



Development of Marine Ornamental Fishes of Andaman & Nicobar Islands Commercial Scope and Sustainability

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The ornamental fish production world-wide has grown to such an extent that it has earned for itself an integrated place of distinction in international fish business. It is estimated that about 1.5 - 2.0 million people worldwide keep marine aquaria and that approximately half of them are in United States alone. The hobby of maintaining an aquarium, with ornamental fishes and the associated activities viz., their collection from the wild and breeding them and rearing the spawn to adulthood has a global dimension now. There has also been a major upgradation in the practices of manufacture of aquaria and also in the distribution and wholesale and retail trading of ornamental fish. These improved activities have been growing very rapidly in the last few decades. While ornamental fish trade is mostly concentrated on freshwater species, in the recent years, a demand has sprung up for marine ornamental fish species too. New information and technologies related to marine aquarium construction and maintenance of fishes is such that aquaria for that purpose are also now available, besides techniques of breeding of marine ornamental fishes and also associated aspects. However, it has to be mentioned here that the number of marine ornamental species that can be economically bred and their young ones raised on commercial scale is extremely limited. Hence, the main focus, in the present situation, is directed at collection of marine ornamental fishes from the wild. An associated disadvantage is that collections from nature and supplies to the customers (hobbyists) entail the risk of high mortality because of long distance transportation, temporary intermediate storage, and also because of adoption of potentially destructive collection practices like cyanide poisoning to catch fishes, which is however often avoided, keeping the purpose of the capture in view.

The global ornamental fish industry is worth about 15 billion US \$ dollars. The industry has been growing at the rate of about 14% since 1985. At present, more than 100

countries are engaged in ornamental fish export activity. As per an FAO's report, Singapore alone contributes around 23.9% out of the total annual global export value (2000) of the industry with freshwater and marine output estimated at US\$ 182.2 million. Even countries like Sri Lanka shared a total export of 4.3% (7.7 million US \$) in total world trade of ornamental fish in 2000. In other words, it can be said that, as such, Asian countries contribute more than 50% of the total value of supplies of ornamental fishes (both freshwater and marine) worldwide. Out of this, 80% of freshwater ornamental fishes are produced at the breeding farms, and 5% of them are collected from the wild. Marine ornamental fishes (15%) are collected from the wild. Thus marine ornamental fish trading is mostly restricted to wild collections as at present.

The contribution from India is almost negligible so far as world trade of ornamental fishes is concerned, despite the fact that, there exists a vast scope for the development of Ornamental fish trade of the country. There are over 200 ornamental fish species (both endemic and exotic) available in India. Yet the export of ornamental fish species from India is presently restricted to the freshwater fishes alone. This is because of the non-utilisation of the opportunities of utilising the immense scope in the production and supply of marine ornamental fishes. This inability can be attributed to inadequacy of infrastructure facilities, and the limitations of entrepreneurial initiatives, which could be reversed only through creation of awareness among stakeholders with emphasis on money earning potential.

The Andaman & Nicobar group of islands are located in the Bay of Bengal between 92° 12' E and 93° 57' E and 6°45' and 13°47' E. The characteristic features of the islands are low ranges of hills and narrow valleys, covered with tropical forest and mangroves. There are 572 Islands including islets, reefs and isolated rock areas. The ornamental fish

potential of most of these areas has not yet been properly explored. One reason for this can be that human population on these islands is restricted to only 38 of them. The island is having a coastline of about 2,000 km encompassing around 16,000 sq. km of continental shelf area. The Islands are having about 6 lakh sq. km. of exclusive economic zone (EEZ), which is almost 30% of the EEZ of the Indian subcontinent. As a unique feature, the fisheries resources of the sea waters around A & N harbour different types of fishes as well as other aquatic organisms. However, the present rate of utilisation of these resources is far below the sustainability level. Estimated fishery potential of the EEZ of A & N islands is about 1.48 lakh t. Against this, the average level of annual of fish production is only about 26,338t (2000-01 to 2004-05).

Andaman and Nicobar islands possess a rich diversity of fishery resources. Over 1,150 fish species belonging to 507 genera and 151 families in fresh, brackish, coastal and offshore waters have been identified. It is well known that coral reef areas are potential grounds that hold colourful fishes. It is estimated that more than 250 species of fishes from waters around Andaman and Nicobar islands are of ornamental value, conducive to be kept in aquaria. Ornamental fishes of this kind, belonging to different families, are commonly found in these waters. These consists of damsel and anemone fishes (Pomacentridae), butterfly fishes (Cheatodontidae), Surgeon fishes (Acanthuridae), angel fishes (Pomacanthidae), wrasses (Labridae), gobies (Gobidae), grouper (Serranidae), dart fishes (Microdesmidae), rabbit fish (Siganidae), dragon fishes (Callionymidae), rock snapper (Blennidae), rabbit fishes (Lutjanidae), trigger fishes, box fishes etc. In addition to these fishes, there are also about 180 species of coral fishes and 30 species of anemones currently available in waters around these islands. Harvesting of coral





fishes for keeping in aquaria is a delicate matter. One should not jump into the collection of these fishes without the backing of proper knowledge about the coral ecosystem and their sustainability. In coral reefs, sea anemones, fishes and other organisms live together as aggregates. Wanton removing or destroying any one of these components would significantly affect the health and well being of the others. Proper base-line study has to be however conducted before granting permission for harvesting of coral fishes. This is, however, a policy matter. Post-harvest studies also would have to be conducted to understand the impact of exploitation of resource and the temporal changes on coral reef and coral fish biodiversity in the collected area. Such a study will give a clear idea about the repercussions of harvest pressure on the structure of populations and their regeneration time.

