



*PROCEEDINGS OF
NATIONAL WORKSHOP
ON
MARKETING
STRATEGIES FOR
NEWLY CULTURED
FISHES IN INDIA*



**THE FISHERIES TECHNOCRATS FORUM
CHENNAI-600 006
&
ICAR-CENTRAL INSTITUTE OF BRACKISHWATER
AQUACULTURE, CHENNAI-600 028**

June 2016

**NATIONAL WORKSHOP ON "MARKETING STRATEGIES
FOR NEWLY CULTURED FISHES IN INDIA"**

16-03-2016, at CIBA, Chennai-28

Organised by



The Fisheries Technocrats Forum (FTF), Chennai-600 006

&



**ICAR-Central Institute of Brackishwater Aquaculture (CIBA),
Chennai-600 028**

Funded by



**Coastal Aquaculture Authority
(Ministry of Agriculture, Govt. of India)
Chennai-600 091**

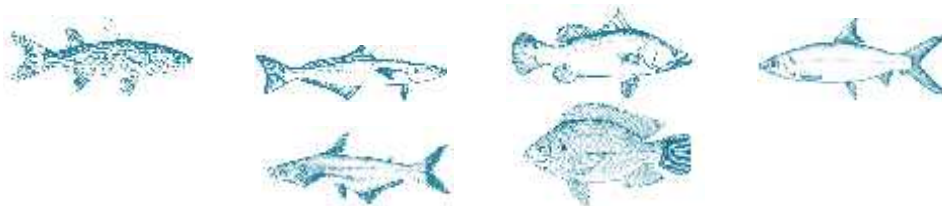
&



**National Fisheries Development Board
(Ministry of Agriculture, Govt. of India)
Hyderabad-500 052**

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Organizing Committee

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भा.कृ.अनु.प.- केन्द्रीय खारा जलजीव पालन अनुसंधान संस्थान

भारतीय कृषि अनुसंधान परिषद, कृषि मंत्रालय, भारत सरकार

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(ISO 9001:2008 certified)

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डॉ के.के. विजयन, पी.एच.डी., ए.आर.एस

निदेशक

Dr. K.K. Vijayan, Ph. D., ARS

Director

Foreword

Ensuring nutritional security for the growing Indian population which has touched 1.2 billion mark is one of the challenges in front of the food production sector. Across the world, aquaculture is emerging as one of the major contributor in providing quality food and nutritional security, aquaculture sector in India is also one of the major contributor registering impressive annual growth. However brackishwater aquaculture has been over dependent on couple of shrimp species targeted at export markets, and the finfish aquaculture is just in the initial stages with seabass farming. Further, Promotion of finfish aquaculture along with shrimp is imperative in the production fish for food and profit. The workshop on 'Marketing Strategies for newly cultured fishes in India' by Fisheries Technocrats Forum of Chennai and ICAR-CIBA has addressed the timely issue of the promotion of finfish aquaculture in the country. Along with the important components of aquaculture such as seed and feed, the theme of the workshop was on the importance of marketing in the promotion of aquaculture in the country, an important one. Specifically, the strategies required for developing marketing channels for the new candidate species brought out through the recent diversification effort, has given the focus.

If more domestic market channels are to be utilized for sustaining momentum of Indian aquaculture, strengthening of transport, cold storage and other market infrastructure need attention. Planning Commission (2012) noted inadequacies of infrastructure of landing, berthing and domestic marketing facilities lead to 15 to 20% post-harvest losses in marine fishing sector. This is equally applicable to Indian brackishwater aquaculture also. It may be noted many time average export prices received for shrimp/fish and crab are comparable to prices prevailing in Indian domestic fish markets at least in tier I and tier II cities and towns. To tap this so far unutilized and huge market prospects, more discussion, planning and execution of a marketing plan is essential. NACER, Delhi reported that, by 2030, India will constitute 28% of the

world's workforce with the workers-to-dependents ratio expected to be higher than 2.1 (up from 1.4 in 1990). Second, the country has seen steady urbanization over the past 30 years, bringing a major shift in the labour market from low-paying agricultural jobs to better-paying manufacturing and service jobs. Third, India is one of the few countries with a third-quartile median age of 27 years, which represents a younger, increasingly connected and digitally savvy population. As Internet penetration grows steadily, this demographic is likely to change consumption patterns and see quicker responses to new consumer opportunities with more affordable income. Hence Indian market is an emerging force in global canvass which is already realized by industrialized nations who have started making appropriate changes in their product profiles suiting to Indian tastes. Indian Fisheries sector can also benefit from similar efforts.

The present workshop by FTF and ICAR-CIBA has generated ideas from professionals working in various aspects of fisheries research, administration and governance, for tapping the ever increasing domestic markets for sustaining fish culture in India. The participation in the meeting by a cross section of professionals from all walks of fisheries sector in the country ensured a thorough discussion and facilitated drawl of salient recommendations.

