



# MPEDA

Newsletter

Vol.VII/No.4/ JULY 2019

## Hyderabad Turns Blue

**AQUA AQUARIA INDIA 2019**

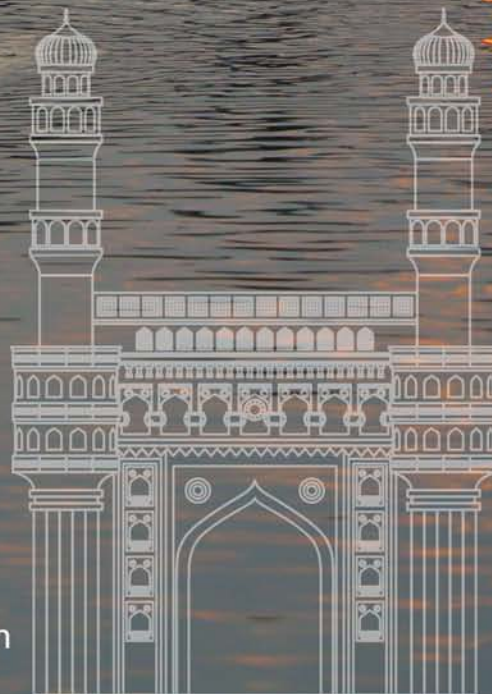
**30<sup>th</sup> Aug- 1<sup>st</sup> Sept 2019**

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# MPEDA

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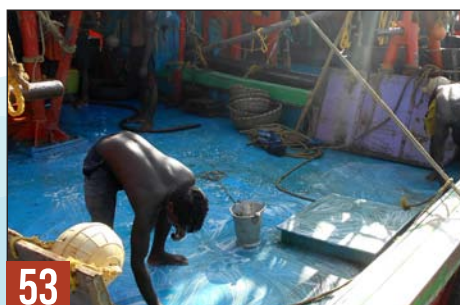
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**K. S. Srinivas IAS**  
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Dear friends,

**W**arm greetings from MPEDA!!

This special issue of MPEDA Newsletter is being brought out on the occasion of Hyderabad hosting the 5<sup>th</sup> Edition of Aqua Aquaria India, the largest exposition of aquaculture and aquarium fish. It is the first time MPEDA is organizing this exhibition in a non coastal state.

The lion's share of Indian seafood exports are comprised of products originated from marine capture fisheries and coastal shrimp farming. Though India is bestowed with a vast expanse of rivers, lakes, ponds, reservoirs and other similar water bodies, the contribution from inland fisheries or inland aquaculture is quite low when it comes to the exports. The inland sector also demands adequate cold chain facilities to preserve the catch. However, countries like China, Vietnam, Myanmar and certain African and European nations have made great strides in inland aquaculture production. The products from inland fishery or aquaculture not only serve for their own food security but also generate export revenue. Those countries use scientific and advanced techniques to enhance the productivity and product quality. Despite the huge potential, inland aquaculture sector is largely following traditional ways compromising the output and quality of produce. India's inland sector with a production of around 8.98 million metric tons, is mostly supporting the domestic fish consumption. However, with the adoption of scientific and advanced techniques, the quality and productivity can be furthered, bringing out better returns to the farmers. This also has to be supported by adequate cold chain infrastructure so that to assist the inland sector to increase their contribution to the export markets.

It is with this aim the Aqua Aquaria India is being organized in Hyderabad with the tag line "Taking Blue Revolution to India's Hinterland". The B2B stalls of the exhibition will showcase advanced technologies in scientific aquafarming. There are sessions by invited national and international experts in the technical sessions organized on the side lines of the show, which will be helpful for the farmers as well as the interested entrepreneurs to know more about the scientific aquaculture. The technical sessions also have an exclusive session wherein the experienced farmers share their success stories on a variety of fin fish and shell fish species, and the trouble shooting measures. The live fish demo units by RGCA will be added attraction for the farmers and public alike. I wish all the exhibitors and the delegates a fruitful time during the exhibition at Hyderabad.

Thank you.

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# Brand Building for Indian Seafood Products

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**\*C. O. MOHAN, \*\* RAVISHANKAR C. N.**

**M**ankind is oriented towards search for safe and healthy food, all through its evolution. Hence, if there is one industry that leads in terms of production, consumption, exports and expected growth, it is definitely food processing industry. Being one of the most vibrant markets, India cannot lag behind in this surge. The Indian food and retail market is poised to touch USD 484 billion by 2020.

Among the food industry, seafood sector is considered as sunrise sector due to its vast potential for both domestic and export market. The demand for both culture and capture fish is on rise due to its proven health benefits. Over the ages, fish held a special position in the menu as it is considered as a treasure store of nutrients. It provides more than 20 per cent of the average per capita animal protein intake for three billion people. This is more important as fish provides more than 50 per cent of the animal protein intake for coastal and some of the under-developed countries population.

It has been scientifically proven that fish and fish products are excellent sources of high-quality protein; bioavailability of protein from fish is approximately 5-15% higher than that from plant sources. Fish contains all the amino acids essential for human health. Many fish (especially fatty fish) are the best source of long-chain omega-3 fatty acids, which contribute to visual and cognitive human development, especially during the first thousand days of a child's life.

However, the fat content and fatty acid profiles of farm-raised fishes get affected by the feed used in culture practice. Though the fish consumption has increased, people are obtaining lesser amounts of omega-3 fatty acids from aquatic foods. This is because of the fact that these fats are present more in marine fishes than in freshwater fish.

Fish also provides essential minerals such as calcium,

phosphorus, zinc, iron, selenium and iodine as well as vitamins A, D and B, thus helping to reduce the risks of both malnutrition and non-communicable diseases which may co-occur when high energy intake is combined with a lack of balanced nutrition.

Nutritional content is especially high in small fish species consumed whole and in fish parts that are not usually consumed (such as heads, bones and skin) which are having lower economic value. Hence, it is desirable to increase the production and consumption of small fish and to find ways of transforming the non-consumed parts into nutritionally rich products.

Seafood has long been an important part of human diets, and increasingly a major source of economic value. Dependence on fish is usually higher in coastal than in inland areas. About 20 per cent of the world's population derives at least one-fifth of its animal protein intake from fish, and some small island states depend almost exclusively on fish. Among the animal's proteins, fish protein is one of the cheapest animal protein sources and it accounts for about 40 per cent of the total animal protein intake of an average person in the tropics.

However, the protein intake from fish is not uniform throughout the world. Globally, fish accounts 6.7 per cent of all protein consumed by humans and fishery products accounted for just one per cent of all global merchandise trade in terms of value, representing more than 9 per cent of total agricultural exports. Worldwide exports accounted USD 150 billion in 2017, up from USD 8 billion in 1976. Developing countries accounted for 55 per cent of fishery exports, providing higher net trade revenues than meat, tobacco, rice and sugar combined.

In this India with a coastline of over 8,118 kms has a crucial role to play. The nation has 2.02 million sq. km of EEZ and 0.5 million sq. km. of continental shelf and is estimated to have exploitable resources to the tune of 4.41 million tons.

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\*Senior Scientist, Fish Processing Division

\*\* Director, ICAR-Central Institute of Fisheries Technology, Cochin



## SPECIAL PAPERS

Apart from the marine resources, inland water resources like rivers (major rivers covering around 29,000 km), reservoirs (3.15 M ha), ponds and tanks (2.35 M ha), flood plains, wet lands (0.2 M ha) add up to the water resources available in the country. Out of 1.24 M ha of brackish water available, up to 1.2 M ha is suitable for shrimp farming and only 14 per cent of it is now utilized for it. The fish production of the country increased constantly over the years from 0.75 mmt during 1950-'51 to over 13 mmt during 2018-'19. This is expected to reach 16 mmt by 2019-20, which will then constitute about 6.3 per cent of the global fish production.

History says that the first consignment of frozen shrimp was exported in 1953 from Cochin Company, Kerala and currently India is exporting fishery products worth Rs. 45,106.89 crores. According to UN FAO, global aquaculture production is anticipated to exceed the 100 million ton mark for the first time in 2025 and to reach 102 million tons by 2026. This offers much more opportunities to diversify fishery products.

India is on par with global trend in fish production as well as export of seafood products. This is evident from the fact that India ranks second in aquaculture fish production and sixth in capture fish production. The Indian fish and seafood industry touched an all-time high in the most recent years, with an annual export value of USD 7.08 billion in 2017-'18 by exporting

13,77,244 tons of fish.

Over the years, Indian seafood industry has established state-of-the-art facilities to process, pack and export as per international norms. Today, India has world class seafood processing plants that follow quality control regimes compliant to stringent international regulatory requirements. Indian fishery products are cherished in more than 160 countries, of which United States of America is the largest market followed by South East Asia and the collective members of the European Union.

With the growing demand for Indian seafood products across the world, the dynamics of the seafood business in India is changing fast. There is a tremendous growth in the resources and infrastructure of the Indian seafood industry today. India has 37 live fish and shell fish handling units and 42 fresh and chilled fish processing units (Table 1) with a capacity of 2,142 and 1488 MT per day. India has an installed processing capacity of 27,850 MT with 529 sophisticated processing plants apart from other supporting system (Table 2). Almost every unit has an HACCP system and other quality control systems on par with the world to ensure highest quality output.

Although Indian seafood industry is well-equipped to cater to the international standards, the value realisation for Indian seafood product is very poor compared to many neighbouring countries. The

**Table 1. Indian Seafood handling facilities**

Facilities	Numbers	Quantity (MT per day)
Fresh / chilled	42	1488
Live fish & shellfish	37	2,142
Dried & salted	69	845

**Table 2. Indian Seafood processing facilities**

Facilities	Numbers	Quantity (MT per day)
Pre-processing / peeling shed	620	11,657
Processing units	529	27,850
Chilled store	29	11,376
Cold store	479	193,464
Dry fish products store	57	11,506
Ice plants	78	2,211
Others	32	7,701



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major reason for this is lack of globally-recognisable seafood brands and lack of product diversification.

Most of Indian seafood is being exported in raw frozen form, which are reprocessed and marketed in their own brand in the importing countries. Indian seafood industrialists have invested in new machineries, technology, importing a variety of food ingredients and packaging material to create better value. It is processed following strict quality norms to provide safe and nutritious seafood products to consumer with long shelf life.

Very few processors are marketing the products in their own brand identities and rest of the Indian seafood processing units are exporting raw frozen products. For getting better returns, seafood processors must be both an efficient manufacturer as well as an efficient marketer.

Edmund Jerome McCarthy, an American marketing professor and author, had proposed 4Ps of the marketing mix in 1960s – which are product, price, promotion and place. Branding, which is the part of promoting the product, is one of the important step in efficient marketing. The Indian seafood processor need to gear up for this to sustain in a global market overflowing with seafood products.

A brand is any word, creative design, fonts, sound or colour that a company uses to provide an identity that distinguishes its product from the others to avoid

A BRAND IS ANY WORD, CREATIVE DESIGN, FONTS, SOUND OR COLOUR THAT A COMPANY USES TO PROVIDE AN IDENTITY THAT DISTINGUISHES ITS PRODUCT FROM THE OTHERS TO AVOID POTENTIAL COMPETITION.

potential competition. Creation of brand helps in building relation with the customers. Building brand is not an easy task. It takes time and resources to build a brand, but once the brand has created an impact on the consumers, marketing as well as revenue will increase many folds.

Many of the Indian food products brands are in great demand due to the trust of the consumers on its

quality. Consider this, iD Fresh food was launched in 2005 with an investment of Rs 25,000 in breakfast food product segment and is now aiming to become a Rs. 1,000 crore company. Innovations from firms like ITC Foods, Britannia, Nestle, MTR, Licious, Haldiram and other small players are all focussed on tapping the potential of the agro-food market.

The ITC foods with its brands like Aashirvaad, Sunfeast, YiPPee!, Bingo!, B Natural, Kitchens of India, Fabelle, Sunbean aims to achieve a turnover of Rs. 1,00,000 crore business by 2030. At present brand Aashirvaad alone has a turnover of Rs. 4,000 crore; Sunfeast over Rs. 3,500 crore; Bingo! Over Rs. 2,000 crore, YiPPee! is over Rs. 1,000 crore and Candyman over Rs. 500 crore per annum.

Natural, health aspects like low cholesterol, high in docosahexaenoic acid (DHA) or polyunsaturated fatty acid (PUFA), fortified with vitamins, collagen, calcium, fibre rich, reduced salt and sugar levels are the trending captions for most of the food products to capture market. Seafood is rich in PUFA including eicosapentaenoic acid (EPA) and DHA, minerals including calcium, low in salt content. This make it a natural choice for many consumers, if it is supplied in convenient form maintaining quality, hygiene and freshness. It is right time for seafood sector to build their own brand aiming for both export and domestic market as the Government of India is very positive for such initiatives.

There are three elements within a brand which include brand name, logo and tag line. A 'brand name' consists of simple wording that defines the product and is designed to promote or create awareness to the consumers. These brand names may provide information on the fish caught, processed hygienically or ethnic product. All these will create the right brand image for the customers. Based on consumer's choice these brand names can be either locally harvested, collected from pristine Indian waters or if a geographic location is known for fresh local seafood, it can be part of brand name. The brand names can be registered for trademark protection for obtaining full ownership of the brand. It helps in protecting brand name, logo or symbol used for the product legally.

'Logo' complements the brand name with distinctive symbol or image as the visual imagery gives greater impression compared to words alone. Design should be simple, attractive and easy to remember by the consumer for better reach. Both brand name and logo should be used for all the promotional activities. Use

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of appropriate colour and graphical design will help in creating better logo.

'Tag line' further defines and identifies the brand name to the target customers. Tag line is essential as it helps in distinguishing your product from the others. For example, brand name and logo focuses on the product being made with seafood or any other material while the tag line highlights its traditional or ethnic preparation, locally harvested or quality seafood product.

### **For building brand for seafood product, following steps can be followed.**

- Market survey to collect information on the target group, products and choice available, and direct and indirect competitors to be faced. Survey on the consumers regarding their choices, the brand they buy and the social media which they are following. Decide on the product, which distinguishes from the competitors.
- Define the product focus and its advantages. It is very important to inform the consumer about the advantages it offers over the existing brands. Unique value proposition offered by the product has to be focussed and promoted. It can be either health benefits, low price or it can be a social or environmental cause. For example, elements like reduced carbon foot print compared to its competitors, biodegradable packaging material compared to plastic counterparts, intelligent information on the product embedded in the packaging can give a unique identity to the brand.
- Choose a brand name for the product carefully as the brand name will impact logo, marketing and intellectual property protection etc. Choose a name that will be difficult to reproduce by other players and it should be very distinctly different. You can play with the brand name like using initials of a longer name, altering word by removing or adding letters or using Greek or Latin endings, combine two or three words, include a metaphor and acronym. Before deciding on the brand name, thorough survey on the existing brand name or similar brand names or trade mark registration has to be carried out as it may affect the business.
- Choose the brands colour and fonts for better visual clarity. Colours also convey feelings choose wisely depending the product and its intended use. If already a competitor exists, choose different colour to avoid confusion among consumers. It is better not to use

more than two fonts for effective design.

- As the logo is the first things that comes to mind of customers and will be the face of your brand, it should be unique, identifiable which should be scalable to present at all sizes.
- Define the traits or adjectives that describes the product. This will be useful for providing a tag line or slogan for the brand. It should either reflect the quality or hygiene of seafood, highlight the geographical location of harvest, controlled culture without use of antibiotics or pesticides, packed in natural bags etc. All the three elements, brand name, logo and tag line are to be used in all the promotional activities like print, visual, online etc.

Apart from branding, the product also should meet the consumer's expectation in its quality, taste and better price. There are more than 40 global top seafood brands but none from India in the list. Gorton's, Star Kist, SeaPak, Trident, Bumble Bee, Chicken of the Sea, High Liner Foods, Van deKamp's, Saucy Fish, Rebel Fish, Young's, Iglo, Aqua Star, Orca Bay, Ocean Beauty, Deutsche See, Clearwater, Labeyrie, Matlaws, Fleury Michon- these are just a few of the world leading seafood brands that have endured the test of time and continue to thrive today.

### **ICAR-CIFT comes forward**

ICAR-Central Institute of Fisheries Technology, under the Indian Council of Agricultural Research, New Delhi, offers services to build seafood brand through its Agri-Business Incubation (ABI) facility. It encourages entrepreneurship development as a mentor and handholds the new and existing companies by providing suitable guidance and transfer of technology. ABI also offers services on building brands, design of logo, tag line and packaging and labelling with attractive designs.

Looking at the magnitude of the seafood sector and the opportunities existing, building a branded seafood at this current scenario will be advantageous as there are very limited branded seafood products in Indian and global market. ICAR-CIFT's service can be utilized by the industry for this purpose. Some of brands developed with the help of ICAR-CIFT are given below.

It is not an easy task to design and build a brand. But once the brand is established, it will yield the best results for many years if the business is managed



## SPECIAL PAPERS

efficiently. Right now, seafood sector has lot to offer if variety of convenient products are developed and

marketed under a trusted brand. This is the right time to venture out and net profits.



