# A Study Of The Ornamental Fish Breeders In India For Analysing The Constraints In Enhancing Production

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## INTRODUCTION

The supply chain of exotic ornamental fish for domestic marketing includes breeders at the first step followed by wholesalers, retailers and consumer/hobbyist where as the chain for export marketing includes breeders, suppliers, exporters and consumers/hobbyist abroad. The trend towards traceability, certification and improved farm management is driving responsibilities down the market chain to the breeders/breeding sector. Tomey (1997) pointed out that, with regards to recent developments in European legislation, tracking i.e. following a shipment from point of export to import and tracing i.e. the ability to follow the consignment all the way back to its original source, for example, a particular breeder or farm for health and welfare for all items are becoming a basic issue. Ornamental fish breeding/production has evolved from a pursuit into a sustainable livelihood alternative, comparable to agriculture or other activities of fisheries in India. Of late, this sector has been accorded wide recognition as a potent instrument for providing employment opportunities, slowing urban migrations, alleviating poverty, contributing to national income growth, and promoting equitable distribution of income and enhancing foreign exchange. In spite of the fact that India has conducive conditions for ornamental fish breeding, the production from the breeding sector is to the level of 100 Million fish per year. The ornamental fish export was to the tune of ₹ 535 Lakh (US $ 1.27 million) in 2008 (MPEDA, 2008). The demand for exotic fishes is high in the international ornamental fish markets such as USA, Europe, and UK. It is noted that in the domestic market for ornamental fishes, the supply from the breeding sector does not meet the domestic demand, which points at the fact that there remains no surplus stock for export. The domestic market for ornamental fishes in India is basically a sellers market and anything bred is devoured by the market without even considering the quality of it. For an industry to improve, the production level has to increase and the quality of the product also has to be enhanced.

## PREMISE OF THE STUDY

It is generally said that the ornamental fish sector in India stands scattered and uncoordinated and hence, is unable to overcome the constraints faced by them as one. There is no comprehensive list which provides the number of ornamental fish breeders in India or any of the states selected for study. **Chaston (1984)** propounded that a pre-requisite for any business venture would be a thorough market survey to study the market situation followed by the linking/ integration of the channel members for uninterrupted supply. General problems mentioned as constraints for the breeding sector in India is the lack of availability of brood stock and difficulty in marketing. For a rapid growth of live ornamental fish industry, import of brood stock of different varieties of exotic ornamental fishes is a prerequisite. Ornamental fishes are in the restricted items of import and the procedure for import is even more cumbersome. The number of varieties of tropical ornamental fish being allowed for import should be widened. Even competent breeders have a mistaken perception that they can never reach up to the international quality benchmarks and reaching up to it may affect their profit margins. These factors point towards the requirement for a holistic study of the sector as there were no previous studies on the breeding sector of India and the players in it.

## METHODOLOGY

The study resorted to primary data collection from the ornamental fish breeders in five states of India for a period of

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five months from May, 2008 to September, 2008 for MPEDA/UNCTAD Project. For the present study, 5 states in India namely Kerala, Karnataka, Tamil Nadu, Maharashtra and West Bengal were chosen. These states were targeted primarily as they were the main ornamental fish exporting states of India. Port wise export of ornamental fishes (MPEDA Statistics, 2008) reveal the significance of five states ie West Bengal, Maharashtra, Tamil Nadu, Kerala and Karnataka). In exports from India, Calcutta tops with 244.50 Lakhs ie (0.58 Million US$), followed by Chennai (102.66 Lakhs ie 0.25 Million US$), Kerala (78.55 Lakhs ie 0.19 Million US$) and Mangalore (46.36 Lakhs ie 0.11 Million US$). There was a parallel development of the ornamental fish production sector in the states from where export of ornamental fishes took place and hence, the study was focused on those states. 30 districts in Karnataka, 14 districts in Kerala, 33 districts in Maharashtra, 32 districts in Tamil Nadu and 19 districts in West Bengal were covered during the survey. Any kind of sampling is possible only if the population size is known. Dey (1996) described that the domestic ornamental fish market of India has two hundred full time and one thousand five hundred part time ornamental fish breeders. Since the present population size of ornamental fish breeders in India is not known accurately, a survey and census sampling (Aaker et al., 1997) was aimed. Census is said to be appropriate if the population size itself is quite small (Aaker et al., 1997). Based on Dey (1996), it was assumed that population of ornamental fish breeders in India would be less than 2000. Questionnare for the survey was developed and translated to five regional languages of the selected states as the breeders would not be well versed in English.

