeping is probably the second most popular hobby in the country. The US import market is always

fluctuated this is due to competition in the market and its reach to a peak value of US\$ 81 million in 1995. The import market value of USA in 2016 is US\$ 56.5 million (Fig. 6) and it contributes 19.7% of the total imports (Fig. 7) ^[5].

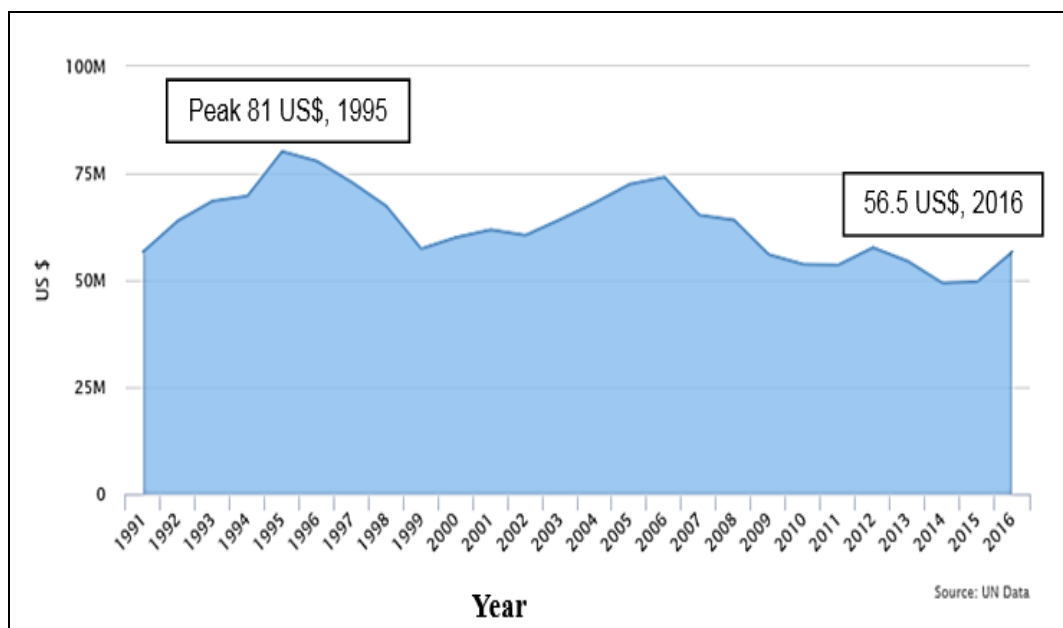


Fig 6: Import performance of the US market, 1990-2016 (in million US\$)

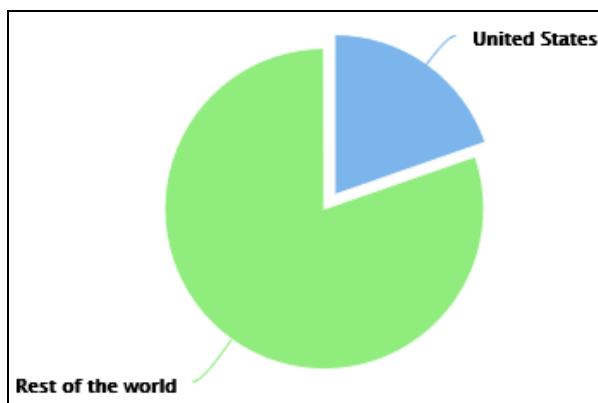


Fig 7: Import performance of the US market 2016 (in million US\$)

USA mainly concerned with importing freshwater ornamental fish, with Singapore, Indonesia, Thailand, Hong Kong and the Philippines, being the major suppliers. Fish from Colombia, Peru, and Brazil also catered to this market.

3.3 Status of Singapore import market

Singapore is one of the world's largest exporters of ornamental fish and the trading hub of Asia. In addition to its own exports, Singapore re-exports fish collected and bred in other countries in Asia (Indonesia, Thailand and Malaysia) and South America (Brazil, Peru and Colombia).