'Foo Foods' a ready to eat traditional Mussel and rice product in retortable pouch



'Prawnices' for extruded snack products with prawn flavour



'Monsoon Bounty' for ready to retort pouch processed and canned products



Brands developed by ICAR-CIFT for entrepreneurs

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# Netting New Realms of Marine Fisheries Extension Services

Extension services play a pivotal role in the development of fisheries sector by providing technical assistance, public outreach, training and education and an important link between research result and the end users of research findings. Extension involves a complex process and its effects are not always clearly visible within a short period of time. An effective extension service requires sound management at various levels, based on an understanding of what is happening in the field. Fisheries management measures for ensuring the quality and sustainability of fish stocks requires rigorous education campaigns and public participation programmes promoting post-harvest handling and sustainable ways of fishing.

IN INDIA, VARIOUS GOVERNMENT AND NON-GOVERNMENT ORGANISATIONS ARE TAKING A LEADING ROLE IN THE CONSERVATION OF NATURAL RESOURCES AND BIODIVERSITY BY ASSOCIATING WITH THE LOCAL COMMUNITY.

In India, various government and non-government organisations are taking a leading role in the conservation of natural resources and biodiversity by associating with the local community. Unfortunately, many of our management measures failed to bring out the desired results due to lack of proper planning and implementation. Imparting training to fishermen at the grassroots level is a challenging task for which the involvement of agencies working close to the fishermen is highly imperative.

The conventional system of extension through the official machinery needs to be replaced by an agency, which can reach out to the grass root levels and work for the welfare of fisher folk. Training fishermen on marine conservation, post-harvest handling and other techniques requires devoted efforts from a dedicated extension agency. Such agency will be

far more effective in imparting training to fishermen and fish workers and thus bring about a "bottom up" approach to various issues related to fish quality management, conservation and sustainable fishing.

### Idea of NETFISH

The Network for Fish Quality Management and Sustainable Fishing (NETFISH) was formed in 2006 as a society under the aegis of Marine Products Export Development Authority (MPEDA). NETFISH was formulated to concentrate deeply on capacity building in fish quality management and conservation of marine resources at the grass-root level by networking with fishermen societies, federations and other non-governmental organisations.

Chairman of MPEDA heads the organisation as the President and the Chief Executive Officer stationed at Head office in Vallarpadam, Kochi executes the extension activities through the State Coordinators deployed in each maritime state. Further, various Non-Governmental Organisations (NGOs) with experience in fisheries development activities have been selected as members in NETFISH and the field level activities among fisher folk are carried out by the State Coordinator with the support of trained personnel from the NGOs as well as resource persons from fisheries institutes, universities, departments etc.

### Vision and Objectives

The vision of NETFISH is to empower seafood sector by imparting knowledge to fishermen, fisherwomen, processing workers, technicians and other fishery stakeholders on hygienic methods of post-harvest handling and sustainable fisheries development. To ensure sustainability in fisheries sector and to enhance the seafood export from the country, NETFISH has designed the following objectives.

- Function as the focal point for upgrading the technology and quality management of fishing and fish processing sectors at the grass root level.
- Organise appropriate training programmes on fish

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quality management and conservation of fishery resources in all the maritime states of India.

- Network with stakeholder organisations by inducting their representatives in to the general body.
- Assimilate, absorb and transfer technologies related to capture fisheries.
- Develop systematic linkages between international, national, state, district institutions of excellence in the field of extension and marketing.
- Facilitate public or private investment in infrastructure development.

### NETFISH Strategy

NETFISH has devised its activities on a three-tier system as follows: (i) giving awareness training classes repeatedly in selected places so as to change the mindset of the target group towards betterment, (ii) providing practical demonstrations and skill development trainings on hygienic handling methods, sustainable fishing methods, value addition etc. and (iii) arranging meetings and discussions with stakeholder's associations and government officials for the development of the sector. NETFISH is liaising with State as well as National level agencies to achieve its goals more effectively.

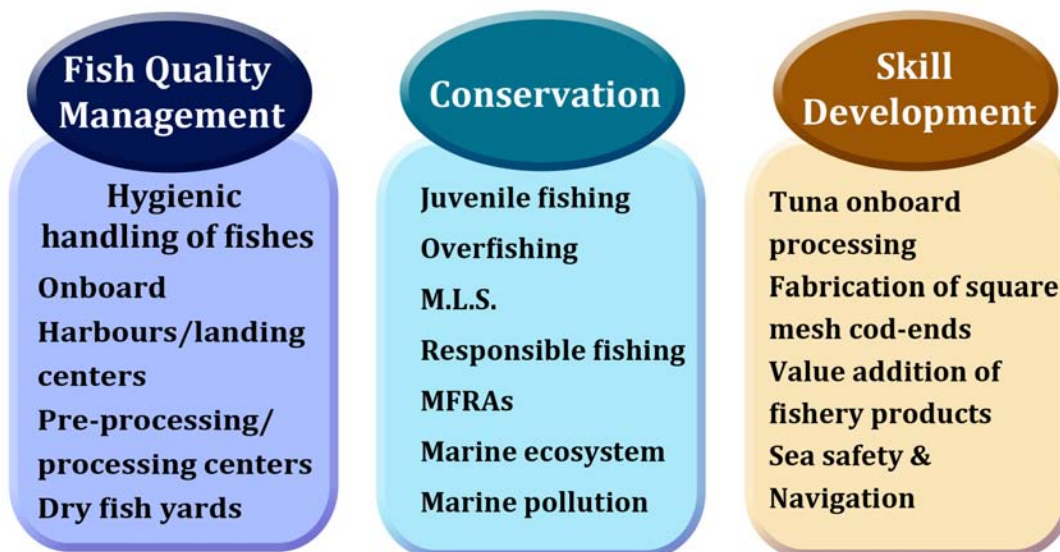
### Training Aspects

With the growing importance of total quality

management in seafood production, post-harvest handling has assumed paramount importance. Although India has world class seafood processing plants that take care of the final stages of post-harvest handling, concerted efforts are limited in the initial stages of quality chain. To generate proper awareness among fishery stakeholders on the quality requirements in international seafood trade and about the depletion of fish stock and marine ecosystems resulting from illegal and irresponsible fishing practices, NETFISH has designed its extension activities based on two major aspects namely, Fish Quality Management and Conservation of Fishery Resources. An added area of action is on skill development of fisher folks for safe and sustainable fishing and improved livelihood.

The Fish quality management programmes includes generating awareness on hygienic handling of fishes and personal hygiene onboard, at harbours and landing centres, at pre-processing and processing centres and at dry fish yards. The topics dealt with in conservation programmes are sustainability of fishery resources by avoiding juvenile fishing and overfishing, following responsible and eco-friendly fishing practices, strict compliance to MFRA rules and regulations, conservation of ecosystem through protection of mangroves, coral reefs etc., avoid or reduce marine pollution, etc.

Under skill development programmes, hands on training are given on 'Tuna onboard processing', 'Fabrication of square mesh cod-ends', 'Value addition of fishery products' and 'Sea safety & Navigation'.



*Various training aspects of NETFISH*



## SPECIAL PAPERS

### Outreach Activities by NETFISH

Since inception in 2007, a total of 27891 extension programmes were executed successfully at areas in and around selected harbours and landing centres across the country. An average of around 1,500

extension programmes were conducted yearly for the welfare of the fisheries and export sectors. The activities included awareness classes, demonstrations, hands on trainings, street plays, clean-up events, mass communications, door to door interactions, supply of fishermen aid materials etc.



NETFISH extension programmes and beneficiaries



Various extension programmes by NETFISH

Projects for the betterment of the sector were also taken up individually or in collaboration with other agencies. Popularisation of MPEDA's subsidy schemes for capture fisheries sector was also carried out along with the training programmes. Meetings and discussions were arranged regularly and linkages were established with central/state departments,

institutes, agencies etc. concerned, in order to solve several issues regarding fish quality management and sustainable fishing and also for the development of infrastructure facilities at harbours and landing centres. Posters (13), Leaflets (22), Training manuals (3), Documentaries (5) and Animation films (4) were developed in English, Hindi and eight regional

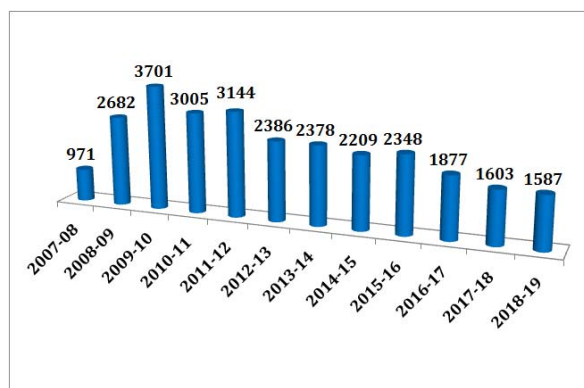
## SPECIAL PAPERS

languages by NETFISH in order to convey its message more effectively to the beneficiaries. In all, NETFISH initiatives have helped fisher communities to further enhance their skill and knowledge in fish quality management and conservation of marine resources.

In addition, NETFISH keeps a record on daily fish landings and boat arrivals occurring at 100 major harbours and landing centres of India through the Harbour Data Collectors, deployed exclusively for the data collection from the harbour assigned to each of them.

The database generated from the major harbours is being used for the validation of Catch Certificate Scheme of MPEDA. It also helps to keep a record

of the fish catch trends of the country which is an inevitable part of marine fisheries management.



*Programmes conducted by NETFISH from April 2007 to March 2019*



*Various extension tools developed by NETFISH*

### Milestones

#### 1. Refinement of laws against juvenile fishing

Wanton destruction of juveniles of commercially important fishes for fish feed and manure industry was identified as one of the major reasons threatening the sustainability of fishery resources.

NETFISH took strong and concerted actions against this by generating mass awareness among fishers through meetings and classes, sensitizing the authorities concerned for taking strict actions and giving wide publicity through news media.

During 2013, State-level brainstorming workshops on 'Sustainable Fishing' were organised in Gujarat, Maharashtra, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha and West Bengal to bring out the suggestions from various stakeholders under a single platform and to jointly recommend solutions for the sustainability of marine fishery resources.

Officials from State Fisheries Departments, MPEDA, NETFISH, Sea Food Association of India, eminent scientists from various fisheries research institutes, NETFISH member NGOs and representatives from various stakeholder groups participated in these



## SPECIAL PAPERS

workshops and shared their ideas and views regarding the objectives of the workshop. On 26<sup>th</sup> August 2016, NETFISH-MPEDA in cooperation with Department of Fisheries in Kerala, CMFRI and CIFT had organised a one day brain-storming workshop on the 'Effective Implementation of Minimum Legal Size (MLS) in Fisheries, Kerala', at Kochi. About 125 people including

stakeholders from all sectors in fisheries, scientists from CMFRI, CIFT, CIFNET, KUFOS, CUSAT, NIFPHATT and officials from State Fisheries, EIA, Matsyafed, MPEDA, NETFISH and SEAI participated in the session. This workshop became a stepping stone for the State Government to notify MLS for 44 more fishery items and also to amend the MFRA of the State.



State level workshops on "Towards Sustainable fishing"



Workshop on M.L.S. conducted jointly by NETFISH-MPEDA, State Fisheries, CMFRI & CIFT

In continuation to this, intensive awareness programmes were conducted for the popularisation of use of square mesh cod ends instead of diamond meshed ones, which is an effective way to avoid juveniles from being caught in nets. Several hands-on training programmes on 'conversion of diamond mesh nets into square mesh nets' were conducted

in association with CIFT, CIFNET, NFDB etc. Fishing trials using square mesh cod ends were conducted to demonstrate the benefits of using square mesh cod ends in trawls. Also, square mesh cod ends were distributed to trawlers free of cost utilizing the fishermen aid fund of NETFISH.



Signboard on MLS installed by NETFISH at harbour

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*Square mesh fabrication training*

In all, the NETFISH efforts were proved fruitful to a great extent and the officials started strong actions against juvenile fishing. Understanding the worse impact of juvenile fishing, many of the fishermen associations themselves took decisions to refrain from catching juveniles of valuable fish species. NETFISH continues its efforts to protect the marine fisheries resources by urging all the maritime states to emulate Kerala model of amendment of MFRAs.

### **2. Suchitwa Saagaram project for eradication of plastic wastes from seas**

As a solution to remove plastic wastes from the sea, fishing harbour and coastal areas, NETFISH partnered with Boat Operators Association Kollam, State Fisheries



Department, Suchitwa mission, Clean Kerala Company, HED and SAF in the Suchitwa Saagaram programme initiated in Sakthikulangara/Neendakara region of Kerala. In this joint effort, eco-friendly carry bags were supplied by NETFISH to fishing boats operating from Sakthikulangara and Neendakara harbours to collect the plastic wastes that they come across during fishing at sea. Awareness programmes were organised about this venture and the method of collection of plastic wastes.

The wastes collected are cleaned, sorted, shredded and used for various activities including road construction by the HED. Efforts are being taken to emulate the same at other major harbours of the country.



*'Suchitwa Saagaram' programme in Kollam*

### **3. Development of Fish NutriCarts**

To improve the livelihood of fisherwomen, awareness programmes and hands-on training on production of value-added fishery products were conducted for fisher Self Help Groups. One of the NETFISH trained fisherwomen collective from Mangamaripeta, a coastal village near Visakhapatnam, had launched a mobile vending van for the preparation and sale of value-added fishery products named as 'Fish Nutri



Cart', in April 2017. The venture was first of its kind in Andhra Pradesh and the fisherwomen are doing good business by selling superior quality seafood items like fish cutlets, fry, shrimp pakoda and fish samosa etc. at the Beach Road during evening.

NETFISH and its member NGO- District Fishermen Welfare Association (DFYWA), Visakhapatnam played a laudable role in developing this fisherwomen entrepreneur by providing effective hands-on trainings



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and facilitating fund from Department of Fisheries to set up the mobile vending unit. In continuation to this, another 'Fish Nutri Cart' was developed in Kerala by NETFISH and handed over to fisherwomen group to operate.



This was the first ever mobile kiosk which is exclusive for seafood in Kerala. The cart run by the ladies group is serving varieties of fish based products at major spots in Kochi.



*Fish Nutricarts launched in Kochi and Vizag*

### 4. Development of Dryfish Units

In Gujarat, a Dry Fish Demo unit was set up in Umergam in collaboration with CIFT and the facility is being used for training as well as production of improved quality of dried fish by Self Help Groups. NETFISH constructed the dry fish yard and arranged training programmes for the stakeholder groups, whereas CIFT gave packing machine as well as net materials to set up the drying yards besides the technical guidance.

Another model fish drying unit was installed at Mangamaripeta, Bheemili beach road, Visakhapatnam, the first one of the kind in Andhra Pradesh, with dual objectives of poverty alleviation among the fisherwomen and demonstrating hygienic drying method to fishers. Trainings were conducted in the unit and many of the trainees have started preparing and selling good quality dryfish. To make available a technology like this to fishermen community is a significant step towards providing hygienic dryfish to consumers.

### 5. Improved Hygiene in Fishing Vessels and Harbours

The handling of fish and ice aboard and at landing sites are improved to a great extent through regular awareness training programmes by NETFISH. Materials such as plastic baskets, plastic shovels, ice trays, trolleys, gloves, gum boots etc. were provided to the beneficiaries to encourage them to practice hygienic handling of fish and ice, which resulted in wider replacement of unhygienic items used onboard and at harbours. This has helped considerably in reducing contamination.

Through NETFISH initiations, regular cleaning

schedules are implemented at fishing vessels and harbours to keep the fish contact surfaces clean and sanitised. One of the major reasons for poor hygiene at harbours was lack of sufficient infrastructure facilities. NETFISH played a laudable role in bringing in necessary infrastructure developments at harbours by coordinating with the State Fisheries and many funding agencies. Because of NETFISH interventions, the fishermen associations themselves are taking necessary initiations to improve the facilities for ice and fish handling at harbours.

### 6. Formation of Harbour Management Societies/ Committees at harbours

For the better management of the fishing harbours, NETFISH took efforts for the formation of Harbour Management Societies at major harbours. The Munambam Fisheries Harbour Management Society (MFHMS) was the first of the kind in the country, where the day-to-day activities of the harbour is controlled by the society. The revenue collected from the fishing harbour by way of toll charges, rent etc. goes to the account of the society, which is being utilised for the development of infrastructure and other activities in the harbour. In line to this, a harbour management society was formed at Paradeep and Dhamara harbours in Odisha too. In some of the harbours where formation of a management society was not possible, Harbour Management Committees were formed with the due representation from all the stakeholder groups.

### Conclusion

NETFISH has established as an important extension agency in India working exclusively among fisher folk, conducting about 1,500 training programmes



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Model Dry fish units by NETFISH in Andhra Pradesh and Gujarat

on an average in a year all along the maritime states of India. Development of agencies like NETFISH with the support of government and related organisations are highly needed in India, considering the vastness of fishing and fishery-related activities being conducted

in the country. Alongside giving awareness to fisher folk on quality and sustainable fishing, infrastructure development at fishing vessels and landing sites on par with international standards is very much essential to bring rapid and noticeable improvements.



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# Multispecies Aquaculture Complex (MAC) brings Black Tiger back



*Mr. Hormis Tharakan with his family members during the harvest*

**T**he Multispecies Aquaculture Complex (MAC) of MPEDA-RGCA at Vallarpadam, Kochi has revived the dreams of an average aquaculture farmer in Kerala – to bring back Black tiger prawn (*Penaeus monodon*), an endemic species to south-east Asia and the major cultivated shrimp item in India till 2010. The disease-free quality seeds of Black tiger shrimp supplied from this facility showing promising performances throughout the state.