I sincerely thank and appreciate the efforts taken by all the members of FTF and ICAR-CIBA for smooth conduct and active participation in the programme. I place on record the efforts of Shri.M.Kathirvel, Secretary FTF and Dr.A.R.Thirunavukkarsu President, FTF for their painstaking efforts in conduct of the event in a professional manner and meticulous editing of the final proceedings.

Chennai
7-6-2016


K.K.VIJAYAN





INAUGURAL FUNCTION



WELCOME ADDRESS



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Chairman

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A banner for a national workshop. At the top, there are six logos: the Government of India emblem, CIBA, a green leaf logo, a blue fish logo, a blue fish logo, and a blue fish logo. Below the logos, the text reads: "National Workshop on MARKETING STRATEGIES FOR NEWLY CULTURED FISHES IN INDIA". Below this, there are two blue boxes: "Date: 16-03-2016" and "Venue: CIBA Auditorium". Below these, it says "Organized by" in red, followed by "The Fisheries Technocrats Forum Chennai - 600 006 & ICAR-Central Institute of Brackishwater Aquaculture Chennai - 600 028". On the right side of the banner, there is a circular logo with a red fish in the center and several black fish around it, all within a yellow and blue circular frame.

Dr. A.R. Thirunavukkarasu, Chairman, FTF welcomed the gathering and informed that the FTF is functioning for the last 25 years and its members include those serving/retired fisheries scientific, technical and administrative personnel, college professors/students, fish farmers/entrepreneurs and state/central govt. organizations. The Forum's members meet at every Second Saturday to discuss the various issues of Indian capture and culture fisheries and further conduct seminars/workshops on important topics in fisheries with the support of central/state fisheries institutions. In one of the meetings, Mr. V. Venkatesan, Former Director of MPEDA and the member of the Forum suggested the concept of the present workshop on fish marketing.

In the recent past, few fish species such as Sea Bass, Cobia, Milkfish, Grey mullet, Silver Pompano, Tilapia and Vietnamese catfish have been considered for aquaculture in freshwater /brackishwater/ open sea. The culture of these fishes has been successfully demonstrated and the commercial venture for Tilapia and Vietnamese catfish had already been in practice, through which considerable quantities have been produced. Their sustainability, growth pattern, production, environment-friendly and marketing are to be looked into for further expansion. In this context, the invited speakers who have carried out the pioneering R & D programmes, demonstrations, commercial ventures and marketing analysis will speak on the sustainability of aquaculture and marketing of these newly introduced fish species.

PRESIDENTIAL ADDRESS



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Dr. K.K. Vijayan, Director, CIBA who presided over the inaugural function, expressed his happiness for a unique assemblage of scientists, administrators and entrepreneurs of aquaculture. Further he remarked that FTF is playing an important role in taking up the need-based aspects of aquaculture for review. The aquaculture can not be compartmentalized in terms of different ecological regimes. For example, the mother tiger shrimp comes from the sea, while its seeds are cultivated in brackish/fresh waters. The aquaculture industry of tiger shrimp has collapsed due to disease outbreaks all over the world including India. However, it has been proved that the aquaculture is economically viable as in the case of the Sea Bass (*Lates calcarifer*) breeding and its culture and the introduction of Atlantic white shrimp (*Litopenaeus vannamei*).

CIBA is always interacting with the entrepreneurs and farmers for transfer of technology through Private-Public Partnership (PPP) concept of ICAR with proper Memorandum of Understanding. Dr. P. Arun Padiyar, M/s Aditya Fish hatchery, Kakinada, Andhra Pradesh, one of the PPPs is with CIBA who is highly motivated to go for a herbivorous fish like Milkfish (*Chanos chanos*) for the production of cost effective brackishwater fish which could be made available for the consumer for a price less than Rs 150/kg. rather than the carnivorous fish. The CIBA has successfully maintained a captive broodstock of milkfish over the years and produced the milkfish seed for the first time in the country in June 2015. The third batch fertilized eggs/early larvae presented at the workshop, to Dr. Arun Padiyar for further rearing. Though the CIBA has succeeded in the continuous production of hatchery seeds of Sea Bass to meet the demand of entrepreneurs, no private hatchery has come up so far, to sustain the large scale pond/cage culture of the species. Here again, PPP mode may be the best option to produce the sea bass seed to increase the farmed fish production. Dr. Vijayan hoped that the outcome of this workshop will find the ways and means for further growth of the aquaculture of newly introduced fish species.