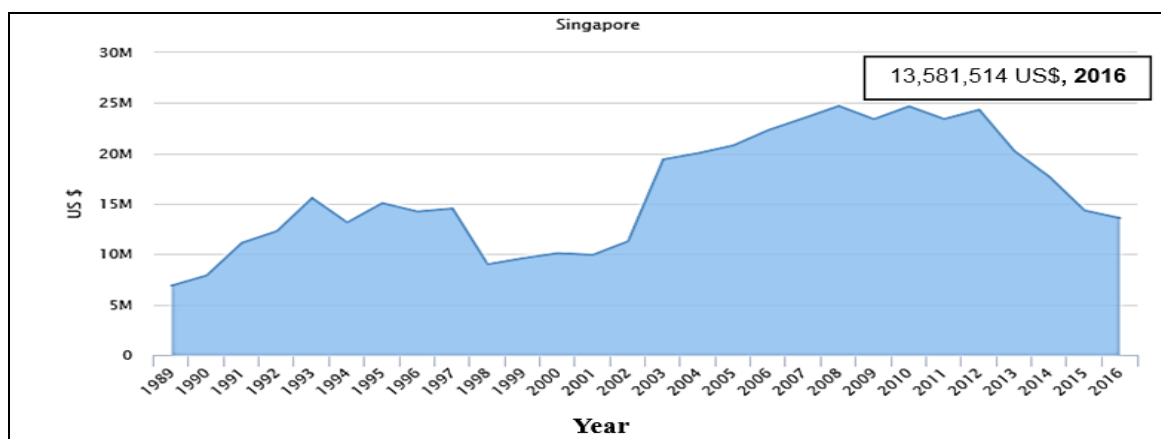


Fig 8: Import performance of the Singapore market, 1990-2016 (in million US\$)

Singapore import market showed an increasing trend till 2012 and with the peak during 2008 to 2012 (Fig.8) ^[5]. The import value for the Singapore ornamental fish industry in 2016 was US \$ 13.5 million, contributing to 4.7% of the total import and holding 6th position in the world (Fig.9). Singapore is a

duty-free zone and there are no heavy import duties to pay, therefore it imports a significant proportion of Asian products and livestock and bulks them together for re-export worldwide. More than 90% of freshwater ornamental fish are captive-bred by the industry ^[7].

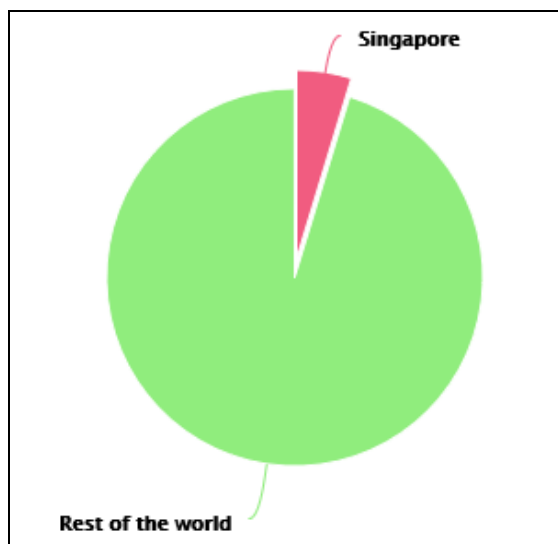


Fig 9: Import performance of the Singapore market 2016 (in million US\$)

Singapore produces more than 30 fish species with hundreds of varieties (new colours, long fin etc.). The 5 most popular

species that are exported by the Singapore ornamental fish industry are guppies, mollies, platys, goldfish, and koi. More than 60 countries receive ornamental fish from this small island nation. Singapore owes its success to its subtropical climate, good market conditions, chemically valid water and the availability of live food [7].