Coral reef areas can generate significant returns to the people of these islands, when the areas are judicially and sustainably regulated. However, till date, no well developed system of collection, rearing, transportation and export of marine ornamental fishes has been introduced in this area. Some of the problems hindering the development of ornamental fish trade are explained here under:

- Most of the stakeholders and also entrepreneurs among them are not aware of the importance of ornamental fish trade as a source of livelihood.
- There is the absence of a well organised ornamental fish trade in freshwater as well as marine sectors.
- Non-availability, irregular supply and high cost of inputs for ornamental fish trade like feed, medicine, decorating items, pebbles, aerators, filters etc., are deterring the development of ornamental fish business.
- Developmental Agencies need to take interest for the development and popularisation of the ornamental fish trade by organising the provision of loan, subsidy, technical help and infrastructure.
- There is a lack of technological knowledge and skills among the

stakeholders to take-up ornamental fish culture in a scientific way.

- Misconception among people, that aquarium keeping is a status symbol for the rich alone, prevails.

All the above problems can be solved so far as Andaman and Nicobar islands are concerned. In fact, the islands can be developed as a model for marine ornamental fish business, as the scope and sustainability of marine ornamental fish trade in Andaman and Nicobar islands is very high. This is because:

- The area is blessed with coral reefs that are a home for an innumerable number of marine ornamental fishes. Judicious exploitation of these resources may not be a threat to the sustainability of the natural population.
- Breeding procedures of many marine ornamental fishes have been standardised. These would facilitate corrections to effects of fishing and other pressures on natural stocks.
- Easy availability of uncontaminated waters around Andaman and Nicobar Islands will be an added advantage for stock maintenance efforts.
- Technological know-how can be pooled up from many research and educational institutes like Central Agricultural Research Institute, ICAR, Port Blair, National Institute of Ocean Technology, Department of Ocean Development, Minnie Bay, Zoological

Survey of India, Port Blair and, Centre for Ocean and Island studies, JNRM Campus, Pondicherry University.

- Very high demand for marine ornamental fishes, in USA, E.U., and in many other western countries and in Japan is an encouraging feature for the promotion of ornamental fish production.
- Unemployed youth can take up this line of commercial activity directly as a source of livelihood. Developments of this industry will open up several avenues for ancillary industries.
- Maintenance of a marine aquarium is not a very tough job. In many hotels, homes and in public places marine aquaria are maintained for display.
- Tourism is one of the main sectors contributing to the economy of Andaman and Nicobar islands. Hence, development of eco-tourism in Ornamental fish area will give boost to this industry.
- Andaman and Nicobar islands are well connected to the mainland by air. Hence transportation of live ornamental fishes will not be a difficult task. The prevailing market prices of ornamental fishes can easily absorb the transportation costs.

Some of the common marine ornamental fishes available in Andaman and Nicobar islands are listed below.