**Table 1 : Sites Selected For The Study**

| STATE | DISTRICTS |
|---|---|
| KARNATAKA<br>30 Districts | Bagalkot, Belgaum, Bijapur, Dharwad, Gadag, Haveri, Bellary, Bidar, Gulbarg, Koppal, Raichur, Banglore City, Banglore Rural, Chikballpur, Chitradurga, Devannagere, Kolar, Ramnagara, Shimoga, Tumkur, Hassan, Chikmangalore, Kodagu, Hubli, Mangalore, Udupi , Karwar , Mandya, Dharmarajanagar, Mysore |
| KERALA<br>14 Districts | Thiruvanathapuram, Kollam, Pathanamthitta, Alappuzha, Kottayam, Idukki, Ernakululam, Thrissur, Palakkad, Malappuram, Kozhikkode, Kannur, Wayanad, Kasargod |
| MAHARASHTRA<br>33 Districts | Akola, Amarawati, Buldhana, Wasim, Yewatmal, Aurangabad, Beed, Hingoli, Jalana, Latur, Nanded, Osmanabad, Parbhani, Mumbai, Sindhudurg, Ahmadnagar, Nasik, Bhandara, Chandrapur, Gadchiroli, Gondia, Nagpur, Wardha, Kolhapur, Pune, Sangali, Satara, Solhapur, Raigad, Ratnagiri, Thane, Jalgaon, Dhule |
| TAMILNADU<br>32 Districts | Thiruvallur, Coimbatore, Cuddalore, Tharmapuri, Dindugal, Erode, Kanchipuram, Kanyakumari, Karur, Krishnagiri, Madurai, Nagapattinam, Namakkal, Nilagiri, Perambalur, Pudukkottai, Ramanathapu ram, Selam, Sivagangai, Thanjavur, Theni, Tuticorin , Thiruchirappali, Thirunelveli, Tiruvannamalai, Vellore, Thiruvarur, Viluppuram, Virudhunagar, Ariyalore, Thirupur, Chennai. |
| WEST BENGAL<br>19 Districts | Kolkata, Bankura, Birbhum, Cooch Behar, Darjeellin g, Hoogly Howrah, Jalpaiguri, Malda, East Midnapore, West Midnapore, Murshidabad, Burdwan, Nadia, Purulia, North 24 Parganas, South 24 Parganas, North Dinajpur, South Dinajpur |

The survey personnel were selected in such a way that they were from the same state of study itself and they could converse freely with the breeders. The pre- survey analysis revealed the main barriers of production expansion in ornamental fish farming. They were - high electricity charges, difficulty in getting financing from institutions, difficulty in getting pure strains of quality brood stock, lack of infrastructural facilities, lack of market information regarding markets and prices, lack of steady demand, difficulty in marketing, lack of technical advice or good training, and lack of space. The surveyed breeders were asked to rank the constraints as 1 for the most difficult barrier to 8 for the least difficult barrier.

## FINDINGS OF THE STUDY

The study identified 1703 breeders from five states in India and carried out an in depth survey. In India, any person involved in activities such as breeding, rearing/growing or combining breeding with marketing activities related to ornamental fish is also described as a "Breeder". Hence the classification of breeders of India based on the general classification is given in Table 2. A person carrying out breeding activity exclusively should be termed as a breeder but the classification of the general category of breeders in India includes all those who were involved with any activity of

ornamental fishes along with breeding. Among the five states surveyed, West Bengal dominated with 47.6% of the total ornamental fish breeding farms in India and was followed by Kerala (23.7%), Tamil Nadu (17.5%), Maharashtra (8%) and Karnataka (3.3%). Figure 2, 3, 4, 5, and 6 shows the percentage of breeding farms in different districts of the five states - Karnataka, Kerala, Maharashtra, Tamil Nadu and West Bengal respectively. In Kerala, it was noted that the percentage of breeders were high in the districts, Thrissur (39%) and Ernakulum (18%) followed by Kottayam (11%) and Wayanad (7%). In Maharashtra, breeding units were concentrated in Mumbai (40%), Thane (31%), Ratnagiri (8%) and Pune (7%). In Tamil Nadu, 87 % of the breeding farms of the state were located in one district i.e. Chennai (Kulathur), followed by Dindigul (9%) and Madurai (4%).