Mr. Hormis Tharakan, former Director General of Police, Kerala said, "I faced crop loss continuously for the last three years. But this time, I brought seeds from MPEDA hatchery at Vallarpadam. The seeds showed very good performance and reached an average weight of 38 grams in 90 days' culture period. The quality of the seeds played a major role in the success of the crop and the Vallarpadam project of MPEDA is really a blessing to the aquaculture sector in Kerala." Mr. Tharakan got 260 kg of shrimp in 90 days from 50 cents by stocking 10,000 seeds. The

rearing of another 90,000 seeds is under progress.

Mr. Vinukuttan, from Kollam, stocked 1,00,000 tiger shrimp seeds purchased from MAC in 0.72 ha. water spread area and harvested 2.7 ton of shrimp after 126 days. In the total harvest, 1980 kg was 20 count (50 g size) and the remaining 720 kg was 25 count (40g. size). Similarly, Mr. Ajithkumar from Kannur stocked 70000 seeds in 1.1 ha area on February 23, 2019 and harvested 2.3 ton biomass in the following counts after 130 days: 25 count (40g.size) – 850 kg; 30 count (35 g size) – 1 ton; 35 count (30g. size) – 450 kg.

Mr. C. V. Mathew from Kumbalanghi said, "I have been doing tiger shrimp farming for the last 16 years. But I have never seen this much growth rate as shown by the seeds supplied from Vallarpadam hatchery for the recent crop. The seeds from Vallarpadam hatchery attained 25 gm size in first 50 days and in 86 days they reached an average size of 40 gm."



## SPECIAL PAPERS



*A view of the harvest from the farm of Mr. Vinukuttan, Kollam*



*A view of the harvest from the farm of Mr. Ajithkumar in Kannur*

Non-availability of good quality disease-free tiger shrimp seeds and the introduction of pacific white shrimp, *L. vannamei* in India in 2009 was the major reasons for the drastic reduction of tiger shrimp farming in India. But tiger shrimp have a very good demand in international seafood market and its price also higher than vannamei shrimp. Mr. K.S. Srinivas,

In addition to tiger shrimp seeds, seeds of other varieties like Asian Seabass, GIFT and Pompano are also available at the Multispecies Aquaculture Complex at Vallarpadam. After inauguration of the facility on December 08, 2018, the seed sales of finfishes was initiated from this facility on December 17, 2018.



*A 3-month-old shrimp: Indicating the success of the culture*

IAS, Chairman, MPEDA expressed great pleasure in the performance of the tiger seeds in the shrimp farms in Kerala.

"The major aim of Vallarpadam facility is to revive tiger shrimp farming in India. To understand the field performance of the seeds from our facility, I visited some of the aquaculture farms. I understood that the performance of our seeds is very good in the field and the encouraging comments from the farming community motivate MPEDA in its developmental activities," he said.

Within a period of three and a half months, the MAC supplied 1.4 million fingerlings of GIFT, Asian Seabass and Pompano to 642 farmers. The seed supply of Black tiger was initiated on February 18, 2018.

In addition to the admirable service rendering to the farming community, this facility has been operating in a self-sustaining model since its inception and generated a revenue of Rs. 1.01 crore through seed sales within the initial 100 days. During the

current financial year, the facility has supplied 1.9 million seeds of Black tiger, 0.56 million seeds of GIFT and 0.41 lakh seeds to Asian Seabass to a total of 541 beneficiaries so far. Sales of good quality Asian Seabass, Pompano and GIFT in live condition for food purpose too started from here recently.

The development of MAC is a milestone achievement in the history of MPEDA and its successful implementation and operation is a model to other projects of similar nature planned in various parts of the country.



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Mr. K.S. Srinivas IAS, Chairman, MPEDA, visiting the farm of Mr. Hormis Tharakan at Poochakkal, Alappuzha



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# Fisheries Development through Fisheries Cooperatives

**B. K. MISHRA**

**T**he National Federation of Fishers Cooperatives Ltd. (FISHCOPFED) is an umbrella body of fishery cooperatives in India. It is an apex and national level cooperative organisation for the development of fishery cooperatives movement in the country. Registered in 1980, the federation started its operation in 1982.

FISHCOPFED has 103 member institutions all over the country, including Ministry of Fisheries, Animal Husbandry and Dairying, Government of India and National Cooperative Development Corporation (NCDC). FISHCOPFED provides social security through insurance scheme and training extension to the poor fishers to train their skills on various aspects of fisheries. FISHCOPFED is the best service delivery system in the country in fisheries sector, focusing on economic empowerment of poor fishers.

FISHCOPFED is a member of the International Co-operative Alliance and also a member of the International Cooperative Fisheries Organization (ICFO) and Network for Development of Agricultural Cooperatives in Asia and the Pacific (NEDAC). FISHCOPFED is engaged in a number of activities of fish marketing in several states as retailer and wholesaler

for the ease of the primary fishery cooperative societies to provide them hurdle free marketing channels and give them better price for their produce.

In order to demonstrate fish culture in inland water, FISHCOPFED is having five water bodies in Odisha and one water body in Bihar. FISHCOPFED also manages and operates a hatchery at Bhimpur in Rajasthan to supply quality fish seeds to fish farmers of Rajasthan and supply fingerlings for reservoirs there.

The Centrally-sponsored Group Accident Insurance Scheme for active fishermen implemented by FISHCOPFED has been converged to Pradhan Mantri Suraksha Bima Yojana (PMSBY), which provided insurance cover to 27.55 lakh fishers in 22 states and 5 UTs during 2018-'19. The premium is Rs. 12 per insured and is shared on 50:50 basis between Union and State governments. It is shared on 80:20 basis between Union and State governments for North-Eastern States and Hill States.

There is cent per cent central share for Union Territories covered under the scheme. The cover is of Rs. two lakh for death or permanent disability and Rs. one lakh on partial but permanent disability due to accident.

Managing Director, National Federation of Fishers Co-operatives Ltd. (FISHCOPFED),  
New Delhi



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**Table 1: Current Structure of Fishery Cooperatives in India**

CURRENT STRUCTURE OF FISHERY CO-OPERATIVES IN INDIA					
Name of the State / UT	Number of Societies (level)				No. of members
	State Level	Regional Level	District Level	Primary Level	
Andhra Pradesh	1		13	2,347	2,60,579
Arunachal Pradesh				11	230
Assam	1			272	43,845
Bihar	2		6	510	4,10,007
Chhattisgarh	1		5	765	26,154
Goa				20	1,503
Gujarat	1		3	263	26,045
Haryana			1		11
Himachal Pradesh				45	5,837
Jammu Kashmir				1	18
Jharkhand	1		1	384	22,853
Karnataka	1		2	418	2,04,689
Kerala	1		1	651	4,60,486
M.P.	1		1	2,290	85,731
Maharashtra	1	2	36	3,315	3,32,636
Manipur	1		3	240	18,433
Meghalaya				18	611
Mizoram	1			47	1,656
Nagaland				267	9,234
Odisha	1	1	3	657	1,38,143
Punjab			1	1	18
Rajasthan			1	34	4,130
Sikkim				8	230
Tamil Nadu (TN)	1		11	1,353	6,01,620
Telangana	1		10	4,005	2,86,687





# Living Jewels

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Tripura	1			142	22,967
UP	1		22	1,011	54,521
Uttarakhand				13	634
West Bengal	1		20	1,433	92,759
Andaman Nicobar Islands	1			41	1,361
Daman and Diu				7	3,176
Lakshadweep				6	2,910
Puducherry	1		1	64	58,525
<b>Total</b>	<b>21</b>	<b>3</b>	<b>141</b>	<b>20,639</b>	<b>31,78,239</b>

**Table 2: Indian Water Resources**

<b>Indian Water Resources</b>
<b>i) Inland Water Resources of India</b>
Area under reservoirs- 3.15 million ha
Area under Ponds and Tanks- 2.36 million ha
Area under Brackish water- 1.24 million ha
Length of Rivers & Canals- 0.19 million ha
<b>ii) Marine Water Resources of India</b>
Length of the coast line- 8,118 kms
Exclusive Economic Zone- 2.02 million Sq.km
Continental Shelf- 0.53 million Sq.km
Number of Fisheries Centres- 1537
Number of Fishing Village- 3432
<b>iii) Target Set by Govt. Of India</b>
Fish production in 1950-51: 0.75MMT
Fish production in 2015-16: 10.79MMT
Target by 2020-21: 15.08MMT

PFCS can play a very vital role in supply of quality fish seed (Tilapia, Pangasius, IMC and Exotic Carps etc.) and set up fish seed rearing farms to supply fingerlings of various fish species.

It can also supply brood stock to hatcheries besides setting up fish feed mills. Technological advancement has also opened doors for cage culture and for the marketing of value-added fish and fishery products in super markets.

Fishery Cooperatives have huge potential in providing aquaculture support services, fish farming and fish marketing and exports.

### **Aquaculture Support Service**

The Federation has signed an MoU for setting up of 25 AOCs with National Fisheries Development Board, Hyderabad to provide aquaculture support services to the farmers and members of PFCS to minimize the loss of fish due to disease outbreaks. In the first phase, the Federation has opened up 16 AOCs in Odisha, Assam and Jharkhand and the remaining AOCs in next six months of implementation phase in other states. The aim of AOC is to provide aquaculture support services to fish farmers and supply inputs in order to increase per unit production of fish and productivity of the Indian sector. The AOC



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View of the National Fish Seed Farm by FISHCOPFED at Bhimpur (Banswara), Rajasthan



shall also propagate genetically improved fish species like Jayanti rohu and GIFT tilapia etc. There is huge potential for PFCS in providing such services under guidance of FISHCOPFED.



Training Centre of FISHCOPFED at Bhubaneswar, Odisha

### Potential for Fisheries Cooperatives in Aquaculture

There are many cat fish/air-breathing fishes, which are commercially very important. Some of them are Singhi (*Heteropneustes fossilis*), Magur (*Clarias batrachus*), Sol (*Channa striatus* & *Channa marulius*)

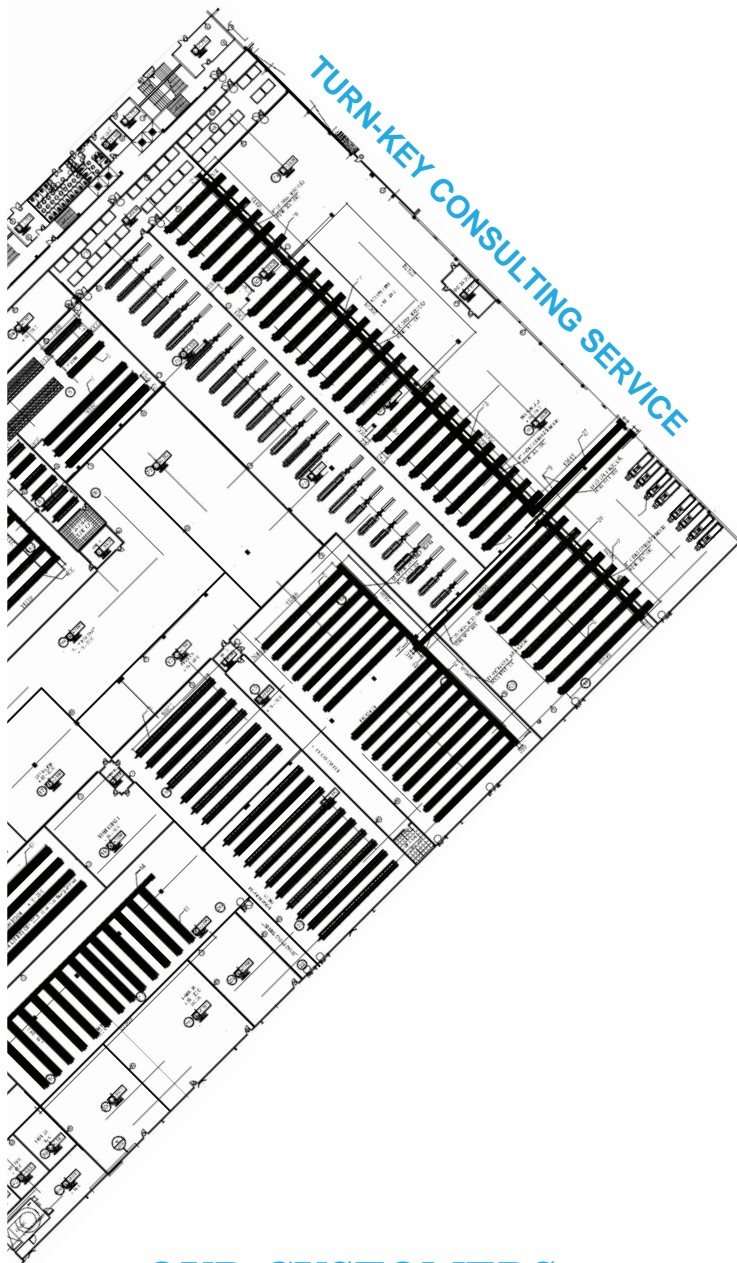
Climbing perch/Koi (*Anabas testudineus*), Pabda (*Ompok pabda*) and species of Pangasius. Fish farmers and fishery cooperatives can breed these species in small water bodies, indoor tanks etc. These fishes have high consumer preference and fetch good prices to farmers. Culture of some fishes can be done with carp fishes, which is also under polyculture system.

The cat fishes can be easily cultured in intensive culture system and hence gives more production from per unit volume or area of water body. The high yield culture system of air-breathing fishes with low input has proved to be of low risk and required simple management and is well suited to rural development.

Genetically improved fish species like GIFT strain of Nile tilapia, Jayanti rohu and improved catla etc. have considerably increased the production of some fishery cooperatives.

Awareness level among the farmers is still very low and there is need of setting of hatchery, nursery and marketing units of these species across the country.

Recently, FISHCOPFED has been shortlisted for establishing GIFT seed production hatchery at its National Fish Seed Farm in Rajasthan, as there is an increasing demand for GIFT Tilapia seed from across the country.



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### Fish Marketing and Processing

#### a) Cooperative Fish Marketing

Fish is a very highly perishable item and its nutritive value has to be maintained by means of fish preservation immediately after it's harvesting and until it reaches the end consumer. Hence, marketing of fish to far distant states has emerged as an issue of great concern for individual fish farmers and fishery cooperative societies. Lack of infrastructure, exploitation at various level of trading by middlemen, uncertainty of market demand and lack of other infrastructure like cold storage and insulated/refrigerated trucks for transportation etc. are the main concerns of farmers. Keeping all these things in view, FISHCOPFED is committed to create marketing infrastructure (Cold Chain Development) with stable supply chain management in some metropolitan cities for fisheries sector. This can be feasible with the support of government and involvement of FISHCOPFED. Development of fish preservation infrastructure and minimization of post-harvest loss can contribute a lot to SDGs.

It is not feasible for the government to establish ice plants, cold storage etc. without the support of fishery cooperative societies in inland States, which are producing large quantities of fish.

The Government of India should consider establishing at least 100 fish collection centres with ice plants and chilled stores near the big reservoirs in inland States and other fish production areas being managed by fishery cooperative societies. From nearby fish farms too, the fishes can be brought to these centres and collected from there having all those facilities for washing, grading, loading/unloading, icing and transportation etc.

#### b) Mobile Fish Parlours

FISHCOPFED also aims at marketing of whole fish, semi-processed fish (ready-to-cook fish fillets etc.), and ready-to-eat fishery products in the retail markets and directly to end users of non-maritime States like Delhi and NCR. There is a vast demand of fish in Delhi and NCR but due to the outlying location of retail and wholesale markets in Delhi, the people are able to get direct access to this healthy food.

The vendors and retailers do not cover sufficient parts of Delhi and NCR. People from government and private institutions, residential complexes, apartments, hostels and hotels etc. generally approaches FISHCOPFED

for delivery of fish and fish products. The whole fish could be easily supplied through mobile vans using a fleet of 20 ton capacity refrigerated trucks reaching Delhi or from the wholesale market. But for semi processed/processed fishery products, a processing plant (or even a big kitchen) should be setup in NCR with 5 ton capacity tube ice plant and cold storage and other processing and cooking facilities.

The cold storage is used to store and preserve whole fish and processed fishery products in separate chambers with proper arrangement to check the cross contamination. From this centralised kitchen, atleast 50 mobile fish parlours can be operated in Delhi and NCR to supply semi-processed, ready-to-cook and ready-to-eat fishery products.

The fish brought in iced and refrigerated condition from fish farmers/members of PFCS to the processing plant shall be processed as per demand of the customers. Pre-processing like sorting (species wise) and grading etc. can be done manually, then it is de-scaled, be-headed, filleted, and final packed in polythene pouch for marketing in consumer packs. Further, cooking faculties are used to prepare ready to eat products.

#### c) Hygienic Fish Retail Outlets

FISHCOPFED has two fish retail outlets in Delhi and some retail outlets in other cities of different states of the country. There is a need to open up more fish retail outlets on the lines of Mother Dairy model. It can be possible only with government support in terms of leasing shops to fishery cooperatives in shopping complexes, markets etc. There is also need of policy to remove hurdles in getting license from several authorities to sell fish in town and cities.