3.4 Europe Import Market

Europe is the largest global trade bloc, with the UK remaining the largest European importer of ornamental fish from outside the EU. In Europe only, a small proportion of the fish are produced and 99% are from re-export, triangulation stocks from Africa and South America. Europe import market showed an increasing trend till 2008 (US\$223.7 million) after that it was gradually decreased. This decrease can be primarily attributed to increased local production. Import value for the Europe ornamental fish industry in 2016 was US\$ 89.3 million (Fig.10). In 2017, Imports into EU Member States of freshwater ornamental fish from non-EU countries accounted for 83.5% of the total value of imports for that year, with the remaining 16.5% attributed to the import of marine ornamental fish [8].

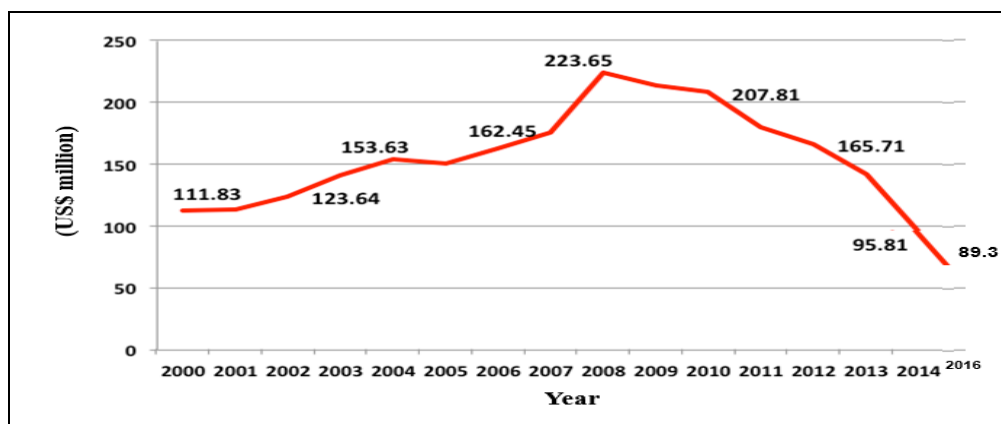


Fig 10: Import performance of the Europe market, 1990-2016 (in million US\$)

In 2017, EU Member States imported ornamental fish from 58 non-EU countries and territories around the world. Of these, 20 Countries exported both freshwater and marine ornamental fish; 19 Countries exported only freshwater ornamental fish and the remaining 19 Countries exported marine ornamental fish [8].

Table 1: Top 10 EU countries importing ornamental fish from non-EU countries for 2017

Country	€ (000s)	% of total freshwater imports
U.K.	18,841	25.4
Germany	13,677	18.6
Netherlands	10,512	14.2
France	6,627	8.9
Italy	4,549	6.1
Spain	3,778	5.1
Belgium	4,873	6.6
Czech Republic	2,313	3.1
Poland	2,589	3.5
Sweden	1,615	2.2
Others	4,684	6.3
Grand Total	74,058	

Table 2: Top 10 non-EU Countries supplying freshwater ornamental fish to EU in 2017

Country	Value (€ 000s)	% of Total EU Imports
Singapore	14,852	24.0
Israel	11,413	18.4
Japan	11,338	18.3
Indonesia	4,736	7.7
Thailand	4,644	7.5
Sri Lanka	3,173	5.1
Colombia	2,044	3.3
Vietnam	2,029	3.2
China	1,486	2.4
Brazil	1,373	2.2
Total remaining 29 countries	4,781	7.7
Grand Total	61,869	

The largest source of ornamental fish into the EU continues to be Singapore, sharing more than 30% of total imports by volume and over 70% by value. The remaining nine top freshwater fish suppliers to the EU are Israel, Japan, Indonesia, Thailand, Sri Lanka, Colombia, Vietnam, China and Brazil (Table. 2).