**Table 2 : Distribution Of Ornamental Fish Breeders/ Breeding Units In India**

| Sl. no | States | Frequency | Percent |
|---|---|---|---|
| 1 | Karnataka | 56 | 3.3% |
| 2 | Kerala | 403 | 23.7% |
| 3 | Maharashtra | 136 | 8% |
| 4 | Tamil Nadu | 298 | 17.5% |
| 5 | West Bengal | 810 | 47.6% |
| | | **1703** | **100%** |

Source: SIF Primary Survey,2008.

The breeder category in India is given below and the activity carried out by them is given in bracket:

- Breeders (Only Breeding-B)
- Rearers/ Growers (Only Rearing-R)
- Breeder -Rearer (Breeding and Rearing-BR1)
- Breeder -Retailer (Breeding and Retailing- BR2)
- Breeder -Exporter (Breeding and Exporting-BE)
- Breeder- Rearer -Retailer (Breeding, Rearing and Retailing-BRR)
- Breeder- Retailer- Exporter (Breeding, Retailing and Exporting-BRE)
- Breeder- Rearer-Retailer-Wholesaler (Breeding, Rearing, Retailing and Wholesaling-BRRW)
- Breeder- Rearer- wholesaler (Breeding, Rearing and Wholesaling- BRW)

The classification of general category of breeders based on their activities and their distribution in India is given in the Figure 1.