*View of a fish retail outlet of FISHCOPFED  
at New Moti Bagh, New Delhi*

### Benefits to Food Value Chain

- Fishery Cooperatives are group of fish farmers who pool in their resources and mechanise their farms to enhance production. They have larger water bodies and can ensure regular supply of fish. While the individual fish farmer lacks infrastructure, knowledge and skill required at various level of aquaculture, capture and marketing of fish etc.
- Cooperative fish marketing system can ascertain supply of wholesome fish from farm gate/landing centres to freeze or deliver to customers of distant states through cold chain development.
- Producer cooperatives/fish farmers can get better prices for their produce through cooperative fish marketing by elimination of middlemen like transporters, multi-level traders etc.
- Employment generation, cold chain, food security, enhanced per capita fish consumption, removal malnutrition, popularity of fish and fishery product, strengthened marketing networks can be achieved through fishery cooperative.

### Conclusion

Around 3.2 million people are being benefited economically through primary fishery cooperatives

in India. By strengthening these cooperatives through cooperative fish marketing with sufficient infrastructure and organized marketing channels, FISHCOPFED can, to a large extent strengthen 3.2 million people of these societies. It can also play a good role to keep the pace of production and supply to the tune of increasing population and its food demand in the country.

FISHCOPFED with its mobile vans can be able to provide fish to the people at their doorsteps and increase the graph of popularity of fish in the market. There is an urgent need of setting up of a small processing plant in big cities of inland states, specifically for semi-processed fishery products like fish fillets, ready-to-cook and ready-to-eat products for local marketing through mobile vans.

With the results of the nationwide fishery cooperatives survey available, FISHCOPFED has also speeded up its work to promote these cooperative societies in a sustainable manner through various means like marketing, processing, insurance, trainings and technology transfer etc. Increased demand of fish in various forms will promote production and this will make fisheries more profitable venture for these cooperatives. Hence, the role of fishery cooperatives has to be considered at every level in the changed economic scenario and it should be supported with fund to develop infrastructure for sustainability.



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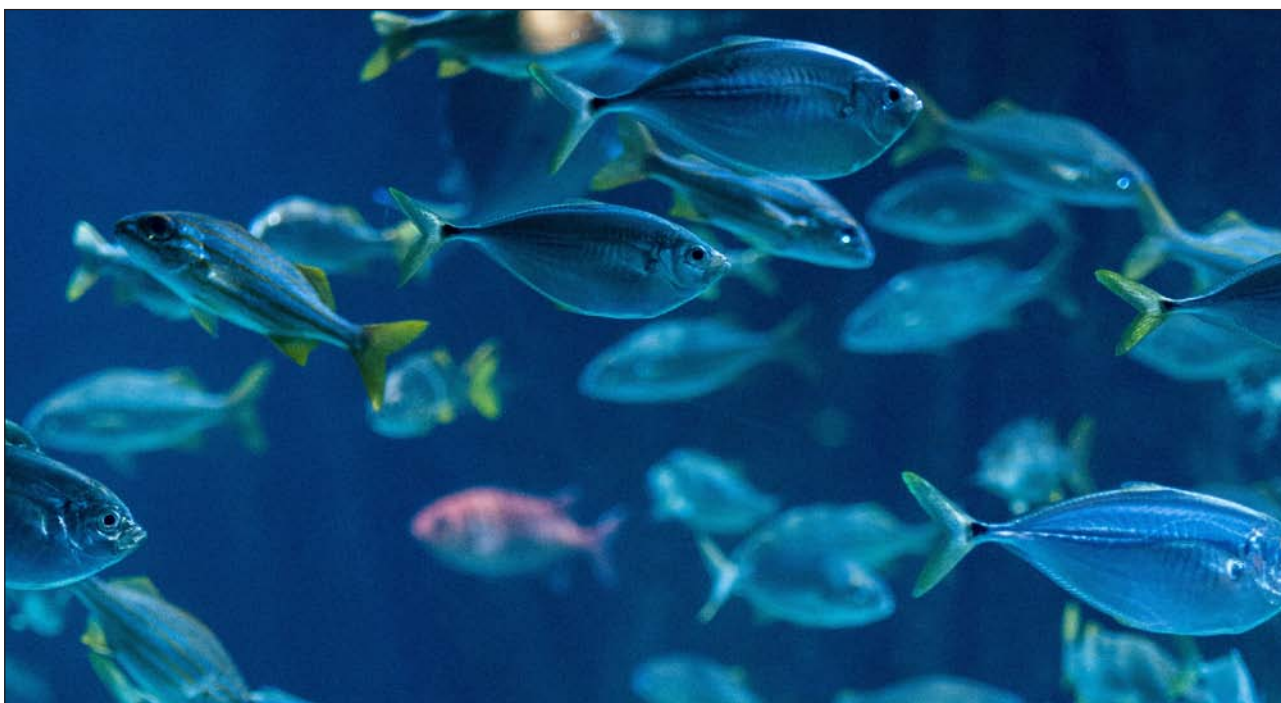
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# Time for Marine Ornamental Aquaculture now

**KULDEEP K LAL , T. T. AJITH KUMAR**



**A**quaculture has been yielding 7 to 9 per cent growth since last two decades, fastest among all the food producing sectors. The sector is expected to surge ahead to meet 50 per cent of the fish demand.

Aquaculture is multifaceted, as it stands now. Beside food production as livelihood and avenue, ornamental fish is becoming a lucrative trade for small and marginal farmers. Domestication of marine ornamentals is gaining popularity in several countries because of the rise of home and public aquaria. It is estimated that over 100 countries are involved in the aquarium trade that involves 37 per cent tropical fresh water fish, 28 per cent cold water fish, 16 per cent marine fish, 8 per cent corals and 11 per cent other invertebrates.

International traders are involved with more than 1470 species; however only 30-40 are domesticated and the rest is with capture fishery. India is the second

largest country, next to China, in inland fish production. But, global export share of the country in ornamental trade is less than one per cent with almost 90 per cent of wild caught species which is not sustainable due to pressure on wild population.

Since, marine ornamental fish culture holds the potential for generating employment, livelihood and earning high foreign exchange, this sector attracts a special attention across the globe.

Owing to the sector's tremendous growth, marine ornamental fish culture has a great prospect to ensure part time or full time business. Economic opportunities are closely related to the land and sea masses, thus vary from country to country.

India is endowed with rich marine ornamental resources from the regions of the Gulf of Mannar, Gulf of Kutch, Andaman & Nicobar and Lakshadweep islands. The

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long coastal maritime states could be able to improve the livelihood security of the coastal communities by opening up or augment marine ornamental culture practices. Presently, only a few species of marine ornamental organisms are well domesticated in our country with the research contributions of the ICAR - National Bureau of Fish Genetic Resources (NBFGR), ICAR - Central Marine Fisheries Research Institute (CMFRI), ICAR - Central Institute of Brackishwater Aquaculture (CIBA) and the Centre of Advanced Study in Marine Biology of Annamalai University.



*Broodstock of Dottyback*

At this point, further research programmes are needed for developing the breeding technology of the species in demand with the aid of new scientific technologies. Setting-up of backyard hatcheries, rearing units, ornamental aqua parks and marine ornamental villages would be helpful in promoting this sector and also create local employment and livelihood. As an initiative, ICAR-NBFGR has taken two programmes on this line and is being implemented at coastal Maharashtra and Lakshadweep.

### Opportunities and Challenges

Marine ornamental fishes are showing a wide range of diversity in colour, shape and design, which easily attracts the hobbyists for higher marketing price and are being compatible to aquaria and hatcheries of our country due to the ideal environmental conditions. Indian waters have more than 350 ornamental fishes and contribute 24 per cent of the total fish species in trade. Recent advancements in scientific technologies and husbandry equipment such as synthetic salt, artificial corals, recirculation and filtration units, UV filters, wave maker, ozonizer, de-nitrifier, thermostats, chillers, pH buffer capsules, ammonia reducers, probiotics and disease curers make this system easy at any corner.

Modernisation in setting-up of aquaria is attracting the hobbyists and visitors to a greater extent. Public aquaria are a great service as they generate awareness about biodiversity among public and school children. ICAR-NBFGR has one such aquarium in its campus at Lucknow (Ganga Aquarium) with marine organisms also. Many innovative research programmes such as selective breeding, artificial insemination techniques, cross breeding, induced breeding, colour enhancement, specific pathogen-free broodstocks (SPF) and Recirculation Aquaculture System (RAS) have helped to find commercial footing for the technologies involved. Agencies like the National Fisheries Development Board (NFDB) and Marine Products Exports and Development Authority (MPEDA) are providing assistance for developing ornamental fish industries to support entrepreneurs. Hence, this sector is opening up for the small stakeholders as well as to the high investors of our country.

Although marine ornamental fish culture is offering more employment opportunities and livelihood for coastal communities, there are certain bottlenecks to overcome. The major slowdown of culture practice is due to inadequate supply of quality brooders with reasonable price, complex pattern of sex changes, sexual dimorphism and larval rearing. Above all, rearing techniques for the mass production of first feed (livefeed) for the newly hatched larvae are lacking. Other limitations are water resource, disease outbreaks, nutritional requirements and feeds, transportation, higher cargo charges etc., hamper the growth of the industry. Unknown biology and behaviours of many marine ornamentals affect captive production compared to their freshwater counterparts.



*Exotic, Banggai cardinal found in Indian trade*

As collection of wild species of ornamental organisms is restricted in the reef environment, breeders and researchers have to import the organisms with higher





*Outer view of the ICAR-NBFGR hatchery at Airoli, Mumbai*

prices. Apart from selection of the species, nutritional supplements and feeding regimes of broodstocks and larvae are still unclear for many species. A common approach in marine fish hatchery is to find an appropriate mix of feed and devise a feeding schedule. Once an acceptable first feed is found for a particular species, then it is easy to develop the larval feeding regimen for that species.

Lack of successful induced breeding activities, poor egg quality and quantity, lower hatch rate and inadequate literatures are the other drawbacks during the domestication of new species. Disease outbreaks or major infections are caused by bacteria, parasites, viruses, fungi and also during poor handling and unhealthy practices. Usage of banned antibiotics and other toxic chemicals curb prevention of some disease outbreaks, which leads to severe loss. During domestication, breeder should be aware of the exotic and endangered status of the species could be governed under the Convention on International Trade in Endangered Species (CITES).

The inequitable profit distribution between the importers and exporters reflects imbalance between them, as it favours the importers. Importing countries generally have buying powers that largely dwarf the financial resource of fish collectors in the developing countries. Due to the negative trade, collectors increase their catch or destructive fishing practices, causing long-term damage to the environment. It is very complicated to develop brooders of all the marine fishes involved in the trade because of the

lack of knowledge in the reproductive biology of every species, so an intensified research on breeding biology of the marine ornamental species is required to overcome this limitation.



*ICAR-NBFGR Marine ornamental hatchery facility at Airoli, Mumbai*

### Introduction of exotics

Non-native fishes are introduced throughout the world mainly for diversifying aquaculture, sport, ornamental fish trade and bio-control of the mosquito and this issue is now getting much attention. In this context, the marine aquarium trade has not come under the scanner of environmentalists, conservationists, ecologists and policy makers as like as trade in terrestrial endangered organisms. The avenues from captivity to wild include dumping of unwanted fishes, escape from tanks and breeding farms perhaps during

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storms and unchecked drainage of water containing organisms from tanks and public aquariums. However, chances of survival of escaped marine organisms in wild are very limited.



*Hatchery bred Damsel, Green Chromis*

The marine ornamental fish trade in India is dominated by the presence of over 100 exotic species or variants and they have been introduced from different parts of world, mainly from Asia. At present, few exotic fish species are considered one of the major causes of erosion or devastation of the native fish biodiversity in freshwater ecosystems; however, it is not reported from marine side.

### Conservation

As there is a high demand for ornamental organisms, over-exploitation of these valuable resources and destructive fishing practices will lead to the risk of resource depletion. Further, global warming and ocean acidification cause unrestricted pressure on the coral reef ecosystem.

Domestication of the much-exploited resources and regulated fishing practices are the alternatives to alleviate the pressure on reefs. The responsible fishing practices can be achieved with the help of sustainable management plans by enforcing the code of conduct. There is a lack of abundance and availability of data on the marine ornamentals with respect to their trade value. However, Marine Stewardship Council (MSC) and Marine Aquarium Council (MAC) have initiated a certification programme to promote the legal and safer fishing through suitable market mechanism, so for sustainable trade.

In India, eco-certification and code of conduct for safer and responsible fishing are very much needed.

A certification system launched by the MPEDA for freshwater ornamental fishes is inevitable at this juncture to regulate the marine organism's trade. In the last decade, many researchers have focused on retrieving marine ornamental fish diversity and trade information. In this context, the works being done by the ICAR - National Bureau of Fish Genetic Resources (NBFGR) on cataloguing of fishes will help register these resources of different regions of India. This will also help ensure the genetic sustainability and to keep monitoring the loss or mix up in their genetic pool.

### Conclusion

Historic rise in the trade of marine ornamental fish and aquarium supplies around the globe is ensuring sustainable income generation, livelihood and more foreign exchange. The hatchery production and domestication of marine ornamental fish could be more economical and also significant in the trade. Efforts on conducting training programmes on sustainable harvest, handling, breeding, rearing, packing and transportation of ornamental fishes should be intensified. New breeding technology, up-gradation of sustainable culture practice and technology transfer will be helpful to safeguard the resources and sustain the sector.

In this context, the ICAR- NBFGR is taking initiatives to establish a Germplasm Resource Centre for the Indian clownfish species at Airoli, Mumbai in collaboration with the Mangrove Foundation, Department of Forest, Government of Maharashtra and a similar kind at the Lakshadweep for marine ornamental invertebrates with the financial support of the Department of Biotechnology, Government of India.

A master facility on marine ornamental fish hatchery was established by the ICAR-NBFGR on the premises of the Centre for Coastal and Marine Biodiversity Centre, Mangrove foundation at Airoli, Mumbai, Maharashtra. Ten different species of clown fishes are stocked here and one-month-old clown hatchery bred progenies will be supplied to the beneficiaries of coastal Maharashtra. They will rear the same for another two months and marketing will be done.

ICAR-NBFGR is providing hands-on training also to the coastal beneficiaries of Maharashtra, identified by the mangrove foundation. It is an initiative taken by the ICAR - NBFGR on establishing a marine ornamental fish village at Maharashtra, which will provide alternative or additional livelihood to the coastal community, besides conserving the marine biodiversity.



# An Introduction to Trade Barriers

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ANJU

**T**rade is a basic economic concept of buying and selling goods and services. Trade between countries increase the scope of marketing area and also offers customers a wide variety of choices exclusive to particular countries on a common platform. Trade is affected by various factors which can be intrinsic or extrinsic.

The intrinsic factors are government rules and regulations, geography of a country, trade policy, demand, skilled labour etc. Similarly, there are extrinsic factors like high tariff rate, rules or standards set by other countries, changes in technology etc. These factors can be categorized as trade barrier. Trade barriers can be broadly classified under tariff barriers and non-tariff barriers or Technical Barriers to Trade (TBT) and Non-Technical Barriers to Trade.

MARKETING PLAYS A PROMINENT  
ROLE IN THE DEVELOPMENT OF A  
COUNTRY AND NURTURING OF AN  
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DIFFERENT NATIONS.

Marketing plays a prominent role in the development of a country and nurturing of an economy. International marketing is specifically designed to cater to the need of consumers of different nations. Since every country has equal right to trade and also to ensure safety of its citizen, flora and fauna, they come up with different standards or regulation to protect the same. But it is also important to confirm that these regulations do not become hurdles and affect the trade. This is where the World Trade Organisation (WTO) comes into picture. WTO was formed on January 1, 1995 under the Marrakesh Agreement signed by 123 nations. It replaced the GATT agreement (General Agreement on Tariff & Trade).

WTO has put forth many rules to ensure transparency in the international trade. Before elaborating on the role of WTO, there should be an overview on Technical Barriers to Trade (TBT) and Non-Technical Barriers to Trade.

### Technical Barrier to Trade

Technical barrier to trade are standards, labelling, packaging or other technical specifications, which can create a hurdle to the trade. Different countries specify different specifications for products to gain entry to their market. These specifications may be required to increase the knowledge of the consumer about the products (like labelling in regional language) or for the safety of the citizen (like banning or regulation of certain items) or requesting certification to ensure sustainability. The list can be exhaustive. But sometimes these regulations are brought to control trade and starts acting as trade barriers.

### Non-Technical Barriers to Trade

Non-Technical barriers include tariff rates, licenses, import quota etc to regulate trade and protect domestic market. The tariff rates or licenses control the movement of goods as per the requirement of the country. If a country wants to encourage import of certain goods, then they will reduce or remove the tariff percentage on the particular item. Similarly, to discourage import the tariff rates can be raised. Countries entering into agreement usually negotiate on several goods and services and offer each other relaxation for better trade and better market penetration. There are several types of tariffs and barriers that a government can employ:

- Specific tariffs – is the fee levied on one unit of good imported.
- Ad valorem tariffs – type of tariff is levied on a good based on a percentage of that good's value.
- Licenses – given to import certain goods.

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Assistant Director, MPEDA Sub Regional Division, Tuticorin



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- Import quotas - similar to license, quota is fixed for a product to be imported.
- Voluntary export restraints – trade barrier is “voluntary” in that it is created by the exporting country rather than the importing one. A voluntary export restraint is usually levied at the behest of the importing country and could be accompanied by a reciprocal VER.
- Local content requirements - instead of regulating import directly by quota or licensing, this specifies the percentage of good to be made domestically. Percentage can be of good itself or value of good.