FELICITATION



Dr. V.V. Sugunan
Senior Consultant

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E-mail: tupnfdb@gmail.com

Dr. V.V. Sugunan thanked the Fisheries Technocrats Forum (FTF) for inviting him to participate in this Workshop. Though he was awarded with the FTF's K. Chidambaram Memorial Award for 2002, he could not come personally to receive it, as he had to be present at his daughter's marriage. He mentioned that the marketing in reservoir fisheries is a long process and complicated as the production is highly variable. An in-dpth study in the market chain has to be made for maximising the profitability. Comparing to the direct sale of fish to the consumers, the value-added products always fetched higher return. However, for the Indian carps, only direct sale is possible. He hoped that some of the issues in fish marketing will be addressed in this event.

FELICITATION



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Dr. S. Santhana Krishnan thanked both FTF and CIBA for inviting him to be present in the inaugural function. He appreciated the role played by CIBA for transfer of technology to the end-users and also the FTF for choosing the innovative topic for discussion. As an industrialist and farmer, he ventured into experiments in farming. Every species considered for aquaculture has its own advantages and disadvantages. For example, sea bass weighing 500 g fetches only Rs. 180/-, while 800 g sized fish sells at Rs. 280/- at farm gate. We have to find out the ways to sell large quantity of cultured fish. The production and marketing models are available only for large scale production. The Tamil Nadu Fisheries Development Corporation is the largest buyer of fish and effects the sale through a large number of outlets. A new business is coming up in rearing of the sea bass fry to fingerling in the indoor facility. Cultured tilapia can reach 320 g in 7 months, while the mullet seedlings attains 1 kg size in a year. Depending upon the demands, the marketable sized fishes can be harvested periodically. The issues pertaining to marketing of cultured fishes will be discussed in this workshop and hoped for suggestions to improve the profitability.

INAUGURAL ADDRESS

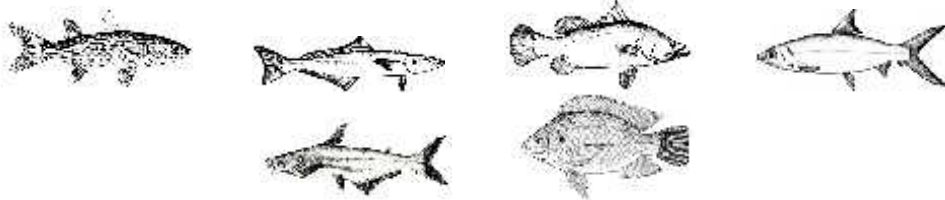


Dr. P. Ravichandran
Member-Secretary

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Dr. P. Ravichandran thanked both FTF & CIBA for inviting him to inaugurate the workshop. First, he conveyed the best wishes of the Chairperson of CAA for the successful conduct of the workshop. In his inaugural address he emphasized that the marketing is one of the important aspects in the aquaculture products from either open sea, brackishwater or freshwater. The fish is good for human health and also serves as a poor man's food. At global level, India ranks second in aquaculture production, the first being China. Apart from the existing carp production, new fishes are considered for culture in the freshwater/brackishwater/open sea sectors. Hence, suitable marketing strategies have to be developed in disposing the produce of the newly introduced fishes. China, the largest producer of freshwater fishes, could meet its domestic demand fully. However, in India, only West Bengal and Odisha consume more fish compared to other states.

An awareness programme has to be created on the availability of different species for consumption. More domestic markets can be established in major and minor cities to channelize, not only fish from wild but also those come from culture ponds/cages. Normally we witness the less price whenever huge quantity of wild fish are landed in markets. In that situation, the cultured fishes also had to compete with them. He suggested for a rationalized approach in the harvest of cultured fishes, depending upon the market demand, thereby to increase farm gate price.



Compere by
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VOTE OF THANKS



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Dr. M. Kumaran proposed a vote of thanks. This workshop is organized to evaluate the current fish marketing strategies. The per capita in fish consumption is only below 10 kg in India, while it is 20 kg globally. He thanked Dr. K.K. Vijayan, Director, CIBA for nominating him to liase with FTF in organizing the workshop, Dr. P. Ravichandran, Member-Secretary, CAA & Dr. V.V. Sugunan, NFDB for their august presence, Dr. A.R. Thirunavukkarssu, Chairman, FTF for advice, invited speakers from CIBA, CMFRI, NIOT, RGCA & private sector hatchery/farm operator, marketing consultant, scientists/technical personnel/research scholars from CIBA & CMFRI, members of FTF, personnel from state fisheries department, fish farmrs and college teaching staff/students for their participation in the workshop.

ICAR-CIBA PUBLIC-PRIVATE PARTNERSHIP (PPP) MODE

Dr K.K. Vijayan, Director, CIBA handing over the hatchery produced eggs and larvae of milkfish (*Chanos chanos*) to Dr. P. Arun Padiyar under ICAR-CIBA PPP mode for further rearing



(L to R) Dr. A.R. Thirunavukkarasu, Mr. R. Subburaj, Dr. P. Arun Padiyar, Dr. K.K. Vijayan, Dr. M. Kailasam, Dr. M. Makesh, Dr. Aritra Bera and Miss Babita



RECOMMENDATIONS



(L to R) Dr. K.K. Vijayan, Director, CIBA, Dr. V. Sampath, Former Advisor, MOES, Govt. of India, Dr. A.R. Thirunavukkarasu, Chairman, FTF and Dr. V.V. Sugunan, Senior Consultant, NFDB

At

Session III: Future Strategies for Speedy Disposal of Cultured Fishes

The panel members thanked the invited speakers for their presentations and suggested the salient points raised by them in marketing the newly cultured fishes, may be considered while writing the recommendations.