**Figure 1: Category Of Ornamental Fish Breeders In Different States Of India**

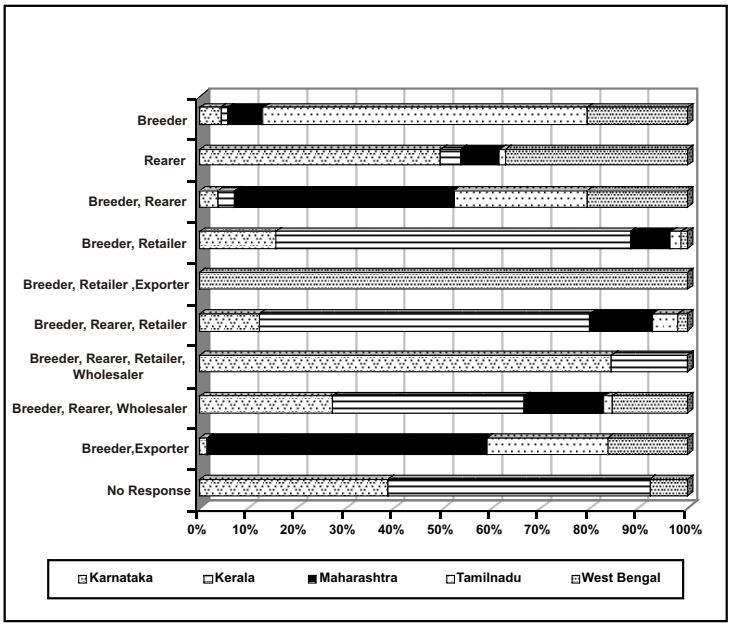


**Figure 2: Distribution Of Ornamental Fish Breeding Units In Karnataka**

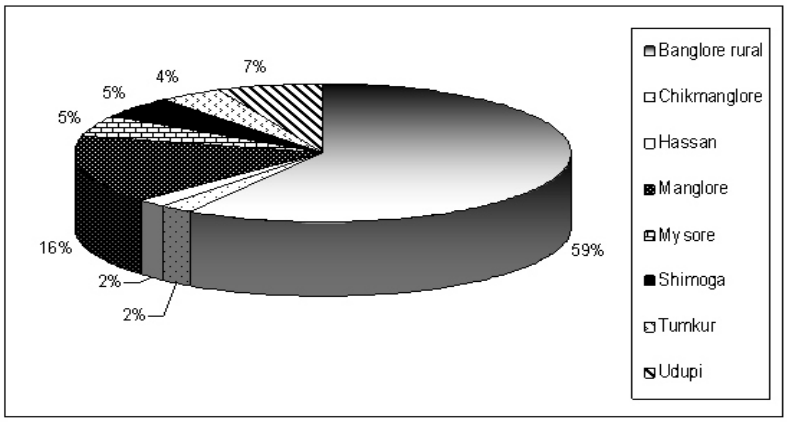



**Figure 3: Distribution Of Ornamental Fish Breeding Units In Kerala**

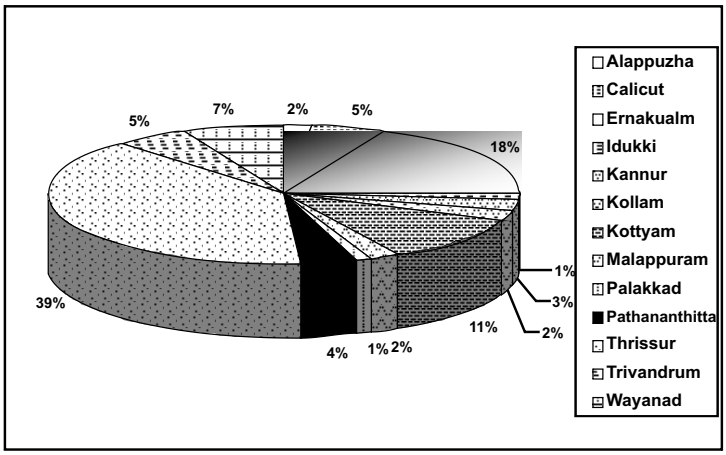



**Figure 4: Distribution Of Ornamental Fish Breeding Units In Maharashtra**

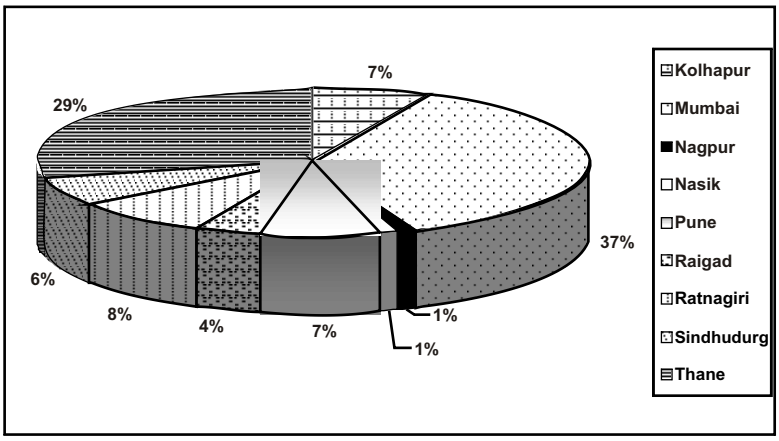


**Figure 5: Distribution Of Ornamental Fish Breeding Units In Tamil Nadu**

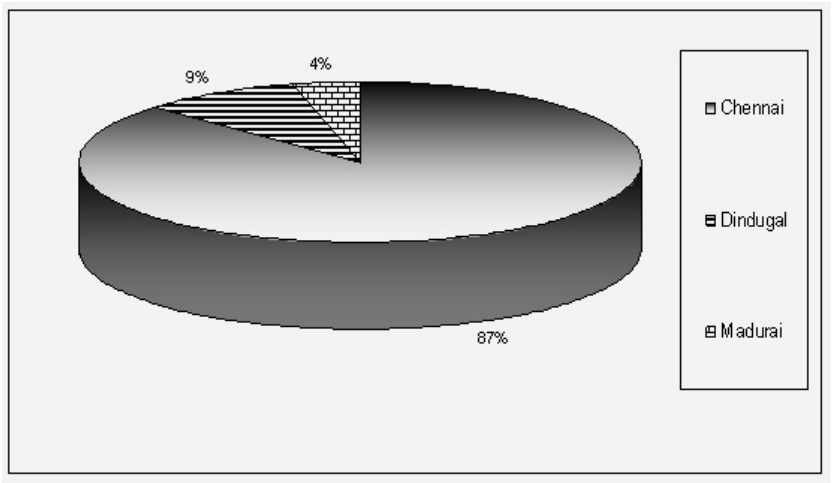
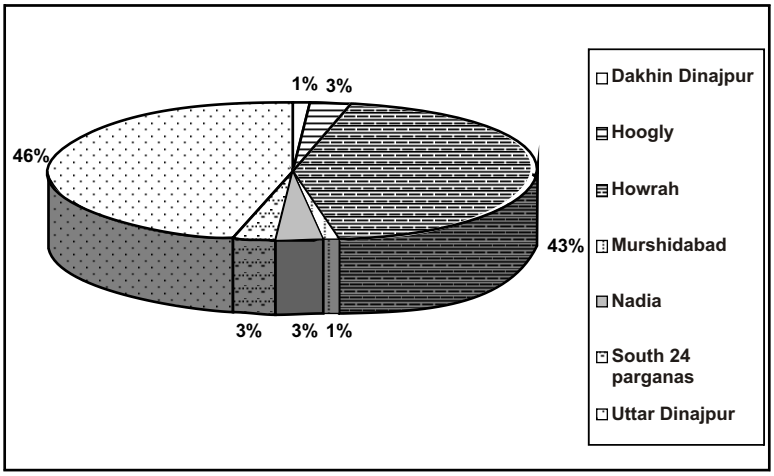