### Role of WTO

Technical Barriers to Trade Agreement (TBT) came into existence on January 1, 1995. It came under the Annex 1A of the Agreement establishing WTO. The TBT agreement was prepared, keeping in mind the need to promote access to markets, transparency in rules and regulations controlling markets, no discrimination. It also included differential treatment for developing countries. It includes the steps involved in bringing out a TBT regulation and also provides opportunity to member countries to comment on the regulation before final adoption.

Scope of TBT agreement included all goods both agriculture and industrial. There is a TBT committee, which does periodic review of regulations that are of trade concern, brought out by different countries time to time. It also encourages sharing of experience between countries on implementation of regulations. The committee conducts annual review of the activities related to implementation and operation of TBT agreement.

TRANSPARENCY IS AN IMPORTANT MANDATE OF THE TBT AGREEMENT AND THE SAME IS ENSURED BY NOTIFICATIONS, ENQUIRY POINTS AND PUBLICATION REQUIREMENTS.

Transparency is an important mandate of the TBT agreement and the same is ensured by notifications, enquiry points and publication requirements. There is a dispute settlement head under the agreement where in member countries can register their complaint regarding any violation in the agreements. There

are several agreements under the consultations like anti-dumping, agriculture, aircraft, Sanitary and Phytosanitary measures (SPS) etc. Article 12 is for special and differential treatment of developing country members.

### Present Scenario

Today trade is an important factor for not only development of the country but also for the preference of the consumer or citizen of the nation. The products not available in a country is imported to meet the demand of the consumer.

Over the period, tariff barriers have been reduced to promote the trade relation between countries. Moreover, the transparency in trade has increased over years with the introduction of WTO. There are rules to monitor and regulate trade in transparent manner. Tariff rates have been fixed accordingly. But still there are many non-tariff barriers affecting trade. Reduction in tariff rates for smooth trade is a good factor but at the same time introducing non-tariff regulations like labelling rules, certification rules, registration rules etc are making trade difficult. Along with this, the testing and quality standards vary for different countries.

THE EQUIPMENT OR TESTING METHODOLOGY VARY FOR DEVELOPED, DEVELOPING AND UNDERDEVELOPED NATIONS BUT THE STANDARDS ARE SET AS PER THE FACILITY AVAILABLE IN THE COUNTRY SETTING THE REGULATION.

The equipment or testing methodology vary for developed, developing and underdeveloped nations but the standards are set as per the facility available in the country setting the regulation. There is need for more transparency at this level. Precision of the testing equipment is also important. There is much more to be done for reducing non-tariff barriers affecting trade.

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# Brackishwater aquaculture, designing blue economy of India

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**VIJAYAN K. K.**



**W**ith the current trends in population rise, it has been estimated that the world will need to double the food production by 2050. Experts point to nutrient-rich foods from aquatic environments (fisheries and aquaculture) as the answer. As the global demand and interest for seafood is increasing every year against the declining trends in fish catch from wild fisheries, aquaculture is looked up to with a lot of hope and responsibilities. This is not only for increasing fish production and nourishing the growing population, but also for fulfilling, sustainable development goals. Aquaculture being the fastest growing food-producing sector across the world, the sector also recognized as one of the most efficient means to meet the nutritional security.

Aquaculture currently produces 47 percent of food fish for the world, and it supplies over 60 percent of food fish, providing over 20 percent of total animal

protein intake to the Asian population. India is the second largest producer of farmed fish and offers a vast potential for aquaculture development. It is inspiring to witness the spectacular growth of this industry in India, spearheaded by shrimp farming with a seafood export of more than USD 7 billion in 2017-'18 (AquaStat India, 2018). It is pertinent to note that this was only a nascent industry during the early 1990s. The aquaculture sector is also confronting severe challenges, such as the impact of climate change and variability, disease outbreaks, environmental degradation, increasing input costs, anthropogenic activities, and related social and economic changes, increasing intra-regional trade and public health concern over food safety. Therefore, addressing these issues through research and development, and policy formulation is of utmost necessity.

Though aquaculture is possible in all types of water

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Director, ICAR-Central Institute of Brackishwater Aquaculture, Chennai, India

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resources, the pressure on freshwater resources due to multi-user demands and climate change-related impacts constraints its future expansion.

### Harvest of seabass from open water cages

Therefore, future aquaculture development is expected to occur mostly in brackishwaters, which is otherwise considered as a zero-economic resource (not used in agriculture, drinking or construction). Further, brackishwater resources are perceived as ideal for aquaculture today and expansion in the future due to its biodiversity richness, high productivity and negligible footprint on potable water and carbon emission, and the vast resources available for expansion. As an added advantage, high tolerance of brackishwater flora and fauna for extremes of the water quality make them more appropriate for farming under controlled conditions.



*Seabass harvest*

In addition to the food production, coastal aquaculture can generate huge employment opportunities in diversified fields across the coastal India. In 2016, the global production from brackishwater was 8.56 million tons and valued at about USD 243.5 billion, which accounted for about 7.8 per cent of the total aquaculture production and 12.5 per cent of the global aquaculture value respectively. Out of the total 8.56 million tons of global brackishwater aquaculture production, crustacean and finfish accounted for 51.44 per cent and 33.67 per cent respectively. Brackishwater

aquaculture contributes more to people's nutrition and livelihood than marine aquaculture, which produces seaweed and mollusc largely.

### Brackishwater resource potential

Out of total 3.9 million ha of the estuarine area estimated; 1.2 million hectares of coastal saline waters have been identified to be potentially suitable for brackish water farming. Also, about 9 million hectares of salt-affected lands were assessed in the hot semi-arid and arid ecoregion of northern plains and central highlands in Haryana, Rajasthan, Uttar Pradesh, Maharashtra and Gujarat with surface and sub-soil saline water.

In India, brackishwater aquaculture is synonymous to shrimp farming, and estimates show that only 11 per cent of the potential area is utilised for farming, which shows there is a tremendous scope for further expansion. On the other hand, about 40 per cent of the potential area for freshwater aquaculture has been already utilised for farming practices (FAO, 2014). Further, freshwater is getting scarce day-by-day and conflicts about resource utilization among the various end users, including industries, pose hurdles to freshwater aquaculture development.

At this juncture, brackishwater aquaculture comes with many scopes and hope due to the various advantages of this sector. To aid in national planning, management and policy decisions in brackishwater aquaculture, precise data on potential brackishwater resource and its mapping is essential. CIBA initiated this task and mapping the potential areas leading aquaculture states in a phased manner.

### Role played by ICAR-CIBA

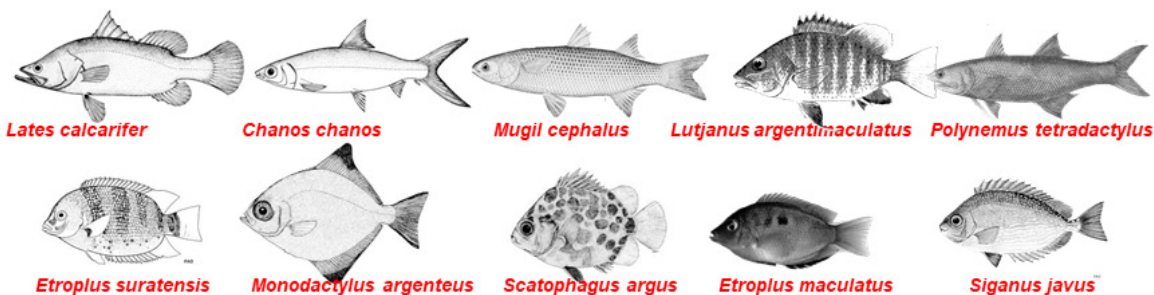
One among the national research institutes under the Indian Council of Agricultural Research (ICAR), New Delhi, ICAR-Central Institute of Brackishwater Aquaculture (CIBA), serves as the nodal agency for research and development of brackishwater aquaculture in the country since the establishment in 1987.

As CIBA has marked thirty years of useful research and development in the brackishwater aquaculture sector focussing on crucial questions to develop strategies and technologies for sustainable aquaculture, it takes the responsibility of steering the brackishwater aquaculture industry towards sustainability, as well as contributing towards food security and livelihood.

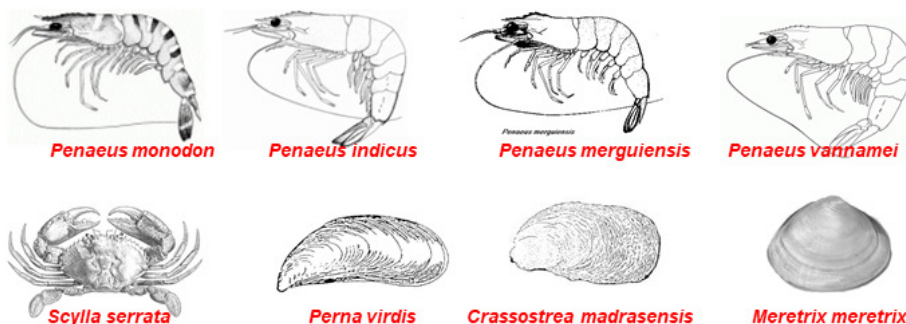


### Potential species for farming in brackishwater.....

#### Fin fishes



#### Shell fishes



#### Seaweeds



At present, brackishwater sector in this country is centred on the exotic vannamei shrimp, and ICAR-CIBA realises the risk of complete dependence single species. CIBA continues to stress upon the diversification of brackishwater aquaculture with different candidate species of shellfish and finfish to utilise the brackishwater resources judiciously and responsibly while ensuring sustainable broad stakeholder participation.

In this direction, CIBA has made creditable progress in the multi-disciplinary areas of brackishwater farming covering captive seed production, feed development, farming system development, disease diagnostics and health management, genetics and stock characterisation, climate-smart aquaculture, community engagements using social science tools and policy interventions through government agencies. Cumulatively, these R&D interventions from CIBA have opened up new diversified farming initiatives and strategies to support the ongoing shrimp farming.

The ultimate goal by CIBA is to achieve sustainable brackishwater aquaculture for food, employment, and

prosperity. It is encouraging to see the tremendous support from the farmers, industry people, and government agencies for our efforts. Still, there is a long way to achieve the committed goals and changing needs.

#### Key Areas of Research & Development

CIBA has already made commendable progress in developing technologies for seed, feed and husbandry of diversified food fishes such as seabass, milkfish, pearlspot, long whiskers catfish, mud crab and five native species of shrimp. CIBA's achievement in breeding the milkfish for the first time in India in captivity has given a considerable hope to the farmers who were looking for a species which they can farm using cost effective feeds, environmentally compatible and profitable.

Standardisation of breeding protocols for fishes such as pearlspot and long-whiskered catfish under captive conditions attracted many stakeholders for monoculture as well as in Integrated Multitrophic Aquaculture (IMTA) models. It is believed that long

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expected grey mullet breeding will add more to it. To have a species composition with balanced trophic nature and feeding behaviour, CIBA is presently focus on the captive breeding of Grey Mullet (*Mugil cephalus*) and Mangrove Red Snapper (*Lutjanus argentimaculatus*).



**Harvest of milkfish from brackishwater pond in Kakdwip West Bengal**

As a significant step, pilot-scale farming demonstrations of Indian white shrimp, *Penaeus indicus* were carried out all along the Indian coast with technologies and expertise of CIBA. Pilot-scale farming demonstrations were conducted at six different coastal states such as West Bengal, Odisha, Andhra Pradesh, Tamil Nadu, Kerala and Gujarat having different agro-climatic conditions.

An average production of 4.4 mt/ha at a stocking density (SD) of 35 PL/m<sup>2</sup> and 1.14 tons/ha at SD of 10 PL/m<sup>2</sup> were obtained. At the end of 135 days grow out, a final body weight of 28-30 g and 17 -20 g was obtained at lower and higher stocking densities respectively. Further, experiments on comparative growth performances of tiger shrimp, *P. monodon*, Pacific white shrimp, *P. vannamei* and Indian white shrimp, *P. indicus* for 120-day in ponds at CIBA field station at Kakdwip, West Bengal showed that the growth pattern of *P. indicus* was similar to *P. vannamei* until 14-week duration.

Results revealed the potential and economic viability of native Indian white shrimp *P. indicus*, which can be farmed as a candidate complimentary species, along with exotic Vannamei. Seeing the encouraging results, there is a call from stakeholders across the country for selective breeding of Indian white shrimp. As the first step in this direction, CIBA scientists have undertaken an extensive population genetic mapping of indian white shrimp along the Indian

coast. Study using modern scientific approaches such as microsatellite markers and mitochondrial gene sequencing revealed that different stocks with promising growth potential are available along the Tamil Nadu and Kerala coast. These are promising data required for the proposed selective breeding programme or genetic improvement programme to perk up the native species.



**Farmed Indian white shrimp**

The success achieved by CIBA in our Regional Centre, Kakdwip, West Bengal in rearing the migratory Hilsa in the pond up to their sexual maturation has given hope for farming this culturally important, and costly fish in Bengal region. Almost all the shrimp and fish hatcheries depend on the imported feeds for the broodstock and larvae. So, CIBA has indigenous functional hatchery feeds, which is very critical for consistent production and supply of seeds required by the expanding brackish water farming. CIBA has developed functional larval feeds for shrimp and seabass, and broodstock feed for milkfish and pearlspot to sustain repeated spawning and higher fry yield.

Efforts in developing seed production of untapped indigenous species, particularly brackishwater candidates, will go a long way for developing a robust ornamental fish industry in India. In this connection, CIBA has placed a significant push on developing seed production technologies of many commercially important brackishwater ornamental fish species.

Brackishwater aquaria is a favourite element within the fishkeeping hobby. Indian brackishwater systems are a treasure of favorite ornamental fishes like chromides, mono angel, scats, puffers, gobies, flatfish, tiger perch, glassy perch let and gar. CIBA has been successful in the breeding and larval rearing of important ornamental fishes like Spotted Scat (*Scatophagus argus*), Silver Moony fish (*Monodactylus argenteus*), Green Chromide



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(*Etroplus suratensis*), Orange chromide (*Etroplus maculatus*), and Crescent perch (*Terapon jarbua*) and continue working on other species. Along with developing ornamental fish for domestic and for export, CIBA places a major emphasis on developing ornamental fish as a livelihood option for the rural women community.

### Research on rearing systems and diversification

Though India has a vast coastal line of 8,129 km with estimated potential brackishwater area of 1.2 million ha, it has been assessed that only 14 per cent has been utilised for farming and the development pattern too is not uniform or adequately planned. The real challenge lies in developing plans strategically to utilize the under-utilised potential resources efficiently. The country has vast areas of open brackishwater resources suitable for cage and pen aqua farming. Recently CIBA in collaboration with NIOT, Chennai and Mangrove foundation, Maharashtra, has widely demonstrated the cage farming of seabass fish (*Lates calcarifer*) in the open backwaters using customized cages.



**Customized open water cages farming of brackishwater finfishes installed in west coast of India**

A unique three-tier model comprising nursery, pre-grow out and grow out cages (25m<sup>3</sup>) got an average production of 460 kg in one cycle at a production cost of Rs.190 per kg of fish. This three-tier cage farming model is a win-win strategy as an alternative

livelihood option for fishers, productive utilisation of water resources and an employment opportunity for the unemployed fisher youths. Similar cage rearing models are being tried out in Maharashtra, Gujarat, Puducherry and Kerala too.

### Development of indigenous feed technology

Nutrition, in synergy with ideal water quality, is a key driver in realising the maximum genetic potential for growth and reproduction in any aquatic species. Hence, about 50 to 60 per cent of the operational cost is spent on feed. It is not only just a biological requirement, but also an economic factor which determines the success of aquaculture. Cost effective manufactured feeds are an important element of modern commercial aquaculture, providing the balanced nutrition needed by farmed aquatic organism. ICAR-CIBA has been involved in development of indigenous cost-effective feeds for the potential candidate species for all their life stages by a strategic approach. Currently, a significant share of Indian shrimp feed business is catered by the multinational corporate companies or their joint ventures, where an upward trend in price has been noticed during the last few years. Treating this as a critical obstacle in realising the returns by farmers, CIBA developed a cost-effective grow-out feed branded as Vannami<sup>iPlus</sup> using indigenous ingredients. Vannami<sup>iPlus</sup> has been widely tested in farmers' ponds of Andhra Pradesh, Kerala, Haryana and Gujarat.



**Launch of indigenous cost-effective shrimp feed processed using CIBA developed feed technology to cater to inland saline soils of Haryana**

While the cost of the commercial feed available to the farmer is about Rs 75 to 85 per kg, the cost of Vannami<sup>iPlus</sup> was only Rs 58 to 60 per kg. It was demonstrated that, while feed cost to produce 1 kg of shrimp can be restricted around Rs 100 (Rs. 91 to 98) by using Vannami<sup>iPlus</sup>, it can go up to Rs.140 to 160 with commercial feeds.



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The feed showed impressive performance and the farmers could reduce the cost of production of shrimp from Rs. 230-240 per kg to Rs. 170-180 per kg. Thus, it plays a crucial role in improving the profitability of small and medium shrimp farmers.

CIBA also involved in the development of cost-effective feeds and feed management for grow-out farming, functional feeds, speciality feeds for



*Shrimp feed processed in Andhra Pradesh with the technological support of ICAR-CIBA*

maturation and larval rearing and nutrient profiling of fin and shellfishes. In the recent past CIBA commercialised a series of feed technologies such as Seebass<sup>Plus</sup>, Poly<sup>Plus</sup>, KOLAR<sup>Plus</sup> and Larvi<sup>Plus</sup> for seabass grow-out farming, polyculture, ornamental fishes and larval rearing.