PREAMBLE

At the moment, India is witnessing an interesting stage of aquaculture newly introduced good quality table fishes such as Sea Bass, Cobia, Milk fish and Grey Mullet and a few exotic species such as Nile Tilapia & Vietnamese catfish etc to meet the growing demand for fish food and also for producing various gourmet items that are preferred by consumers. Within a period of 6-7 years of introduction, production of Vietnamese catfish had touched over 500000 tonnes. The newly introduced varieties of fish including the Vietnamese catfish are not fetching a reasonable farm gate price because their cost of production has gone up due to various reasons and demand is picking up slowly. While it is imperative to produce the fish at a reasonable cost, there is an urgent need to ensure that the farmers get a reasonable farm gate price so that the aquaculture of these fishes is not only sustained but also grows fast.

The main objectives of the Workshop are a) to evaluate the current status of seed production, grow-out culture and production trends of Sea Bass, Cobia, Milkfish, Grey Mullet, Nile Tilapia and Vietnamese Catfish, b) to understand the problems in marketing of these newly cultured fishes and c) to discuss and suggest strategies for enhanced production of these species of fish and their marketing so as ensure higher economic returns to fish culturists.

Hatchery production of seeds and grow-out

Sea Bass

The two Government hatcheries in the country -CIBA and RGCA- are producing quality seed which are in great demand among the freshwater/brackish water fish culturists.

There is a thriving stocking size seed production activity in Andhra Pradesh. Marketable size fish fetch a farm gate price of Rs. 150 to 250/- per kg which are sold in the retail at a rate of Rs. 300 to 500/- per kg.

Cobia

The recent success by central institutions (Central Marine Fisheries Research Institute and RGCA) in the brood stock maintenance, seed production, open sea cage culture demonstrations, economic viability and adoption of technology by coastal fishermen has shown the Cobia is a promising species for mariculture..

The cage reared Cobia attains 2.5 kg and 7.0 kg by 6th and 12th month of rearing.

Milkfish

Growing of milk fish in freshwater/brackishwater tanks/ ponds was taken up as early in 1950s in Andhra Pradesh and Tamil Nadu using wild seeds. However, aquaculture of this species has not been taken up later. At present, the species is cultivated on a small scale in Andhra Pradesh and Kerala depending upon the availability of wild seed. Very recently the CIBA has succeeded in hatchery production of milkfish seeds, which will go a long way to meet the seed requirement. As the milkfish is an herbivorous species, the pond culture may be easier and less expensive as in the case of freshwater carps.

Milk fish has a considerable demand in the state Kerala where it is sold at Rs 150/kg in the retail, while the cost of production only in the range of Rs 90-100/kg.

Nile Tilapia

Culture of Nile Tilapia has just been introduced in the country. At present, only three hatcheries are producing the seeds. Annual grow-out production is estimated around 400 tonnes.

Even though the farm gate price of this fish is not attractive at present, there is good scope for fetching a better price in the future. .

Vietnamese Catfish

In India, Vietnamese Catfish production has gone up to 5 lakh tones in the end of 2010, which came down to 3 lakh tonnes subsequently. Current year, production is expected to touch 4,00,000 tonnes. There are one or two hatcheries only in the country and the entire seed requirement for aquaculture is met by smuggling the seeds from Bangladesh.

Currently produced quantity of 3 lakh tones is sold in the domestic markets all over India. In addition, the imported quantity of about 10,000 tonnes is also sold especially to institutional users.

Thus there is considerable demand for the fish within the country. Additional demand has to be created if the production has to be increased further.

RECOMMENDATIONS

Sea Bass

- 1) Other than CIBA and RGCA, the private entrepreneurs should play a major role in setting up captive brood stock maintenance and seed production. To take up large scale farming, the private sector role in producing required quantity of seeds is important.
- 2) The high cost of manufactured feed is a constraint in increasing production. If the fish is promoted suitably as a top class table fish, it can fetch a better farm gate price to the farmers which will compensate the high cost of production. It is therefore imperative that the fish is promoted as a top variety of fish and can be made available to consumers in pristine freshness.
- 3) Staggered harvest may be adopted to reduce the quantity of fish supplied to market on a particular day or period. Depending upon the day-to-day market requirement, the quantity of harvested fish may be determined.