Table 3: Top 10 non-EU Countries supplying Marine Ornamental Fish to EU in 2017

Country	Value (€ 000s)	% of Total EU Imports
Indonesia	4,189	34.4
U.S.A.	2,072	17.0
Philippines	1,270	10.4
Sri Lanka	1,139	9.3
Kenya	997	8.2
Maldives	657	5.4
Australia	242	1.9
Fiji	226	1.9
Israel	190	1.6
South Africa	147	1.2
Total remaining 29 countries	1,060	8.7
Grand Total	12,189	

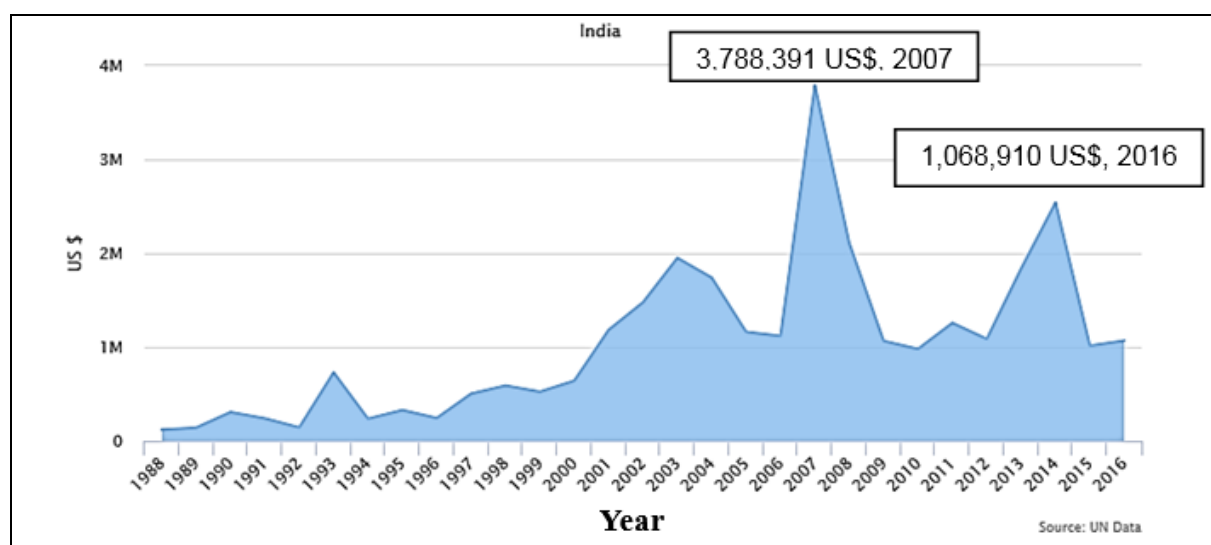
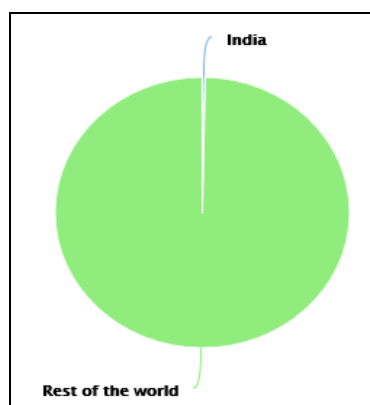
Indonesia, USA, the Philippines, Sri Lanka, Kenya and Maldives are the main suppliers of marine ornamental fish to

EU markets. Imports and re-exports of ornamental fish, which are not required to pass through border inspection posts (BIPs), take place between EU member states. In view of its close proximity, the Czech Rep is the most important European supplier in the regional markets. (Tab. 3)

4. Overview of Indian Exports

The export of ornamental fishes from our country started during 1969 with a few species of tropical freshwater fish with insignificant export earnings, which increased to 10 crore rupees in 1994. Indian Ornamental fish have also established a greater demand in International market.