### Health management and disease control

Overall health and disease monitoring is mandatory for successful farming. CIBA, as a referral laboratory for screening OIE listed aquatic animal pathogens including emerging pathogens. It will continue observing the prevalence of existing and newly emerging aquatic diseases and under The National surveillance programme of aquatic animal diseases (NSPAAD).

CIBA's Aquatic Animal Health and Environment Division (AAHED) has state-of-the-art laboratory facilities for carrying out cutting edge research in frontier areas on aquatic animal health and environment management, including diagnostics, prophylactics and health management in brackishwater aquaculture.

The AAHED of CIBA was the first to commercialise a diagnostic kit for the diagnosis of the dreaded white spot disease of shrimp to a premier biotechnology company in 2002. AAHED has the expertise and capacity to carry out all the proposed levels of diagnostics of OIE listed

brackishwater pathogens, and has been serving as a National Referral Laboratory to the Department of Animal Husbandry Dairying and Fisheries, Ministry of Agriculture and Farmers' Welfare, Government of India. AAHED made a pivotal contribution to the import risk analysis (IRA) of Pacific white shrimp into India, which has resulted in quadrupling aquaculture production in the country. AAHED has been carrying out research on various aspects of prophylactics and therapeutics



*ICAR-CIBA signed MoU for the indigenous formulated feed for ornamental fishes, with techno feeder, Chennai*

of brackishwater aquatic animal. CIBAMOX is a water probiotic containing an innovative combination of autotrophic ammonia oxidizing, nitrite-oxidizing and denitrifying bacterial consortia.

LUMI<sup>Phage</sup> is the phage therapy technology for biocontrol of pathogenic vibrios in shrimp hatcheries. The technology has been developed using bacteriophages (or phages in short, are viruses that selectively infect and kill bacteria) capable of against the luminescent bacteria of genus *Vibrio*.

### Selective breeding of indigenous shrimp species

There are only two cases of selective breeding in India. First was in fish, which was the selective breeding work on *Labeo rohita* (Jayanti Rohu) since the early nineties and the next work in *Macrobrachium rosenbergii*, which was initiated in 2010. Jayanti Rohu showed that benefits could accrue from genetic improvement programmes. While a selective breeding programme on native shrimp was not thought of till recently, when the selective-bred exotic *Vannamei* dominated the Indian shrimp farming scene since its introduction in 2010.

The laboratory and field studies conducted by CIBA revealed that the indigenous shrimp species *Penaeus indicus* farming can provide comparable results. This species can size at least up to 20 grams on par with



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Vannamei farming about production and monetary benefits. Hence, this is a right candidate for selective breeding programme, to cater the requirements of Indian shrimp farming sector. The selective breeding programme for the indigenous species of the shrimp is the need of the hour.

CIBA has already accomplished genetic characterisation of the white shrimp stock along the Indian coast, which will serve for initiation of the selective breeding programme. Any selective breeding programme being a long-term programme, it is imperative for government agencies that work for the shrimp farming sector such as CIBA and MPEDA work in tandem with the leaders in private sector.



Indian white shrimp

### Inland saline shrimp farming: A new avenue

According to Central Soil Salinity Research Institute (CSSRI), India has around 6.7 million hectares of salt-affected soils and 1.9 lakh sq.km of saline groundwater area. They are present in states like Haryana, Punjab, parts of Rajasthan and Western Uttar Pradesh. Saline aquifers are formed as a result of salt-bearing rocks in the deeper layers or as a result of anthropogenic interventions like excessive irrigation and deforestation. Interestingly, most soils overlying these saline aquifers are also saline.

The inland saline areas have long been considered as a hindrance to economic development as the land could not be used for agriculture, animal husbandry and other industrial applications. Saline groundwater, however, may be used to rear brackishwater shrimp and fish after the necessary ionic amendment of the saline water.

Shrimp farming in amended inland saline groundwater is already in vogue in the states like Haryana and Punjab. However, the expansion needs to be regulated considering the possibility of salination affecting the freshwater resources.

### Conclusion

In the present context of shrimp aquaculture scenario in India, it is worthwhile to relook into the candidate shrimp species used for aquaculture for a long-term sustainability of brackishwater shrimp farming. Promotion of a native species for aquaculture has always been advantageous as many of the scientific knowledge have already been generated. The present analysis indicates that native Indian white shrimp is similar to the *P. vannamei* in all the aquaculture traits. In the case of Vannamei, the most advantage, which one can argue, is the availability of genetically selected stock. However, in the case of *P. indicus*, breeding programmes are yet to start. When considering all benefits of the development of domesticated native species, it is an important strategy to achieve the goal of sustainable aquaculture.

As the bulk of brackishwater aquaculture is based out of rural regions, it plays a significant role as a provider of direct and indirect employment to the rural poor and, thereby, to poverty alleviation. In this direction, CIBA strengthened its bonds with many stakeholders in the brackishwater sector ranging from farmers to export agencies.





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Ministry of Commerce & Industry, Government of India

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# Hyderabad to host mega aqua event, as MPEDA ties up with Telangana Govt



*(From Right) Mr. Sandeep Kumar Sultania IAS, Secretary to Chief Minister, Mr. Talasani Srinivasa Yadav, Hon'ble Minister for Animal Husbandry, Government of Telangana, Mr. K. S. Srinivas IAS, Chairman, MPEDA and Dr. C. Suvarna, Commissioner of Fisheries, Govt. of Telangana during exchange of MoU in Hyderabad*

Telangana is all set to boost its export-oriented aquaculture, as the government is joining hands with the Marine Products Export Development Authority (MPEDA). A Memorandum of Understanding in this regard was signed in presence of Mr. Talasani Srinivasa Yadav, Minister for Animal Husbandry, Dairy Development, Cinematography and Fisheries, Government of Telangana by Mr. Sandeep Kumar Sultania, IAS, Secretary to Chief Minister and Secretary to Animal Husbandry, Dairy Development and Fisheries, Government of Telangana and Mr. K S Srinivas IAS, Chairman, MPEDA at Hyderabad on 18.07.2019.

MPEDA, which was founded in 1972, signed the MoU for the development of export-oriented aquaculture in the State so as to also promote its fish exports in the next five years. The MoU involves setting up a multi-species aquaculture centre with the State government's funding. The facility will consist of

hatcheries, nurseries and training centres for export-oriented aquaculture species. The pact also envisages providing technical assistance to set up an Aquatic Quarantine Facility at Hyderabad Airport through Rajiv Gandhi Centre for Aquaculture (RGCA) the R & D arm of MPEDA, besides extending technical and financial assistance for a chilled and live fish-handling facility at the same place.

MPEDA will also assist the Telangana government in formulating a cage culture policy for promoting export-oriented aquaculture in the water bodies of the state. In order to build the capacity of farmers in adopting better management practices, MPEDA will organise the farmers into clusters under the National Centre for Sustainable Aquaculture (NaCSA).

Telangana has the country's third-largest inland water resource base for fisheries with 77 large, medium and minor reservoirs and as many as 24,189 tanks with 5.7 lakh

## FOCUS AREA



*Mr. Talasani Srinivasa Yadav, Hon'ble Minister for Animal Husbandry, Dairy Development and Fisheries, Government of Telangana in discussion with Mr. K. S. Srinivas IAS, Chairman, MPEDA and others*

ha water spread area suitable for fisheries. Aquaculture is being carried out in more than 1,000-ha area. Also, the State has fisher communities totalling 27.14 lakh people. Telangana is also home for 4,000 fishermen societies, which connects 3 lakh members who are spread across the entire state.

The MPEDA, through its research and development wing RGCA, has developed and standardised technology for a number of candidate species, including fast-growing fish like the GIFT (genetically improved farmed tilapia) and highly-valued fish such as the seabass. The fishes are suitable for culture in the freshwater environments and are amenable to cage culture technology as well. MPEDA also has the expertise to set up quarantine facility at the ports as well as facilitate export of chilled fish exports. Prior to the signing of the MoU, a coordination meeting was done by Mr. Sandeep Kumar Sulatania IAS, Secretary, Fisheries, Government of Telangana in presence of Mr. K S Srinivas IAS, Chairman, MPEDA and other senior officials from Department of Fisheries, GHMC, Transport, Police, Fire and Rescue, Information and Public Relations departments, in connection with organising Aqua Aquaria India 2019, a major event hosted by MPEDA in the southern state's capital city of Hyderabad on August 30, 31 and September 1, 2019. In the meeting, Chairman, MPEDA highlighted the importance of fisheries sector and its importance in export earnings of the country.

As per the latest figures, India exports over 14 lakh

tons of marine products worth Rs. 47,000 Crore, which is nearly USD 7 billion. The major markets for Indian marine products are USA, EU, South East Asia, China, Japan and Middle East countries. Chairman noted that Telangana holds immense potential in developing inland aquaculture and could thereby contribute to exports significantly in the future. The State can also utilise the air connectivity from Hyderabad to export live and chilled fish to various markets.

"Telangana has already realised the importance of development of export-oriented aquaculture. The upcoming meet will enrich the State's food security and further promote its fish exports," said Mr K.S. Srinivas, Chairman of the Kochi-headquartered MPEDA, which functions under the Union Government's Department of Commerce.

Aqua Aquaria India 2019, the three-day show being held in Hitex City, Hyderabad from August 30 will be Asia's biggest of its kind with more than 250 exhibitors, showcasing various production and harvest technologies, machinery and accessories in export-oriented aquaculture as well as ornamental fisheries sectors.

The meet will witness the participation of no less than 5,000 national and international delegates. The August 30-September 1 conclave will also feature technical sessions led by national and international experts in various domains of aquaculture.



# Highlights of marine fish landings in selected harbours of India during May 2019

**AFSAL V.V., N.J. NEETHU AND JOICE V. THOMAS**  
NETFISH-MPEDA

### NETFISH-MPEDA

NETFISH, the extension arm of MPEDA, keep a record on daily fish landings and boat arrivals occurring at the major harbours and landing centres of India and the database generated is being used for the validation of Catch Certificate Scheme of MPEDA. It also helps to keep a record of the fish catch trends of the country which is an inevitable part of marine fisheries management. This report portrays the analysis results of harbour data obtained during May 2019.

### Data Collection & Analysis

The fish catch and boat arrival data were obtained on a day-to-day basis by the Harbour Data Collectors placed at selected harbours across all the maritime states of India. The name, registration number and type of fishing vessels arrived as well as the approximate quantity of major fishery items landed at the harbour were recorded by primary and secondary data collection modes. The data were further analysed using online applications and MS office (Excel) tools to arrive at species-wise, state-wise and harbour-wise estimations. During May 2019, data from 75 harbours (see Table 1) along the 8 coastal states were obtained, which were analysed for this report.

**Table 1. List of landing sites selected for data collection**

Sl. No.	State	Harbour
1	Gujarat	Ghoghla
2		Jafrabad
3		Veraval
4		Mangrol
5		Kotada
6		Sutrapada

7	Gujarat	Vanakbara
8		Dwarka Rupen
9		Dholai
10		Umargam
11		Chorwad
12		Porbandar
13	Maharashtra	Dahanu
14		Versova
15		New Ferry Wharf
16		Sakharinate
17		Malvan
18		Arnala
19		Vasai
20		Dabhol
21		Devgad
22		Uttan
23		Ratnagiri
24		Sasoon Dock
25		Satpati
26		Alibagh Koliwada
27	Goa	Vasco
28		Chapora
29		Malim
30		Cutbona
31	Karnataka	Bhatkal
32		Belekeri
33		Amdalli
34		Karwar

## FOCUS AREA

35	Karnataka	Malpe
36		Mangalore
37		Gangolli
38		Honnavar
39		Tadri
40	Kerala	Koyilandi
41		Cheruvathur
42		Mopla Bay
43		Azheekkal
44		Thangassery
45		Vaadi
46		Neendakara
47		Chellanam
48		Ponnani
49		Vypin
50		Munambam
51		Puthiyappa
52		Beypore
53		Kayamkulam
54		Thottappally
55		Vizhinjam
56		Sakthikulangara
57		Chettuva
58		Thoppumpady Cochin
59	Tamil Nadu & Pondicherry	Colachel
60		Poompuhar
61		Mudasalodi
62		Kodiyakarai
63		Thengaipattinam
64		Pulicat
65		Tharuvaikulam
66		Chennai
67		Cuddalore
68		Nagapattinam
69		Pazhayar
70		Karaikal

71	Tamil Nadu & Pondicherry	Pondicherry
72	Andhra Pradesh	Pudimadaka
73		Visakhapatnam
74		Kakinada
75	Odisha	Balugaon

### Estimations on fish landings

During the month of May 2019, when the East coast states are observing fishing ban, a total of 63255.97 tons of landings of marine fishery resources was recorded from 75 landing sites, mostly from the West coast. The total catch was composed of 25509.54 tons (40 per cent) of Demersal finfishes, 21013.59 tons (33 per cent) of Pelagic finfish resources, 9344.22 tons (15 per cent) of Molluscs and 7388.62 tons (12 per cent) of Crustaceans (Fig.1).

The total catch was comprised of around 217 varieties of fishery items, among which the top five items were Threadfin breams, Trigger fish, Squid, Indian mackerel and Ribbon fish (Fig. 2). These 5 fishery items together formed 42 per cent of the total catch. The other major species contributed to the catch was the Bombay duck with a quantity of 3250.65 tons. The species which registered least landing during the month was the

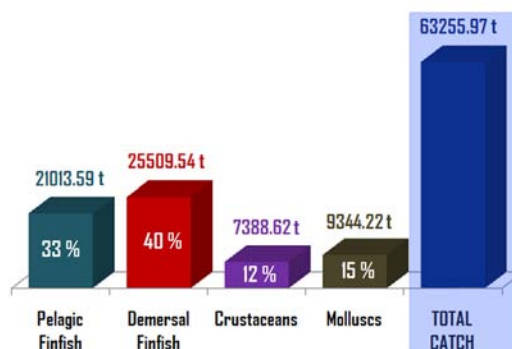


Fig. 1. Category-wise fish landings during May 2019

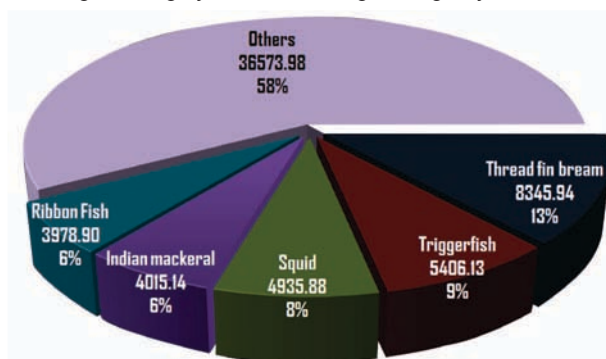


Fig. 2. Major fishery items landed during May 2019



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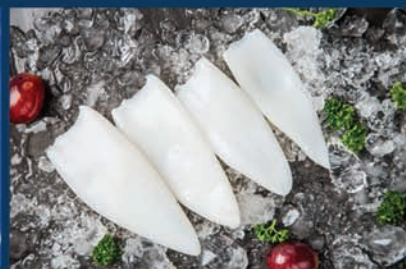
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## FOCUS AREA

Argentine Red Shrimp, with a quantity of 0.09 tons. Table 2 is about the quantity of various categories of fishery items recorded during May 2019. Among the Pelagic finfish resources, Indian mackerel, Ribbon fish and Bombay duck were the major contributors and in the case of demersal finfishes, it was Threadfin breams and Trigger fishes which contributed more. Major items among Crustacean were Jawala and *Karikkadi* shrimps, whereas among Molluscs Squid and Cuttle fish were the major items landed.