Family	Species
Pomacentridae (Damsel and anemone fish)	<i>Amphiprion percula</i> , <i>A. oellaris</i> , <i>A. clarkii</i> , <i>A. ephippium</i> , <i>A. alkaalopsis</i> , <i>A. sebae</i> , <i>A. frenatus</i> , <i>A. peridarion</i> , <i>A. polymnus</i> , <i>A. blaculeatus</i> , <i>Premnas biaculeatus</i> , <i>Dascyllus bimaculatus</i> , <i>Dascyllus aruanus</i> etc.
Chaetodontidae (Butterfly fish)	<i>Chaetodon collaris</i> , <i>C. auriga</i> , <i>C. citrinellus</i> , <i>C. ephippium</i> , <i>C. gutatissinus</i> , <i>C. klenni</i> , <i>C. falula</i> , <i>C. trifasciatus</i> , <i>C. decussates</i> , <i>Chelmon tostratus</i> , <i>Forcipiger flavissimus</i> , <i>F. longirostris</i> , <i>Hemitaenichthys polylepis</i> , <i>Hemiochus acuminatus</i> , <i>H. diphreutes</i> , <i>H. sigularius</i> , <i>H. varius</i> , <i>Chelmon rostratus</i> etc.
Pomacanthidae (Angel fish)	<i>Pomacanthus imperator</i> , <i>P. annularis</i> , <i>P. semicirculatus</i> etc.
Labridae (Wrasses)	<i>Anampses caeruleopunctatus</i> , <i>Choerodon robustus</i> , <i>Halichoeres chrysus</i> , <i>H. hortulances</i> , <i>Thalassoma purpureum</i> , etc.
Gobidae	<i>Asterropteryx septipunctatus</i> , <i>Periophthalmus keelocuteri</i> , <i>Oplopomus oplopomus</i> , etc.
Callionymidae (Dragome)	<i>Synchtiropus splendidus</i> , <i>S. stellatus</i> , etc.
Microdesmidae (Dast fish)	<i>Ptereleotris hanae</i> , <i>P. heteroptera</i> , <i>P. microlepis</i> , etc.
Serranidae (Grouper)	<i>Pseudamthias squamipinnis</i> , <i>Cromileptes altivelis</i> , <i>Grammistes sexlineatus</i> , etc.
Blennidae (Rock skipper)	<i>Istiblennius lineatus</i> , <i>I. endentulus</i> , <i>Petroscirtes mitratus</i> , <i>Salarias fasciatus</i> , etc.
Lutjanidae	<i>Lutjanus kasmira</i> , <i>L. argentimaculatus</i> , <i>L. decussates</i> , etc.
Siganidae (Rabbit fish)	<i>Siganus magnificus</i> , <i>S. vermiculatus</i> , <i>S. spinus</i> , etc.





Sustainability of this industry cannot be achieved in a short time. At the same time, an Industry cannot thrive for a long time without sustainability. For achieving sustainable marine ornamental fish trade, it is felt that the following points have to be taken into consideration:

- Protection and prohibition of some reef zone fishing, especially in the spawning areas. Fishing should be prohibited during breeding season of fishes.
- Rotational harvesting can be undertaken in the coverage of a number of reef areas. Allowing fish harvesting only from a particular reef for a year, leaving the fishes in the other reefs areas to grow and mature will be a good strategy to minimise the harvesting pressure in other reef areas. A practice based on this system is being efficiently carried out in Philippines. Here, out of three coral reef zones, harvesting is allowed only in a particular area in a year, leaving the other two areas untouched.
- Resource mapping is to be done and resource abundance has to be standardised at a sustainable level so that the industry can run in an enduring way.
- Quota and licensing system can be introduced. As soon as the target is achieved harvesting would have to be stopped. The CPUE has to be less than 50% of the available stocks for

the sustainability of a species.

- Total ban on the use of destructive method of fishing like cyanide, explosives, non-selective gear, etc. has to be imposed. Destruction should not be done to the corals during collection of fishes.
- Fish harvesters should be educated and trained about the importance of coral reef and reef fishes to ensure sustainable collection of coral fishes.
- A coordinated approach and an effective information exchange among fishermen, middlemen, wholesalers and retailers are essential. These will eliminate irrational harvesting and will facilitate retention of resources.
- Species in respect of which there is limited information on feeding, growth, and reproduction and in respect of fishes with discontinuous distribution and of an endangered status should not be allowed to be harvested. Many coral-loving fishes have symbiotic associations. Hence, indiscriminate exploitation of corals, anemones and fishes will negatively affect the association with serious repercussions.
- Continuous monitoring and generation of scientific data should be undertaken on biodiversity, resource dynamics, mortality, reproduction, recruitment and CPUE in respect of each of the species.
- Captive breeding technology should be standardised for different varieties of reef aquarium fishes. This will

decrease the pressure on natural stocks and will reduce the expenditure on sea ranching programmes.

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India Poised to Produce Certified Organic GFP

As part of the India Organic Aquaculture Project (IOAP), India is likely to become the first in the world to produce certified organic Giant Freshwater Prawn (GFP). This is part of the Marine Products Export Development Authority's (MPEDA) project on organic aquaculture in India with technical and consultancy collaboration with Swiss Import Promotion Programme (SIPPO).

At a recent meeting with MPEDA, Mr. Thomas Sporrer of SIPPO spoke about the vast potential of the emerging organic shrimp and GFP market in Europe.

To induct select farmers of Kerala and Andhra Pradesh into organic aquaculture, the project authorities would be visiting the farms in these states shortly. MPEDA and SIPPO has earlier signed an MoU for imparting technical and consultancy collaboration.

GPF Production: The meeting was also told of the changing trends in global fish consumption as a large number of affluent Europeans are willing to pay a higher price for certified organic fish products. GFP is a traditional freshwater shrimp found in all Coastal States.

Prawn Farmers Federation of India has estimated that GFP and shrimp production and sales from the country would double from Rs 4,800 crore to Rs 10,000 crore by 2012. This is likely to come about through an expansion of area under prawn culture by over 1.65 lakh hectares, of which one lakh hectares would be brackishwater and 65,000 hectares of freshwater lands.

An additional investment of Rs 4,500 crore would be required, while availability of quality seeds, institutional finance and insurance would make the programme more feasible.