The ornamental fish exports from India showed an increasing trend and an exponential growth over the years. The share of India in world ornamental fish exports fluctuated and remained less than one per cent for most of the years. India's share in world market ranged from 0.12% to 1.16% during 1991-2009 and India gained highest market share of 1.16% during the year 2007 US\$ 1.06 million. (Fig.11) (5).

**Fig 11:** Export performance of the Indian market, 1990-2016 (in million US\$)**Fig 12:** Export performance of the Indian market 2016 (in million US\$)

Export value for the Indian ornamental fish industry in 2016 was US\$ 1.06 million and it contributed 0.3% of the total export (Fig.12). India ranks 31st position in the world exporting countries list ^[5]. Singapore, USA, Hong Kong, Malaysia and Japan were India's favorite top five market destinations. Sri Lanka being a small country still occupy the 6th position in the world, this being primarily due to capture, breeding and export of ornamental fish, generating jobs and income ^[5].

In Sri Lanka 80 freshwater ornamental native fishes are present (of which 27 are endemic) and 53 of them are regularly exported to over 30 countries, including the United States of America, Japan, the United Kingdom and other European Community countries ^[4].

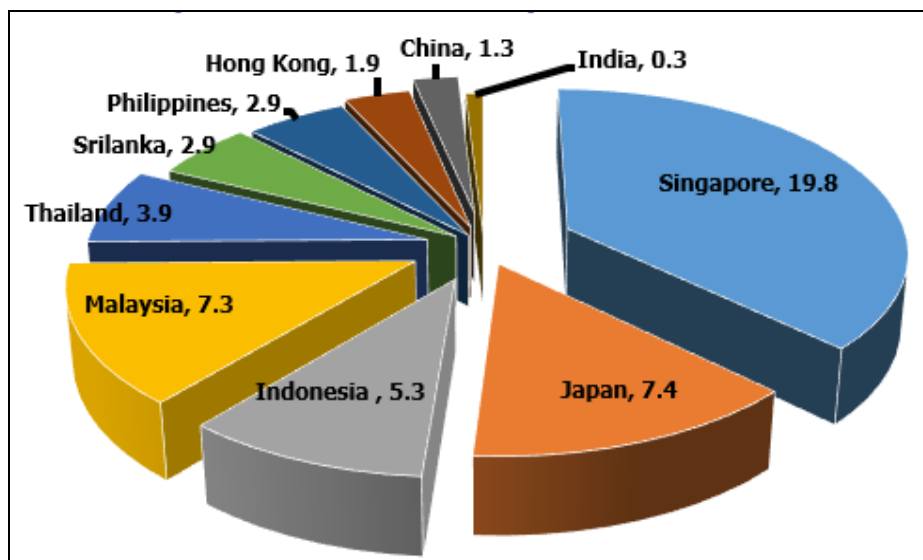


Fig 13: Pie chart showing India's position in global ornamental fish trade 2016

5. Overview of Indian Imports

Import value for the Indian ornamental fish industry in 2016 was 192,511 US\$ and it contributed to 0.1% of the total

imports (Fig.14). India holds 66th position in the world among the importing countries ^[5].