Cobia

- 1) The major problems in taking up the aquaculture of this species is finding suitable locations in the coastal area for cage culture and apportioning the area among fishermen entrepreneurs. Unless this is done, promoting aquaculture of this species will be difficult.
- 2) Apart from two government hatcheries, more hatcheries have to be set up through private enterprise. Financial assistance has to be extended for setting up more hatcheries.
- 3) Economic viability of the culture has also to be demonstrated further.

Milkfish

- 1) The technology of hatchery production of seeds from hatcheries should be standardized.
- 2) Other than CIBA, the central government institution like RGCA and also the private entrepreneurs should play a major role in developing technology for captive broodstock maintenance and seed production.
- 3) The central government fisheries premier agency, NFDB should lend a hand in financing the both the government and private entrepreneurs in establishing satellite hatcheries and grow-out system to increase the overall production of milkfish.

Nile Tilapia

- 1) Nile tilapia is a versatile fish, which can be grown in fresh and brackish water ponds, freshwater tanks, lakes and reservoirs and also in cages fixed in these water bodies. It can withstand wide variations in temperature and dissolved oxygen. The fish is very much suitable for pond culture - both extensive and semi-intensive. As the fish can feed on natural food (produced by fertilization) in the pond as well as on artificial feed, there is good scope for producing the fish at a reasonable cost by achieving a conversion ration of 1:1 or even less. Thus the cost of production can be kept at minimum. In the initial stages, growing them in earthen ponds will be cheaper and easier for achieving mass production. However, more attention is paid in growing them in cages fixed in tanks and reservoirs where there is not much scope for utilizing natural food. Consequently, the cost of production is high.

2) The fish can reach marketable size in 5-6 months, thus making it ideal to grow in seasonal ponds or taking two crops per year in ponds with perennial water source. As the fish is amenable for production of boneless fillet, it is preferred by consumers in USA, China etc for its gastronomic quality.

3) There is an urgent need to popularize pond culture of Nile Tilapia for ensuring higher volumes of production at a reasonable cost which will help to introduce the boneless fillet in the market. The fish can also be sold in live.

4) By positioning the fish as a delicacy suitable for preparations using boneless fillets and for whole fish cooking, the fish can be popularized among consumers. This in turn will help to get a better farm gate price to farmers. Thus there is an urgent need to promote the fish as a moderately priced delicacy suitable for gourmet preparations.

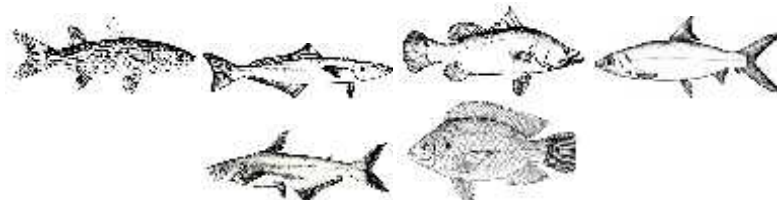
Vietnamese Catfish

1) To stabilize and improve the production of fish, adequate number of hatcheries has to be set up in India, so that, quality seeds can be made available for grow-out operations.

2) There is a need to improve the grow- out techniques also so that the quality of the meat of harvested fish is improved. Such improved quality of meat will help to produce good quality boneless fillet which can easily compete with the imported fillets from Vietnam.

3) The Government agencies have to take up necessary promotional measures to popularize the fish as a nutritious fish food, which is amenable for various types of boneless gourmet preparations. In the initial period, financial assistance may be given for producing frozen fillets for the domestic market.

4) It has to be appreciated that this species can easily meet the gap in fish production and supply nutritious food at a reasonable price to the consumers.



TECHNICAL SESSION I

REVIEW OF CURRENT MODALITIES IN MARKETING OF THE NEWLY CULTURED FISHES



**Chairman: Dr. V.V. Sugunan,
Former Asst. Director General of ICAR &
Senior Consultant, NFDB**

**Vice-Chairman: Mr. V. Venkatesan
Former Director of MPEDA & FTF's Member**

FISH MARKETING CONCEPTS AND PRACTICES



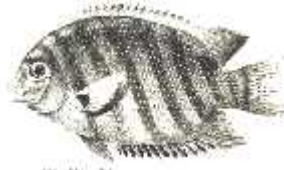
Mr. M. Dayalan
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1. COMMERCIAL FISH CLASSIFICATION