**Figure 6: Distribution Of Ornamental Fish Breeding Units In West Bengal**




Majority (81.3%) of the breeders in India bred exotic fishes and very less percentage of the breeders dealt with indigenous, marine and brackish water fish breeding. This was the same in the case of all five states surveyed. High percentage of the breeders (42.5%) in India bred less than 5 varieties, and only 21.6% bred 5-10 species. Very less percentage of the Indian breeders (4.5%) bred 10-15 species. Only 10 breeders in India bred more than 20 species at a time. Goldfish was seen to be the highest consumer preferred variety and hence, its breeding dominated the Indian breeding sector. The varieties of ornamental fish bred in India varied from state to state and different reasons can be attributed to this. First, the fish bred in any area or state depends on how developed the ornamental fish sector is in that area, second, the consumer preference levels in the state followed by the climatic conditions and the variation in water pH, hardness, temperature, etc. **Tissera (2006)** explained that in Srilanka, fish farmers and exporters concentrate on the proper conditioning and exporting while leaving fish production to those who do it the best. He described how the breeders of Srilanka were dissuaded from producing large number of varieties and were motivated to produce one or two varieties and developing their colour variants. In Karnataka, the main varieties bred are the common bred and butter species like Guppy, Molly, Platty, Sword Tail etc. The other common varieties bred are Gold Fish, Koicarp, Tiger Barb, Angel, Gourami etc. In contrast to Karnataka, the breeding sector of Maharashtra is very well developed. Apart from the common live bearers varieties, the breeders also breed varieties such as Oscar, Flower Horn, Tetras, Discus, Cichlids and prefer breeding high specialized varieties. In Tamil Nadu, the breeding sector is very well developed and breeders are highly dependent on this profession. They breed all the common varieties popular in the Indian ornamental fish Breeding sector and those that are preferred in the Indian market. Live Beares, Angels and Goldfishes were the main varieties cultured by the breeders in Kerala. Other varieties cultured were Barb, Oscars,

Suckers, Tetra, Shark, Gourami And Fighter. (Shyma, 2008). The study noted that majority of the breeders do not realize the importance of quality as the domestic market consumes whatever is produced, due to the deficit in demand and supply. Total Quality Management Practices have to be implemented in the breeding units, which can be a prerequisite for eco certification in the breeding sector.

**Table 3: Type Of Ornamental Fishes Bred By The Breeders Of India**

| | FRESHWATER EXOTIC | FRESHWATER EXOTIC& FW WILD CAUGHT | FRESHWATER EXOTIC, FW WILD CAUGHT AND MARINE | FRESHWATER EXOTIC AND MARINE | FRESHWATER EXOTIC AND BRACKISH WAT ER | NO RESPONSE | TOTAL |
|---|---|---|---|---|---|---|---|
| **KARNATAKA** | 50 | 4 | 1 | 0 | 0 | 1 | 56 |
| | (89.3%) | (7.1%) | (1.8%) | (0%) | (0%) | (1.8%) | (100%) |
| **KERALA** | 356 | 26 | 1 | 1 | 1 | 18 | 403 |
| | (88.3%) | (6.5%) | (0.2%) | (0.2%) | (0.2%) | (4.5%) | (100%) |
| **MAHARASHTRA** | 118 | 5 | 1 | 1 | 0 | 8 | 136 |
| | (86.8%) | (3.7%) | (0.7%) | (0.7%) | (0%) | 5.9% | (100%) |
| **TAMIL NADU** | 286 | 3 | 0 | 0 | 0 | 9 | 298 |
| | (96%) | (1.0%) | (0%) | (0%) | (0%) | 3% | (100%) |
| **WEST BENGAL** | 575 | 91 | 0 | 0 | 1 | 143 | 810 |
| | (71%) | (11.2%) | (0%) | (0%) | (0.1%) | 17.7% | (100%) |
| **TOTAL** | 1385 | 129 | 3 | 5 | 2 | 179 | 1703 |
| | (81.3%) | (7.6%) | (0.2%) | (0.3%) | (0.1%) | (10.5%) | (100%) |

Source: SIF Primary Survey,2008.