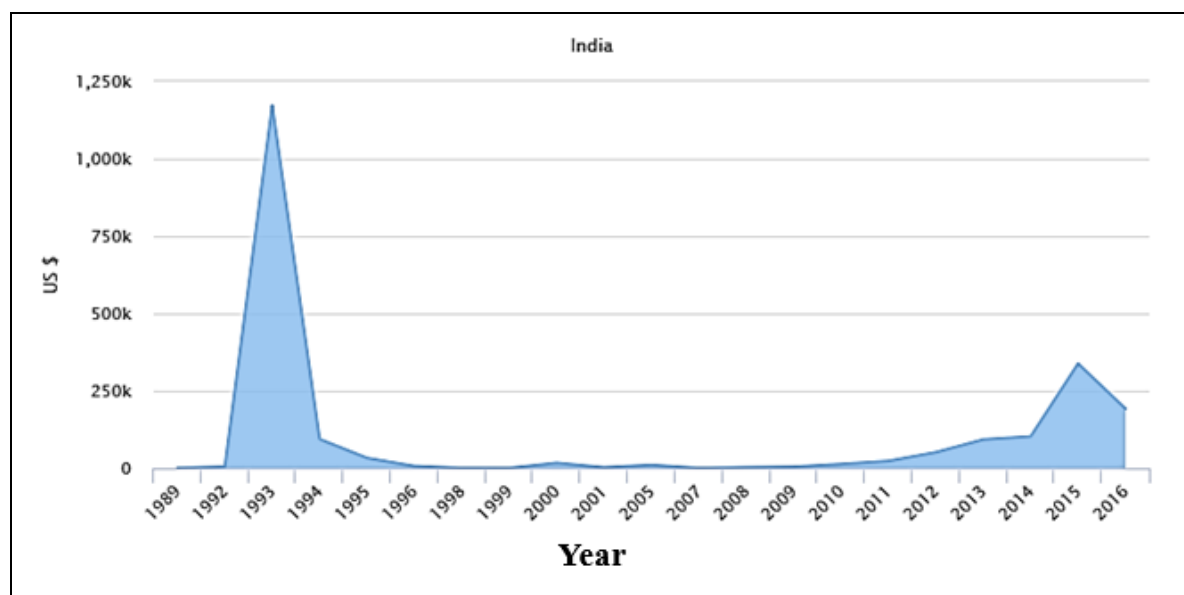


Fig 14: Import performance of the Indian market, 1990-2016 (in million US\$)

6. Indian ornamental fish resources

India is a country with high biodiversity, with about 374 indigenous fresh water ornamental fish species and about 700 indigenous marine ornamental fishes. Among the indigenous ornamental fish about 261 egg layers and 27 live bearing freshwater exotic fishes and more than 300 marine exotic fish species. Fresh water ornamental fish contributed is about 80% and 20% from brackish and marine waters in ornamental fish trade ^[9].

6.1 Freshwater ornamental fish resource in India

India is blessed with a rich diversity of freshwater fishes both in the North-Eastern hills and Western Ghats. Rivers of north-eastern states and their Himalayan streams have an abundant variety of ornamental fish species. In India, the north-eastern states play leading role in ornamental fish trade.

In Western Ghats 155 ornamental fish species are present of which 117 are endemic to the Western Ghats. The fish fauna

of the Western Ghats includes variety of barbs, rasboras, killifishes, glass fishes, catfishes, catopra, hill trouts, and danios, which are suitable candidates for ornamental fish trade ^[10].

The north-eastern states contribute around 85% of the total market and the rest comes from the southern states of India. In North Eastern states 250 ornamental fish species are present of which 58 indigenous ornamental fishes are currently being exported. Most potential species from north-eastern states for aquarium fish are *Botia dario*, *Dania dangila*, *Puntius shalynius* and *Schistura reticulofasciatus* ^[10].

6.2 Marine ornamental fish resource in India

India possesses rich resources of marine ornamental fishes such as the lagoons and coral reefs of Lakshadweep and Minicoy islands, Andaman and Nicobar Islands, Gulf of Kutch, Coast of Kerala, Gulf of Mannar and Palk Bay. In Gulf of Mannar, a total of 113 marine ornamental finfish species

have been recorded under 24 families of which the family Acanthuridae, Balistidae, Chaetodontidae, Haemulidae, Labridae, Pomacanthidae, Pomacentridae, Scaridae and Syngnathidae have a very rich biodiversity perspective in Gulf of Mannar. Andaman and Nicobar Islands contribute 150 Marine Ornamental fish species and Lakshadweep islands contribute marine ornamental fish 300 species ^[10].