Core Alternative



Darling



Rang

High Value

2. TYPES OF FISH RETAIL IN INDIA



Online



Super/Hyper Markets



Stand alone, look and feel good shop



Street



Cycle/Moped Wala



Stand alone



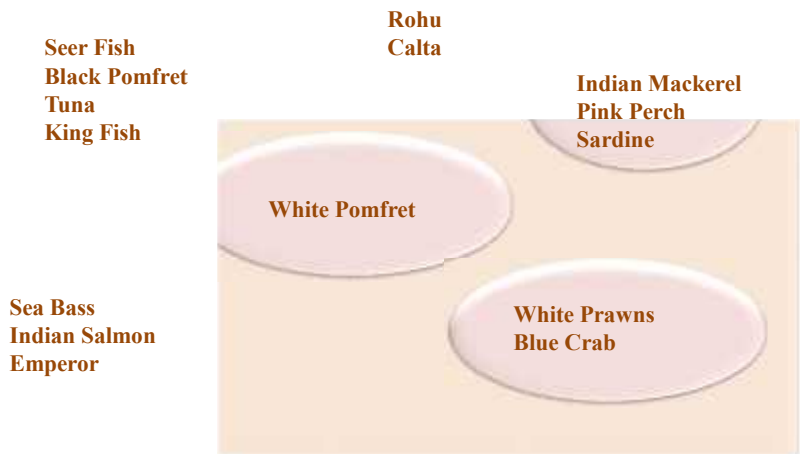
Whole sale

3.HOW IMPORTANT IS FISH IN HYPER MARKET ?



The high perishable , Consistent sourcing , Frequent price fluctuation and Smell control are being the bigger challenges, If one can convince any customer to buy fish from you then they will blindly buy everything else from you

Top Selling Verities Contribute more than 75% of Sale



4. FACTORS INFLUENCING HIGHER SALES

S.No.	Item name	Taste	Less thorn	Low price	Flesh. texture	Big chunk
1	Seer fish	Y	Y	N	Y	Y
2	White prawn medium	Y	Y	N	Y	N
3	Rohu	Y	N	Y	N	Y
4	Indian mackerel	Y	N	Y	N	N
5	Black pomfret	Y	Y	N	Y	Y
6	Catla	Y	N	Y	N	Y
7	White pomfret medium	Y	Y	N	N	N
8	Sea Bass	Y	Y	N	Y	Y
9	Indian salmon	Y	Y	N	Y	Y
10	Pink perch	Y	N	Y	N	N
11	Blue crab	Y	N	N	N	N
12	Tuna	Y	Y	Y	Y	Y
13	King fish	Y	Y	N(Av.)	Y	Y
14	Emperor	Y	Y		Y	Y
15	Sardine	Y	N	Y	N	N

Y - Yes; N-No

	Indian Mackerel	Pink perch	Seer fish
Landing Centre	Rs. 120/-	Rs. 200/-	RS. 400/-
Auction Commission (3 to 6 %)	Rs. 128/-	Rs. 212/-	Rs. 424/-
Fish traderes (ice+packing+ transport+labour+ margin) Rs. 20 per kg	Rs. 148/-	Rs. 232/-	Rs. 444/-
Whole Sellers (City) (Transport+ damage) Rs. 35 per kg	Rs. 183/-	Rs. 267/-	Rs. 479/-
Price Increase	52%	33%	20%
Retailer (Margin of 25 %)	Rs. 230/-	Rs. 335/-	Es. 600/-

5. HOW PRICE POINT IS IMPORTANT IN MODERN RETAIL - MIDDLE AND UPPER MIDDLE CLASS

Item name	Price Point	Share % Qty	Share % Value
Sardine, Pangasius, Tilapia, Rohu, Catla, Bombay duck, Lizard Fish, Roop Chand	100 to 199	37%	16%
Indian Mackerel, Silver Fish, Pink Perch, Tuna, Ora, Sweep Lip, Parshe, Marine catfish, Anchovy, Leather skin, White Fish, Ribbon Fish, Croaker, Thengda, Dotted crab, Sole, Squid, Ghol, Red Crab	200 to 299 %	17%	12%
Mullet, Silver Belly, Paiya, Malabar Travelly, Halibut Sole, Mussel, Murrel, Pearl Spot, Parrot Fish.	300 to 399 %	4%	4%
Barracuda, Emperor, Red Snapper, Dotted Cod, Papda, Blue Crab, Arr Much, Mud Crab, White Prawn Small	400 to 499%	5%	6%
Lady Fish, White Prawns Medium, Scampi, Seer , King Fish,	500 to 599 %	26%	40%
Sea Bass, Indian Salmon, Chitol, Koi Much, Black Pomfret	600 to 699%	8%	15%
	700 to 799 %	0%	0%
White ponfret	800 to 999 %	2%	5%
Hilsa, White Pomfret Large, Lobster, Jumbo Tiger Prawns, Atlantic Salmon	1000 and above	1%	2%

Bangalore Market
Size / Trend
Avg 35 tonnes per day

➤ By Train	- 85 %
➤ By Road	-15%
➤ General Trade	- 89 %
➤ Modern Trade	-11%
➤ Orissa	- 43 %
➤ Tamil Nadu	-38%
➤ Andhra Pradesh	-10%
➤ Mumbai	- 4%
➤ Kolkatta	- 3%

Fruits & Vegetable Penetration -38% to 40%
Fish & Meat - 7% to 9%

Why ?