**Table 4 : Barriers For Production Expansion In The Ornamental Fish Breeding Sector In India**

| Barriers | India (Mean) |
|---|---|
| High electricity charges | 4.41(II) |
| Difficulty in obtaining Finance | 2.59(I) |
| Difficulty in obtaining Pure Strains | 4.68(IV) |
| Lack of Infrastructure | 5.92(VIII) |
| Lack of Market information | 4.65(III) |
| Limited demand | 5.63(VII) |
| Difficulty in Marketing | 5.93(IX) |
| Space Constraint | 5.47(VI) |
| Technical Advice | 5.12(V) |
| Source: SIF Primary Survey,2008. | |
| Figure in the paranthesis indicate the rank | |

On analyzing the mean of ranks for barriers in production, expansion by the breeders of India as a whole, it was noted that financing formed the main constraint followed by electricity charges, lack of market information, lack of pure strains of fishes, lack of technical advice, space constraint, limited demand and lack of infrastructure. Perishable nature of fish, difficulty in obtaining feasibility reports and the procedural difficulties made the obtaining of finances a difficult barrier to overcome. It was felt that the ornamental fish breeders have to pay high electricity charges based on industrial rate and it is not subsidized as in agriculture or small scale industry.

## SUGGESTIONS

**1.** Capacity building at all levels is crucial if the sector has to enhance its production.

**2.** A network of ornamental fish breeders and stakeholders in India has to be established. This can be made possible if the breeders are registered under MPEDA (Marine Product Export Development Authority of India) and the database of breeders is added to the MPEDA website for developing a network with marketers.

**3.** Along with the increasing of the number of breeders and assistance schemes, participatory rural appraisals and rapid rural appraisals have to be planned for the sector.

**4.** If nodal centres can be set up in 4-5 districts (having high concentration of ornamental fish breeders) in each of the five states, extension/outreach activities can be penetrated to all levels of breeders. Periodic visits (maximum 6 and minimum 2) have to be carried out to farms by the extension staff as in agriculture sector, diary sector etc. Any problem faced by the breeders have to be addressed by the extension staff and reported to higher ups and solved at the earliest disposal.

**5.** Trainings can be conducted on a periodic basis on different aspects which include, breeding, live feed culture, packaging and transportation, disease management, cluster development, scientific procedures of farm management, entrepreneurship and marketing. Training /reach out activities have to be planned by giving focus on the education level, experience, gender of the breeders and season of production and be conducted in areas near to the breeder farms. For less educated people, the training has to be modified and should be based on visuals, pictorial presentations, classes in local language and in farm training. For women breeders,the trainings can be conducted closer to their homes.

**6.**Develop clusters/consortium on a trial basis. Make people aware of the need of a consortium/cluster by means of training. Village level cluster development can enable the sourcing of inputs, and marketing of outputs as a cluster. Establishing of the marketing societies along with the cluster can be highly beneficial.

**7.**People following good culture practices have to selected and rewarded every year which can motivate the breeders.

**8.**Changing the electricity rate from industrial rate to agricultural rate, developing an area or special zones for breeding are areas which demand immediate attention for enhancing production.

**9.**Further domestic and export market research, capacity building activities for breeders and supply chain management with emphasis on packing and transportation seems warranted if fish production has to reach up to international quality benchmarks.

## CONCLUSION

The study identified 1703 breeders from five states in India. The state wise distribution of ornamental fish breeders showed that West Bengal dominates with 47.6% of the total ornamental fish breeding farms in India and was followed by Kerala (23.7%), Tamil Nadu (17.5%), Maharashtra (8%) and Karnataka (3.3%). Even though ornamental fish breeding is not as popular as agriculture or other activities of fisheries, for a significant proportion of the breeders, breeding was a full time occupation to maintain livelihood and not merely an additional income earner. A thorough empowerment and capacity building activities have to be imparted for enabling the sector to increase production of high quality fishes for domestic and export purpose.

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❁ Employee perspective is also important for the same study.

❁ An online banking comparison may be conducted among developed, developing and under developed countries.

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