Status of Breeding of Freshwater ornamental fish

About 13 indigenous freshwater ornamental fish species successfully bred in captivity in which the Kerala queen, *Puntius denisonii* has been used for mass scale seed production and trading. Rosy barb, *Puntius conchonius* is being utilized for varietal development and Shining barb variety has been developed ^[9].



Status of Breeding of Marine ornamental fish

CMFRI has developed hatchery technology for 14 species of

marine ornamental fish species including 5 Clown fish species, 8 damsel fish species, 1 Dotty back fish ^[9].



6.3 Major breeding centres in India

There 212 MPEDA authorized breeding centres in India. Kerala 126 nos, Tamil Nadu 44 nos, Mathya Pradesh 11 nos, Himachel Pradesh 10 nos, West Bengal 8 nos, Maharastra 7 nos, Rajasthan 4 nos, Karnataka 2 nos ^[11].

6.4 Ornamental Fish Exporters in India

There 35 MPEDA authorized Ornamental Fish Exporters in India, West Bengal 12 suppliers, Kerala 8 suppliers, Tamil Nadu 8 suppliers, Karnataka 4 suppliers, Maharashtra 3 suppliers ^[12]. About 90% of ornamental fish is traded from Kolkata port followed by 8% from Mumbai and 2% from

Chennai ^[13].

One hundred and fifty-six Ornamental fishes are recorded in Tamil Nadu of which 14 species are endemic to Tamil Nadu, 131 species are endemic to Indian sub-continent and 11 species are exotic. 156 ornamental fish species under eight orders, 27 families and 68 genera were recorded from streams, rivers, canals, reservoirs, irrigation tanks and cold-water lakes of Tamil Nadu. Cyprinidae (45.5%) was the most dominant family represented by 71 species belonging to 22 genera, followed by Nemacheilidae (nine species from two genera), Ambassidae (eight species from three genera) and Cichlidae ^[14].

Table 4: World's most expensive tropical fish

Rank	Fish species	Price (in \$)
1.	Platinum Arowana	400,000
2.	Freshwater Polka Dot Stingray	100,000
3.	Peppermint Angelfish	30,000
4.	Bladefin Basslet*	10,000
5.	Golden Basslet	8,000
6.	Neptune Grouper	6,000
7.	Australian Flathead Perch*	5,000
8.	Wrought Iron Butterfly Fish	2,700
9.	Clarion Angelfish	2,500
10.	Candy Basslet	1,000

*from India

Table 5: World's most beautiful Freshwater Ornamental Fish

Rank	Fish species
1.	Mandarin Dragonet*
2.	Juvenile Emperor Angel Fish
3.	Lion Fish*
4.	Clown Trigger Fish
5.	Nudi branch
6.	Leaf Scorpion
7.	Black Clownfish*
8.	Pink Spot Shrimp Goby*
9.	Blue Tang
10.	<i>Acanthurus olivaceus</i>

*from India

Table 6: World's most beautiful Marine Ornamental Fish

Rank	Fish species
1.	Discus
2.	Killifish
3.	Male Betta
4.	German Blue Ram
5.	Endlers Livebearer
6.	Boeseman's Rainbow fish
7.	Gourami*
8.	Peacock Cichlid
9.	Fantail Guppy
10.	Flowerhorn Cichlid

6.5 Problems faced in the Indian ornamental fish industry

The ornamental fish sector in India is plagued by myriad of problems. Some of the major issues faced are

- Lack of latest techniques in packaging technology
- Lack of techniques in intensive farming
- Lack of quality brooders – both marine and freshwater
- Lack of species-specific feeds – both marine and freshwater
- Restriction and lack of incentives in the marketing of marine fishes and invertebrates

Sales volume is comparatively higher for exotic freshwater fishes, but very low for marine fishes and nil in the case of indigenous ornamental fishes in the domestic market ^[13]. *Sahyadria denisonii* (Syn *Puntius denisonii*) is, the only indigenous fish which has demand both in the domestic and export market ^[13]. To improve the regional market there is a need to improve planted tanks and marine aquaria, which would increase the scope of scales by diversification.