**Table 2. Category-wise landing of various fishery items during May 2019**

Fishery item	Quantity in tons	% of total catch
<b>Pelagic Finfish</b>		
Indian mackerel	4015.14	6.35
Ribbon fish	3978.90	6.29
Bombay duck	3250.65	5.14
Scads	2191.18	3.46
Anchovies	2169.74	3.43
Tuna	1851.99	2.93
Indian oil sardine	701.49	1.11
Trevallys	675.31	1.07
Barracudas	470.00	0.74
Seerfish	318.82	0.50
Dolphin fish	244.95	0.39
False trevally	227.38	0.36
Sail Fish	188.56	0.30
Sword fish	140.87	0.22
Lesser Sardine	81.25	0.13
White sardine	70.67	0.11
Queenfishes	60.93	0.10
Shads	60.51	0.10
Herrings	59.18	0.09
Cobia	49.10	0.08
Mulletts	33.66	0.05
Marlins	32.54	0.05
Indian Salmon	23.84	0.04
Surgeon fish	22.26	0.04

White Fish	21.00	0.03
Silver Biddies	20.72	0.03
Halfbeak	19.64	0.03
Needlefish	16.92	0.03
Sillago	6.50	0.01
Milk fish	5.92	0.01
Barramundi	1.36	0.00
Flyingfish	1.12	0.00
Pompano	0.87	0.00
Indian threadfish	0.50	0.00
Oriental bonito	0.12	0.00
<b>Total</b>	<b>21013.59</b>	<b>33.22</b>
<b>Demersal Finfish</b>		
Thread fin breams	8345.94	13.19
Triggerfish	5406.13	8.55
Lizard Fish	2908.13	4.60
Croakers	2630.62	4.16
Catfish	1535.45	2.43
Bull Eyes	926.29	1.46
Leatherjacket	786.16	1.24
Sole fish	686.03	1.08
Moon Fish	642.99	1.02
Reef Cod	399.21	0.63
Pomfrets	312.97	0.49
Snapper	214.72	0.34
Goat Fish	160.99	0.25
Sharks	143.66	0.23
Rays	134.93	0.21
Ponyfish	128.30	0.20
Eels	104.29	0.16
Perch	13.58	0.02
Indian threadfin	12.23	0.02
Emperor Bream	4.80	0.01
Parrot Fish	4.15	0.01
Flat Head	3.62	0.01
Seabream	2.71	0.00
Rabbit Fish	1.65	0.00

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<b>Total</b>	<b>25509.54</b>	<b>40.33</b>
<b>Crustaceans</b>		
Jawala shrimp	1704.52	2.69
Karikkadi shrimp	999.53	1.58
Deep sea shrimp	837.13	1.32
Poovalan shrimp	686.67	1.09
Indian White shrimp	665.46	1.05
Sea Crabs	622.68	0.98
Pink shrimp	534.78	0.85
Brown shrimp	473.02	0.75
Flower shrimp	301.34	0.48
Rainbow shrimp	238.81	0.38
Mud crab	75.41	0.12
Indian Tiger shrimp	64.28	0.10
Shrimp	59.64	0.09
Red Tail Prawn	47.19	0.07
Lobsters	42.01	0.07
Yellow shrimp	28.82	0.05
Banana shrimp	7.06	0.01
Ginger Shrimp	0.20	0.00
Argentine red shrimp	0.09	0.00
<b>Total Crustaceans</b>	<b>7388.62</b>	<b>11.68</b>
<b>Molluscs</b>		
Squid	4935.88	7.80
Cuttlefish	2515.46	3.98
Whelk	1126.00	1.78
Octopus	766.89	1.21
<b>Total Molluscs</b>	<b>9344.22</b>	<b>14.77</b>
<b>Grand Total</b>	<b>63255.97</b>	<b>100.00</b>

### State-wise landings

While analysing the State-wise catch, it is learnt that the maximum landing recorded was from Gujarat, which was to the tune of 21193.98 tons (34 per cent of total catch) (Fig. 3). This was followed by Karnataka with 15940.23 tons (25 per cent) and then by Maharashtra with a contribution of 13336.24 tons (21 per cent).

The State which reported least landing during the

period was Odisha, where only 6.99 tons (0.01 per cent) of marine fish catch was recorded. The West coast states together formed 96 per cent of the total catch. No landing from West Bengal as well as the meagre landing along the other East coast states can be attributed to the fishing ban period prevailed there.

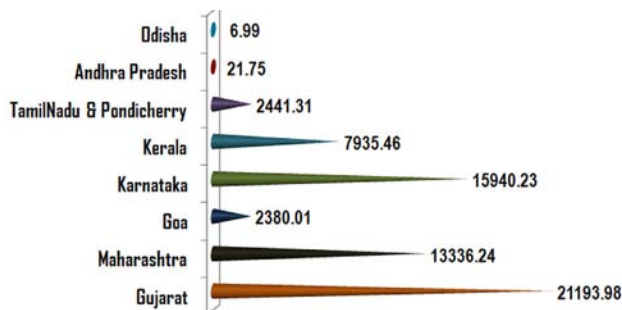


Fig. 3. State-wise fish landings (in tons) during May 2019

### Harbour-wise landings

Figure 4 represent the fish landings recorded during the

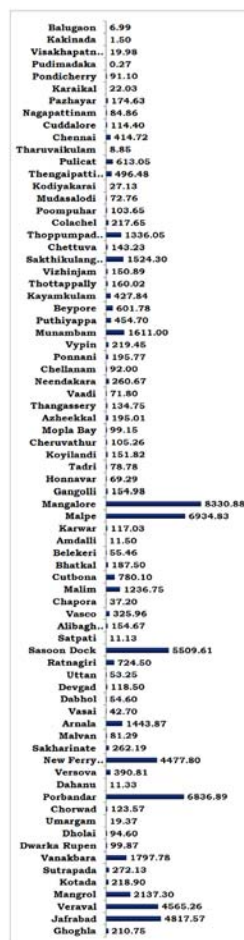


Fig. 4. Landings (in tons) recorded at harbours during May 2019

month at the selected harbours of West and East coasts. Of the 75 harbours, Mangalore harbour registered the maximum landing of 8330.88 tons (13 per cent) and it was followed by Malpe harbour with a landing of 6934.83 tons (11 per cent).

The least quantity of marine fish catch was recorded from Pudimadaka harbour in Andhra Pradesh (0.27 tons).

### Estimations on boat arrivals

A total of 40366 boat arrivals were recorded during May 2019, of which the highest recording was from Porbandar harbour (2623) and it was followed by Sakthikulangara harbour with 2537 boat arrivals. The Satpati harbour had registered



## FOCUS AREA

the least boat arrival during the month.

### Summary

In May 2019, a total landing of 63255.97 tons of marine fishery resources was registered from the 75 major fishing harbours of India, where in Demersal finfish

was the major contributor. Considering the fishery item-wise landings of the month, the Threadfin bream was the item which registered the highest landing. Gujarat recorded maximum landing during the period and the Mangalore harbour registered the highest landing. The maximum boat arrivals were recorded at Porbandar harbour.



## NETFISH conducts Mass boat clean-up



*Fishermen cleaning the deck of the fishing vessel*

**R**egular cleaning of fish contact surfaces, fishing gears, equipment, utensils etc. onboard fishing vessels, especially before and after fishing, is utmost important to prevent pathogenic contamination of fishery items. Better sanitation practices, hygienic handling and personal hygiene are the key factors to be taken care to avoid contamination of fishes onboard.

To create proper awareness among fishing boat owners, crew members and fishermen about the good hygienic and sanitation condition of fishing boats, fish hold and fishing accessories, NETFISH conducted two mass boat clean-up programmes at Deshapran fishing harbour, Petuaghat during June 24 and 25, 2019.

The programme included a brief lecture on the significance of cleaning of fishing boats, fish holds and accessories and then a practical demonstration on cleaning procedures to be followed onboard.

Mr. Ujjwal Kr. Sar of Sarboday Sangha and Mr. Atanu Ray, State Coordinator, NETFISH, delivered talks and demonstrated the cleaning procedure. Then each of the boat was given liquid soap and they were made to clean their boat's deck, equipment and utensils.

In all, 60 mechanized fishing boats were cleaned by the two programmes. The fishers cooperated well with the programme by actively involving in cleaning process.





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# Stakeholder's meetings held for vessel log sheet at harbours

**N**ETFISH Tamil Nadu South had organized three awareness as well as stakeholders' meetings on June 25, 26 and 27, 2019 at Chinnamuttom, Rameswaram and Tuticorin respectively. These meetings were held in connection with the campaign for the implementation of vessel log sheets in fishing vessels for better traceability, adoption of Minimum Legal Size (MLS) in fisheries and avoiding Illegal, Unreported and Unregulated fishing (IUU).



*Stakeholders meeting at Thangachimadam*

Around 90 participants including officials of Department of Fisheries and representatives from mechanized boat owners' association, traditional boat owners, merchants etc. actively participated in the meetings. The meeting at Chinnamuttom had a participation of 27 stakeholders, including the Secretary of Annai Theresa Fishermen Union; President of Magilchi Madha Mechanized Boat Association, Chinnamuttom; President of MeenavarThozhizhalarMarumalarchiSangam; Secretary of Cooperative Society, Kovalam etc. Dr. Joice V. Thomas, Chief Executive, NETFISH, Dr. Vinoth S. Ravindran, State Coordinator, NETFISH, Mrs. Maria FransoVivin, Inspector of Fisheries, Mrs. Libin Mary, Sub Inspector of Fisheries and Mr. A. Mubarak Ali, M. S. Swaminathan Research Foundation, were the officials present in the meeting.

The meeting at Rameswaram was attended by Mr. Sathik Ali, Inspector of Fisheries, Mandapam and Mr. Ramesh Babu, Inspector of Fisheries, Rameswaram, Mr. Ganesamoorthy, Sub Inspector of Marine Police, Mandapam, Dr. Raju Saravanan, Scientist CMFRI, Mandapam and Mrs. ArokyaKevi Kumar, MSSRF, Thangachimadam along with members of boat owners' associations and fishermen associations. In

Tuticorin, Mrs. N. Chandra, Joint Director, Fisheries, Tuticorin, Mrs. Viola, Assistant Director, Fisheries, Tuticorin and representatives from boat owners' association, traditional fishers' association etc. were present in the programme.

In all the meetings, Chief Executive, NETFISH, spoke about the inspection of foreign countries for import of seafood from India and their emphasis on quality standards and hygienic handling of fishes. He talked to the stakeholders, mainly trawl boat fishermen, owners and union leaders about the importance of catch certificate and vessel log sheet in order to improve traceability from sea to the vessel and to the processing factories. He also explained about the Seafood Import Monitoring Program (SIMP) of US aimed to stop procurement of seafood caught by IUU fishing.

The State Coordinator highlighted on the importance of registration of fishing vessels with the State fisheries, avoiding of fishing within five nautical miles and juvenile fishing and usage of nets with proper mesh sizes, abiding the TNMFRA. The importance of using gum boots, gloves, uniforms and caps during handling of fishes is also explained during the meeting.



*A view of stakeholders meeting at Tuticorin*

While discussing the implementation of vessel log sheet in trawlers, the boat owners emphatically stated that they would comply with it, only if their grievances were addressed to. The fisherman group said that they are not consulted enough before any developmental activities and hence useful infrastructure facilities are lacking at fishing harbours. They are willing to cooperate with all development plans, if provided with suitable amenities.



# Training Programme for ETP Operators



*Dr. T R Gibinkumar, Deputy Director, MPEDA delivering the inaugural address*

**M**PEDA Sub Regional Division, Ratnagiri organised a one-day training programme as a capacity building exercise for the Effluent Treatment Plant operators and as an awareness programme for the management of seafood processing units in Ratnagiri and Sindhudurg on June 14, 2019 at Malnaka, Ratnagiri. The Sub Regional Office of Maharashtra Pollution Control Board (MPCB) at Ratnagiri was associated with MPEDA for organising this training programme.

### Background

The concern of pollution from the seafood processing plants was an agenda for discussion in the 129<sup>th</sup> Meeting of the Authority held at Mangalore on May 15, 2017. During the discussion, it was noted that no study or assessment of ETPs associated with seafood processing units has been conducted. Following this, a decision was taken in the meeting to conduct a study on 'Environmental Impact of Effluent Discharges from Seafood Processing Plants and Control Measures'. Based on this decision tenders were invited in July 2017 and the work order was issued to M/s. Ultra-Tec Environmental Consultancy and Laboratory in January 2018.

The work order was issued for six months and so, the final report was submitted by Ultra-Tec in August 2018.

The main objectives of the study were

- To assess the effectiveness of the existing facilities in mitigating/ preventing the pollution/ impact on environment due to the liquid waste (effluent) discharge.
- To identify the feasible reuse options of the treated effluent
- To have a proactive environmental management action to identify environmental issues in order to take corrective and preventive measures
- To recommend financial assistance schemes for establishing/ renovating ETPs

The study report had listed a series of recommendations for adoption by the seafood industry. Among them, due stress was given for imparting training to the ETP Operators on the operation and management of ETPs, along with the training for seafood processing plant management and staff on the significance of ETPs and on the latest technologies available for effluent treatment. The study reiterated that the general lack of awareness regarding the environmental impact of effluent discharges from the seafood processing units can be overcome only through properly designed awareness campaigns and training programs.

## FOCUS AREA

This was the background for the regional training programme organised by MPEDA Sub Regional Division in association with Maharashtra PCB. The programme started with an inaugural session and Dr.T.R.Gibinkumar, Deputy Director, MPEDA Sub Regional Division, Ratnagiri in his introductory address welcomed the speakers and participants from the processing plants to this training programme. He also explained the purpose of conducting such programme for the first time by MPEDA for the benefit of ETP Operators. Mrs. Indira P Gaikwad, Sub Regional Officer of Maharashtra pollution Control Board and Mr. Sandeep Chodankar (ETP, STP & WTP designer and consultant) from Chodankar Systems, Kolhapur were present during the function.



*Presentation by Mrs. Indira P Gaikwad, SRO, MPCB*

The inaugural session was followed by technical sessions. The presentations in the session were so designed as to highlight the basic essentials that Good ETP management requires. This included

- Regular training programs for capacity building
  - Maintenance of optimum operating conditions
  - Trouble shooting along with the environmental health and safety aspects in ETP operations
- First presentation was made by Dr T R Gibinkumar, Deputy Director, MPEDA, on the study titled 'Environmental Impact of Effluent Discharges from Seafood Processing Plants and Control Measures', which was conducted by MPEDA. The presentation briefed the background of the study, its objectives, scope and the recommendations made by the agency for improving the efficiency of ETPs. Various suggestions made by the agency on the reuse of treated water were also discussed. This was followed by the presentation by Mrs. Indira T. Gaikwad, Sub Regional Officer from MPCB Ratnagiri on the 'Role of MPCB and Environmental Acts'. Mrs. Gaikwad gave a detailed description on the activities of Pollution Control Board and on the Environmental Acts with reference to Seafood Processing Units.



*Presentation by Mr. Sandeep Chodankar, Chodankar Systems*

Next two presentations were made by Mr. Sandeep Chodankar from Chodankar System in Kohlapur. In the first topic 'Water and Waste water', Mr. Chodankar gave a clear idea about the significance of water and on the need for conserve the same. He also gave the detailed segregation of waste water from different industries and the ways of their treatment. In the second presentation titled 'Environment Technology', Mr. Chodankar detailed on latest technologies for effluent treatment with their typical schematics of treatment, wastewater biochemistry, operating parameters and nutrient removal.

Mr. Sakib Mir (ETP –Biofilter-In-charge) of Akash Fish Meal & Fish Oil Pvt. Ltd., Vengurla, made the fifth presentation on the Operation, Maintenance and troubleshooting of the Effluent Treatment



## FOCUS AREA



*Distribution of participation certificates*



*Participants with speakers*

Plants in Seafood Processing Units. Mr. Sakib in his presentation gave detailed information on the common misunderstandings on ETP operation and on the practices, that reduce the efficiency of a treatment system. He gave the participants some trouble shooting techniques on the operation and maintenance of ETPs.

The final presentation was on the topic 'Environmental impacts of direct discharges' by Dr. Pandurang Patil, Assistant Professor in Environmental Science from the Ratnagiri Sub Centre of University of Mumbai. In his presentation, Dr. Patil dealt about the various types of pollution caused by different types of seafood processing plants and about the consequences of discharging the

effluent without proper treatment in ETPs.

The presentations were followed by question and answer sessions, in which the participants cleared their doubts on the maintenance of ETPs and discussed about the commonly observed issues with the speakers. Participants requested MPEDA and MPCB to conduct similar and advanced training programmes on ETP operation in regular intervals. The participants were presented with participation certificates.

The training programme was attended by 28 participants from eleven processing plants in the region and included ETP operators, production staff, staff from quality control division and HACCP team.





# Consultative workshop on Certification Scheme for Shrimp Hatcheries



*Mr. U C Mohapatra, Deputy Director, MPEDA Regional Division, Bhubaneswar presenting the scheme details*

Aquaculture has emerged as a fast growing enterprise in the world. It is the most viable source of fish food production due to declining fish catch from natural resources for the last several years. With the expansion of aquaculture on a faster pace, numerous diseases have also emerged. In order to tackle disease problems, industry is procuring and applying antibiotics and other pharmacologically active substances. The consumers demand residue-free food fish and regulatory authorities across the world have put in place measures to ensure that safe and residue free produce is imported.

India, being a major player in seafood exports has to undertake sustainable actions in aquaculture focusing mainly on bio-security protocols and responsible use of chemicals and pharmacologically active substances in hatcheries.

A certification scheme for hatcheries for production and supply of antibiotic-free seeds has been presented as a solution to put an end to antibiotic usage in hatcheries in consultation with the stakeholders and MPEDA conducted such consultation meetings in various places. MPEDA offices in Odisha also conducted a

series of consultative meetings and workshops in creating awareness among the stakeholders.

### **1. Consultative meeting for Hatchery Operators' and technicians, Ganjam**

MPEDA Regional Division, Bhubaneswar organized the first consultative workshop at Youth Hostel, Gopalpur in Ganjam district to introduce the new scheme of antibiotic-free shrimp seed production of hatcheries. 25 hatchery operators and technicians attended the workshop, which was held on May 15, 2019.

Mr. U.C. Mohapatra, Deputy Director, made a presentation on the antibiotic issues, which threatens both aquaculture sector and seafood exports from our country. He stressed the need to concentrate on sustainability citing the issues like export rejections, loss of reputation and health problems posed by means of anti-microbial resistance.

Mr. S. Durga Rao, Field Supervisor, gave an idea on the importance of record keeping which is essential to achieve traceability and in complying to the auditing procedures of certification.