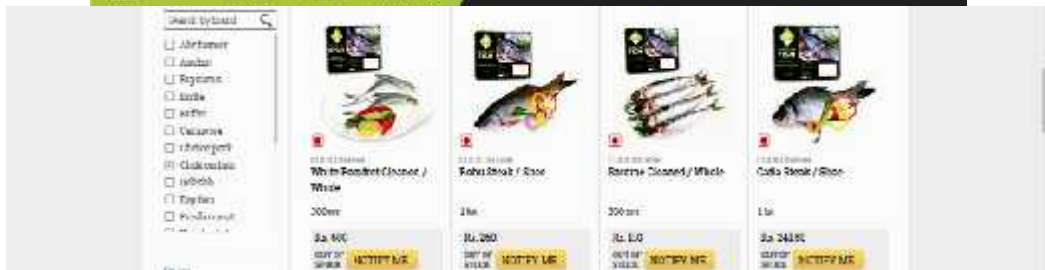
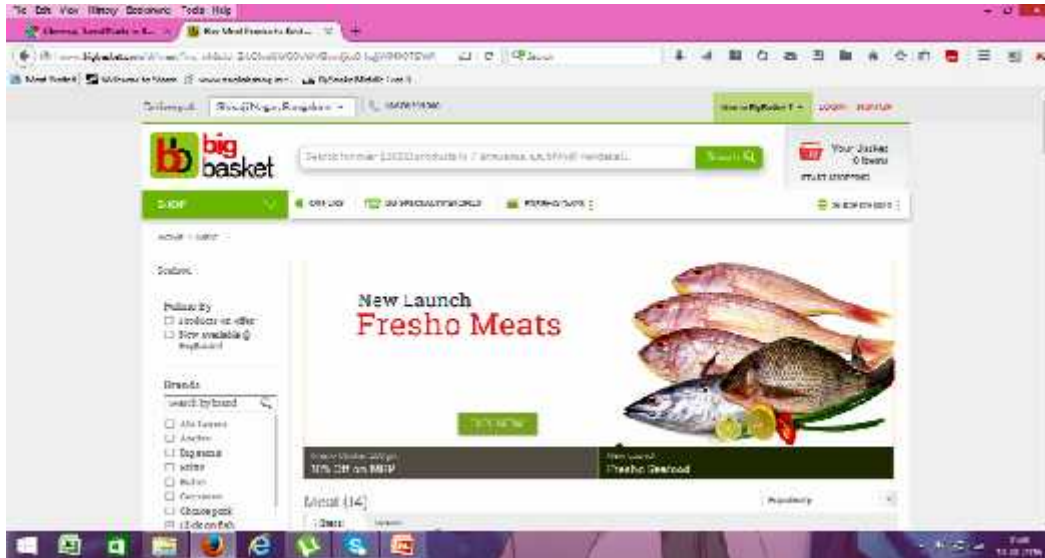
- How Fish is Different from Chicken and Mutton ?
- Price Fluctuation
- Size Specific Rejection
- Why do People buy Seer Fish even when the Price go Very High ?
- Why Pangasius sells more ?

Suggested Species

- Taste - Seer, Mackerel, Bhetki & Indian Salmon
- Big Chunk - Rohu, Catla, Cod, Bhetki & Indian Salmon.
- Price - Rs.250 to Rs.300 and /or Rs.400 to Rs.500/-
- Texture - Bhetki, Indian Salmon, Emperor & Pangasius
- Less Thorn - Seer & Pangasius

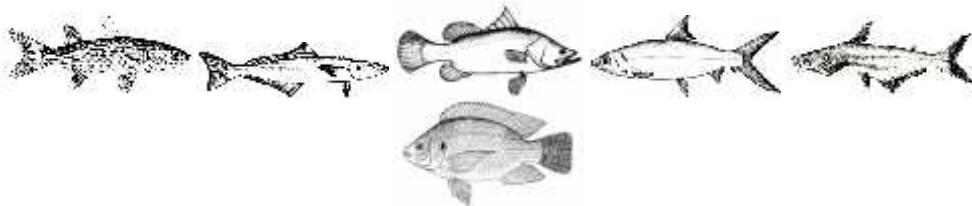


Click on Fish





Mr. M. Dayalan (left) receiving the memento from Dr. V. Sampath, Former Advisor, Ministry of Earth Sciences, Govt. of India & FTF's Member



FISH MARKETING IN CHENNAI - CHALLENGES AND PROBLEMS



Mr. V. Chandran

**President, Chennai Whole Sale Fish Merchants Association
1/1, Venkatesa Gramani Street
Chintadripet, Chennai-600 002
Mobile No. 938 10 23 44**