6.6 Indian future prospects

India's share to global ornamental fish trade is less than 1% but still India is projected as a "sleeping giant" because of yet untapped potential resources. Development of regional hub for ornamental "on the lines of aquaculture rainbow technology park, developed by Tamil Nadu Dr. J. Jayalalithaa Fisheries University, would improve overall exports. Popularization of planted tanks will open new avenues for increasing the existing market. Popularization of marine aquarium with synthetic salts is showing increasing trends it needs to be tapped. Development of packing techniques will help our farmers to compete with regional players this would definitely uplift the existing market level. Indian domestic trade in this area is growing @ 20% annually and demand at domestic level is higher than supply. Selective breeding of fish and developing new stain of ornamental fish is a common practice but in India this technology not yet popularized and hence the indigenous ornamental fish are not accepted in large scale due to their less attractiveness.

7. Conclusion

Even though there is good demand for Indian indigenous ornamental fish in the international markets, limited numbers are exported due to many reasons. The most important of these is the sustainability factor; secondly, there is not much interest in breeding indigenous fishes which are not popular in the domestic market. Although breeding techniques for selected indigenous ornamental fishes have been scientifically perfected in the country, their large-scale production is yet to begin. If government institutions could set up large scale facilities and provide specialised training and assistance to breeders, more indigenous ornamental fish can be produced for enhancing export from the country.

8. References

1. Satam SB, Sawant NH, Ghughuskar MM, Sahastrabuddhe VD, Naik VV, Pagarkar AU *et al.* Ornamental Fisheries: A new Avenue to Supplement Farm Income, Advanced Agricultural Research & Technology Journal. 2018; II(2):193-197
2. Raja S, Babu TD, Nammalwar P, Thomson Jacob C, Dinesh KPB. Potential of ornamental fish culture and marketing strategies for future prospects in India, International Journal of Biosciences and Nano science 2014; 1(5):119-125.
3. Sahayak S. Marine Aquarium Trade in India, MPEDA Newsletter. 2009; XIIV:31-33
4. Pierluigi Monticini. The ornamental fish trade. Production and commerce of ornamental fish: technical-managerial and legislative aspects, Globefish Research Programme, FAO 2010; 102:134
5. www.factfish.com/statistic/ornamental%20fish%2C%20live%2C%20export%20value
6. Dey VK. The global trade in ornamental fish, Info fish International, 2016, 4/2016, www.infofish.org

7. Singapore Ornamental Fish Industry Statistics, Trends & Analysis, 2018. <https://brandongaille.com/singapore-ornamental-fish-industry-statistics/>
8. EU Ornamental Fish Import & Export Statistics, Ornamental aquatic trade association, 2017. ltd. www.ornamentalfish.org
9. Mahapatra BK. Ornamental Fishery Resources in India: Diversified Option for Livelihood Improvement, National seminar on recent trends in fishery and ecological science, 2018.
10. Pandey, Mandal. Present status, challenges and scope of ornamental fish trade in India. Conference paper: Aqua Aquaria 2017 at Mangalore, 2017.
11. Major Breeding units in India, MPEDA, 2018 <http://mpeda.gov.in/MPEDA/cms.php?id=bWFqb3ItYnJlZW5pdHM=#>
12. Major Exporters in India, MPEDA 2018 <http://mpeda.gov.in/MPEDA/cms.php?id=b3JuYW1lbnRhbC1maXNoLWV4cG9ydGVycy1jb250YWN0LWRldGFpbHM=#>
13. Sekharan N. Market trends in Indian ornamental fish trade, INFOFISH International, 2017, 42-44. 3/2017, www.infofish.org
14. Mogalekar HS, Jawahar P. Freshwater ornamental fish diversity of Tamil Nadu, J Inland Fish. Soc. India. 2015; 47(2):27-37.