## AQUACULTURE SCENE

### 2. Farmers' consultative meeting at Parikhi, Balasore

A one day meeting on certification scheme for shrimp hatcheries and farms was organised by Sub Regional Division of MPEDA at Balasore in Netaji Public school, Parikhi village, Sadar block of Balasore district on May 28, 2019. The meeting was attended by 67 farmers of Balasore and Bhadrak districts, hatchery representatives from the various villages of Sadar block and hatchery owners and representatives from Ganjam district, and representatives of Farmers Producer Company from Bhadrak district. Mr. Aditya Dash, Authority Member, MPEDA and Managing Director of M/s.Suryo Udyog Pvt. Ltd., Mr. P. Anil Kumar, Joint Director, MPEDA, Mr. U.C. Mohapatra, Deputy Director, MPEDA, Regional Division, Bhubaneswar, Mr. Arabinda Bal, Director, M/s. Chandabali Farmers Producer Company Limited, Mrs. Kabita Patra, Sarpanch, Parikhi, Sadar were present during the meeting and deliberated with the stakeholders on the relevance of the new scheme.

Mr. Mohapatra, Deputy Director, Regional Division, Bhubaneswar, gave a brief account on the present

status of aquaculture in the country and MPEDA's promotional activities for the promotion of the same. Mr. Aditya Dash, Managing Director, M/s.Suryo Udyog Company and also an Authority member of MPEDA, appreciated the efforts by MPEDA to bring different schemes regularly for the development of aquaculture. He shared his experience and demand of international market towards certification scheme.

Mr. P. Anil Kumar, Joint Director, MPEDA, briefed the significant role which certification schemes for shrimp hatcheries and farms play in adding value to their produce. Mr. Arabinda Bal, Director, M/s. Chandabali Farmers Producer Company Limited, Chandabali Block, Bhadrak, narrated his experience before and after the formation of Farmers Producer Company (FPO) at Chandabali, Bhadrak. He explained the role of NABARD in helping cluster farms with financial assistance, procedure of FPO formation and encouraged the farmers to form FPO.

Mr. Sibasish Mohanty, Junior Technical Officer, Sub Regional Division, Balasore, proposed vote of thanks.



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# Training Programme on Fresh Water Aquaculture



*A view of the farm visit by the participants of the training programme*

**T**he Sub Regional Division of MPEDA at Kannur organised a 3-day general training programme on "Eco-friendly and Sustainable Diversified Aquaculture" at Pulpally, Wayanad district from June 26 to 28, 2019. The training programme, held at ICDS Hall, Pulpally, Wayanad, was mainly focused on "Fresh Water Aquaculture" for the benefit of twenty entrepreneurs from Pulpally and Mananthavady areas of Wayanad district.

Mrs. Bindhu Prakash, Panchayat President, Pulpally, inaugurated the programme at the meeting, which was presided over by Mr. Dhilipkumar, Panchayat President, Panamaram.

During the programme, MPEDA and its role in development of aquaculture were explained in detail. The technical sessions on recent trends in fresh water aquaculture, sustainable culture of GIFT Tilapia, scampi and seabass farming, starting from site selection to harvest, misuse of antibiotics in aquaculture and schemes and services of MPEDA were handled by Mr. Arul Raj, Field Supervisor, Sub Regional Division, Kannur. Mrs. Priya Vijayakumar, Fisheries Co-Ordinator, Wayanad and Dr. Baiju, Project Officer, MATSYAFED, Kannur, also led technical classes and Mr. Rajan, President, Kerala Aqua Farmers Federation, shared

his experiences in aquaculture.

On third day, a field visit was organised for the trainees. Trainees were taken to GIFT Tilapia fish farm of Mr. Shaji, Aarmaduand and to the Pangasius fish farm of Mr. Jithesh Chooliyadu.



*Trainees attending the session*

A small valedictory function was also organised in the afternoon. During this programme, farmers expressed their views on training. Certificates and stipend were distributed by Mr. Rajan, President, Kerala Aqua Farmers Federation, Wayanad. Mr. Arul Raj, Field Supervisor, Sub Regional Division, Kannur, proposed the vote of thanks.



# Workshop on Good Aquaculture practices



*The team from USFDA and MPEDA that led the workshop*

**M**PEDA Regional Division, Valsad organised a workshop on good aquaculture practices and food safety at Valsad from June 27 to 28, 2019 for shrimp farmers, hatchery operators, exporters, feed manufacturers, officials of Department of Fisheries, ICAR and EIC. The programme was part of an international collaboration between MPEDA and USFDA and 35 trainees participated. Dr. Ansar Ali, Deputy Director, MPEDA welcomed the guests and trainees and briefed them about the importance of the workshop.

Mr. Stanley G. Serfling, USFDA official, conducted pre-examination for the trainees to gauge their basic knowledge about good aquaculture practices and food safety. Mr. Stanley G. Serfling then introduced the Good Aquaculture Practices and Seafood HACCP principles. He talked about the importance of Good Management Practices, primary components of Good Aquaculture Practices and application of GMP to farm site, water source, feed management, production methods, biosecurity and record keeping. He also covered HACCP principles for the farms, application of seafood HACCP principles, hazard analysis, critical control point

to establishments, critical limits, monitoring CCP's, corrective actions, verification steps, record keeping and preventive control measures. He said good management practices and HACCP in aquaculture plays an important role in food safety.



*A view of the programme*

Mr. Sankara Pillai, Assistant Director, Sub Regional Division, Porbandar made a technical presentation on farm biosecurity and covered various aspects of biosecurity measures in site selection, water source, importance of sedimentation in pond, farm design, farm effluent, seed stocking and record keeping.



## AQUACULTURE SCENE

Mr. Serfling also presented farm biosecurity and covered objectives of biosecurity inside and outside the farm. This included subjects like written plan with training, farm location, feed source, water testing, written plan to control access to people, animals, vehicles, disinfection at farm entry points, use of SPF seed, routine monitoring of ponds, disease contingency plans, harvesting plans, routine environmental monitoring, monitoring controls, corrective actions and verifications, food safety, record keeping and preventive controls. Later group exercise was given to the trainees on biosecurity, to be done outside and inside the farm. Presentations were made by the group leaders.



**Mr. U. K. Pandya, Assistant Director, MPEDA making presentation**

Mr. Serfling explained about the USFDA Seafood HACCP regulations and covered details on USFDA Administration, seafood hazards, how FDA regulates sea food, USFDA sea food HACCP regulation, mandatory steps in seafood HACCP, details of Seafood HACCP, Seafood HACCP training programme, GMP and SSOPs, key elements of the HACCP regulation, prerequisite programmes, sanitation control procedures, eight key sanitation areas for safety of water, condition and cleanliness of food contact surfaces, prevention of cross contamination, hand washing-sanitizing and toilet facilities, protection from adulterants, proper labelling, storage and use of toxic compounds, control of employee health conditions and exclusion of pests, additional prerequisite programs like employee training, suppliers controls, traceability and product recall, preventive maintenance procedures to guard against economic fraud, allergen labelling, country of origin labelling requirements and products subject

to the regulation, Seafood HACCP Plan and seven principles of HACCP and said failure to meet Sea food HACCP regulations considered as adulterated under Section 402 (a) (4) of the Food, Drug and Cosmetic Act.

Mr. Christopher Priddy and Ms. Sarah E. McMullen, officials of USFDA, discussed about USFDA import programme and covered the details of USFDA regulated products and FDA Import procedures like registration of food processor, registration of food facilities, requirement of United States agents, shared responsibility, prior notice of imported food, sampling process, type of detention and detention without physical examination removal requirements. Indian exporters will have to follow USFDA import procedures strictly.

Mr. Serfling then spoke about USFDA-approved aquaculture drugs and laboratory testing overview and explained in detail about USFDA definition for a drug, regulating animals drugs in the United States, FDA-approved drugs for aquaculture, drugs of low regulatory priority, un-approved animal drugs of concern, laboratory testing as a verification tool, selecting laboratory, quality management system, sample analysis, types of methods, screening methods and interpreting result from confirmation method. Later, exercise was given to the trainees on developing preventive controls for food safety and group leader reported food safety controls using the PC Form.

Dr. Ansar Ali, Deputy Director, briefed about the importance of enrolment of aquaculture farms and traceability programme and shared the efforts taken by MPEDA in ensuring the food safety and traceability of shrimp cultured in India.

Dr. Manoj Sharma briefed about the production of antibiotic-free shrimp in India and shared his 25 years' experience in aquaculture as a farmer.

The officials of USFDA conducted post-examination for the trainees to know the effect of the workshop and exam review was also done and trainees expressed their happiness and thanked MPEDA and USFDA for organising the workshop.

After the programme, Mr. Maruti D. Yaligar, Deputy Director, Regional Division, Valsad made the concluding remarks, and thanked the USFDA officials for laying strong foundation for the growth of Indo-US business relationship in this sector and assured that India will export high quality shrimp to US, which is free from any banned antibiotics.





# Training Programme on 'eco-friendly and sustainable shrimp farming'



*Field visit to the Crab farm by the trainees*

Sub Regional Division of MPEDA at Ratnagiri organised a five-day training programme on 'eco-friendly and sustainable shrimp farming' for SC/ST candidates at Shiroda village in Sindhudurg district from June 18 to 22, 2019.

Shiroda village, located in Sindhudurg district has enough cultivable brackish water area ideal for shrimp farming. The training programme was designed to address the local community and train them on sustainable farming and diversification of aquaculture. The programme was attended by 21 participants from SC/ST communities in the neighbourhood.

Mr. Lakshmikant Karpe, President, Swachha Bharat Abhiyana, Shiroda Taluka, inaugurated the training programme on June 18, 2019. Mr. Pandurang Naik, former Gram Panchayat member, also spoke.

During the five-day programme, various topics related to the subject were discussed by MPEDA officials, agriculture officers and experienced farmers. Dr. T.R. Gibinkumar, Deputy Director and Dr. Vishnudas R. Gunaga, Junior Technical Officer, gave preliminary information on the topics of aquaculture right from the site selection, selection of species, pond preparation,

water quality management, feed management, disease management and harvesting.



*Dr. T.R. Gibinkumar, Deputy Director, MPEDA during inaugural function*

Apart from the details of shrimp farming, the trainees were given basic information about the culture of crab, seabass, tilapia and scampi. Ms. Shradda Wadekar, Agriculture Assistant, Department of Agriculture, Shiroda, was the resource person on second day of training programme. Other resource person, Mrs. Bharati Gawade, a progressive Vannamei farmer in

## AQUACULTURE SCENE



*Visit to the Soft shell crab farm*

the area, shared her experience of Vannamei culture with trainees. She detailed about the precautions to be taken during shrimp culture and gave the trainees some useful tips on pond construction, water management, identifying suitable land for culture etc. On the fourth day of the training programme, a field trip was arranged for trainees. The trainees were taken to the shrimp farm owned by Mr. Prabhakar at Dabol in Vengurla. Trainees also visited crab farm that belonged to Mr. Bhaskar Raout at Vengurla, where

farm owner explained the various techniques involved in crab farming. He also demonstrated the method of soft shell crab culture in floating plastic boxes.

The five-day training programme concluded with the valedictory session on June 22, which was chaired by Mr. Manoj Ugavekar, Sarpanch, Gram Panchayat, Shiroda, who distributed the certificates to the trainees in the presence of other Gram Panchayat members and MPEDA officials.



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# New technology may help Indian farmers double their income

The National Institute of Rural Development and Panchayati Raj (NIRDPR) is working on a new technology in aquaculture to help double the income of Indian farmers, an official said.

The institute has recently established a 'Backyard Re-circulatory Aquaculture System' developed by Cochin University of Science and Technology.

The system, an intensive fish culture pond, enables high density stocking of fish in cages. This would allow off-setting of the load by stocking different varieties and sizes of fish in smaller cages in a pond, the institute said in a statement.

Since the water requirement for this system is quite low, the high-density stocking of fish in different cages enables flexibility in managing a fishpond.

"We can only double the income of farmers by promoting integrated farming practices. Such technology-backed smart farming solutions will encourage youth to undertake farming as an occupation," said W.R. Reddy, Director General at NIRDPR. This system, inaugurated at the Institute's Rural Technology Park, was established with funding support of the National Fisheries Development Board,

a government organisation. Fish varieties that can be grown in the system include Tilapia, Pangasius, Murrel and Pearlscale. The economics of growing Genetically Improved Farm Tilapia (GIFT) in the pond, for a stocking period of 120 days over three cycles per year, demonstrates that an average monthly return of Rs. 25,750 can be expected from fish culture.

The aquaculture system can act as a source of additional income for farmers located even in low water availability areas, helping them double their income, the statement said. In addition, the sludge periodically pumped out of the pond can be utilised to grow agriculture crops without the addition of chemical fertilizers, it said.

Given that the intensive fish culture does not require to be limited in geography to coastal areas, it can also be used in inland areas, further confirming the flexibility of the system.

The Rural Technology Park at NIRDPR will demonstrate the functioning of the system and provide necessary training to farmers, self-help groups (SHGs) and youth who are keen on undertaking fish culture for enhancing their income.

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# Friend of the Sea Recertifies Jude Foods India for Sustainable Seafood Production

*Indian seafood processor renews commitment to environmentally responsible practices*

Friend of the Sea, the number one global certification standard for products and services that respect and protect the marine environment, announced on July 17, 2019 that it has recertified Jude Foods India Pvt. Ltd. for sustainable practices. With this renewed certification, Jude Foods can display the Friend of the Sea eco-label on its products.

"When you see how broad Jude Foods' product line, you can understand the level of commitment it takes to uphold sustainable practices," said Paolo Bray, Director of Friend of the Sea. "Their achievement in this recertification is truly impressive."

Jude Foods is one of India's leading fresh fish processors. The company has been a trailblazer in the use of scientifically-proven techniques in hygienic fish processing. Jude Foods has also invested in employee training to support hygienic and environmentally sustainable practices. They operate a technologically advanced facility at Kanyakumari,

Tamil Nadu, at the very southern tip of India. Serving markets in Europe and the Middle East, Jude Foods processes an extensive array of fish, crustaceans and cephalopods. Their fish catalogue comprises of dozens of species, including catfish, kingfish, lady fish, yellow fin tuna and many others. Jude Foods processes these fish into steaks and other portion servings. Crustaceans processed by the company include a range of crab and shrimp varieties. Their cephalopod line up contains cuttle-fish as well as multiple types of squid and octopus.

### About Friend of the Sea

Friend of the Sea, a project of the World Sustainability Organization, awards sustainable practices in Fisheries, Aquaculture, Fishmeal and Omega 3 Fish Oil. The organisation promotes pilot projects related to restaurants, sustainable shipping, whale and dolphin-watching, aquaria, ornamental fish, UV creams and others. It is the only sustainable fisheries certification program recognized and supervised globally by a National Accreditation Body.

[-www.friendofthesea.org](http://www.friendofthesea.org)



## JK produces 20000 tons of fish annually, 93000 people dependent on fisheries sector

Advisor to Governor, K Skandan, on July 18, 2019 said that massive fisheries and aquaculture programme has been undertaken by the government to boost the fishing industry in the State.

The Advisor stated this while speaking at a two-day National Conference on Fisheries and Climate Change at Sher-e-Kashmir University of Agricultural Sciences and Technology Kashmir (SKUAST-K) here, the spokesman said.

Advisor Skandan delved into detail as to how climate change has affected food systems. He said that the fisheries and aquaculture sector is a crucial resource in terms of ensuring food and nutrition security. He called for collective efforts to create a balance between developmental needs and environmental sustainability. He said universities, scientists and people together can make strategies to tackle the important issue of climate change which is affecting the ecosystem, adding if things go unchecked oceans

## NEWS SPECTRUM

will also undergo multiple woes. Terming trout as the pride of Jammu and Kashmir, he said there is a need to protect the fish variety and their ecosystem, adding various measures are being taken for the welfare of people associated with the fishing industry.

The Advisor announced that an Aquaculture Park shall be set up in Srinagar for which various locations are being explored. He said that there is a need to have a big aquaculture park where students and the general population can get acquainted with aquaculture practices.

The two-day conference titled 'Fisheries and Climate: Strategies, Challenges and Sustainable Management' is being organised by Division of Fishery Engineering, Faculty of Fisheries SKUAST-K in collaboration with Ministry of Earth Sciences, Government of India.

Professor Nazeer Ahmed, Vice-Chancellor, SKUAST-K, Dr Debajit Sarma, Director ICAR-DCFR, Bhimtal, Professor MH Balki, Dean faculty of Fisheries, Dr Gohar Bilal Wani, Organizing Secretary and Dr A S Ninawe, former Vice-Chancellor MAFSU also spoke on the occasion.

The conference was told that J&K produces 20,000 tons of fish annually with a huge gap between demand and supply while only 50 per cent population of the

State consumes fish.

Addressing the conference, VC SKUAST-K said the fishing industry is an important not only in nutrition but also in providing employment in southern states of India, adding it contributes one per cent of National GDP and five per cent in Agriculture GDP and employing around 14 million people in India.

He said J&K State has around 93,000 people dependent on the fisheries sector, while the requirement of fish is 1.5 lakh tons, however, the state produces only 20,000 tons of fish.

"J&K has tremendous potential in the fisheries sector and it can become a modern world-class industry as we have 50,000 hectares of water area in the state," he added.

Later, the Advisor also released a compendium of Abstracts compiled by the University students. The Advisor also appreciated SKUAST-K for attaining 13<sup>th</sup> rank specified by the Indian Council of Agricultural Research (ICAR), New Delhi.

He also felicitated Ambreen Hamdani, an MSc student of SKUAST-K, for winning DST-Lockheed Martin-Tata Trusts IIGP 2.0-University Challenge 20-19 for her innovation.

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