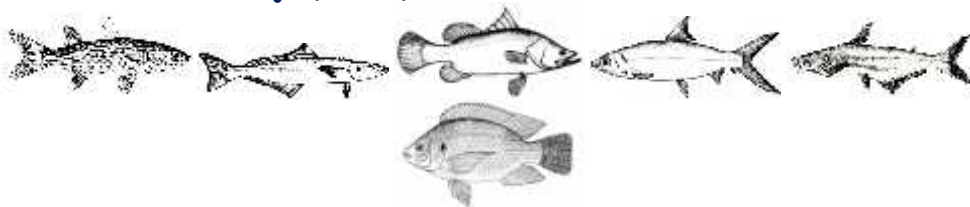


Mr. V. Chandran gave a brief account of sales of fish from marine and freshwater sectors at different fish markets in Chennai. Those Sea Bass, Cobia and Tilapia from culture ponds/cages weighing 400-500 g are in great demand and fetch a good price. Another fish from freshwater/brackishwater regions, namely "Karimeen" (*Etroplus suratensis*) is sold at a rate of Rs. 300 per kg for those fish weighing 200 g and above. Whenever there is a lean season for sea fishes, these fishes are in great demand. The existing fish markets in the city are smaller in size, probably for want of space inside the city. Comparing to these city fish markets, the one at Vanagaram is the largest, where fishes not only from the local marine/freshwater fish landing centres, but also from the neighbouring states, namely, Andhra Pradesh and Kerala are sold. The Chennai Whole Sale Fish Merchants Association is taking up their causes with the local government for the establishment of a government-owned larger whole sale fish market as done in Coimbatore. He further requested this august body to make suitable recommendations for the establishment of such larger whole sale fish market in the city.



Mr. V. Chandran (left) receiving the memento from Mr. V. Venkatesan, Former Director of MPEDA & FTF's Member.

Mr. A. Govindaraju (middle), M/s AGR Sea Food, Chennai looks on



**ASIAN SEA BASS (*LATES CALCARIFER*) PRODUCTION
AND MARKETING**



**Dr. A.R. Thirunavukkarasu,
Former Principal Scientist of CIBA &
Chairman, The Fisheries Technocrats Forum, Chennai-600 006
Mobile: 9444 945 590
E-mail: artarasu@yahoo.com**



1.NEED FOR AQUACULTURE

- a) Protein rich fish production for 'Nutritional Security'
- b) Generation of Employment - Livelihood security
- c) Economic Status & Social Upliftment - Social security
- d) Reduce Pressure on Wild Stock - Conservation
- e) Biological Indicator for Water Quality
- f) Culture of Nutrient utilizers like Sea weeds, Molluscs improve Water Quality - Environment security
- g) Integrated farming with other production sectors compliment each other
- h) Leads to technological improvements
- i) Using the resources for food production

2.ISSUES IN AQUACULTURE

- a) Availability of seed
- b) Species as carnivorous
- c) Available season & Specific period
- d) Seed resource, Natural collection, Hatchery produced healthy seed
- e) Availability cost effective quality feed
- f) Culture systems: Pond-based & Open water cages (floating/fixed)
- g) Culture period: Long term (yearly based & Short term (months)
- h) International markets: Live or processed
- i) Domestic markets: Actual demand, Price flexibility & Marketing channel

3.AQUACULTURE IN INDIA- PERSPECTIVE

- a) Average per capita availability/consumption 9 kg/year
- b) World average 15.8 kg
- c) India's target 12 kg/individual -
- d) Apart from this, the export demand also will be increasing
- e) Additional fish/shell fishes production is required



4.POTENTIAL AQUATIC RESOURCES IN INDIA

Resources	
Continental Shelf Area	- 8129 km ²
Estuaries	- 3.50 million ha
Backwater	- 3.90 million ha
Mangroves	- 0.40 million ha
Potential Brackishwater	
Area for aquaculture	- 1.19 million ha
Freshwater Reservoirs	- 3.15 million ha
Ponds and Tank	- 2.25 million ha
Bheels and Oxbow lakes	- 0.82 million ha
Medium & large Reservoirs	- 2.04 million ha
Irrigation canals	- 1,46,000 km

5.CANDIDATE SPECIES FOR AQUACULTURE

- Finfish: Tilapia, Catfish, Sea Bass, Groupers, Cobia, Milkfish, Mulletts, Snapper, Silver Pompano, Halibuts, Butter fish, *Siganus* spp. Marine & Freshwater ornamental fishes etc.
- Crustaceans: Penaeid shrimps, Mud crabs, Sea crab, Lobsters, etc.
- Molluscs: Mussels, Oysters & Clams
- Live feeds: Brine shrimp, Copepods, Rotifers, Polychaetes, etc.
- Other items: Holothurians, commercially important species of seaweeds, aquarium plants etc

6.ASIAN SEA BASS (*LATES CALCARIFER*)

- Asian Sea Bass is one of the delicious table fishes with excellent flavor and texture
- It is a high value Fish in demand throughout India
- Amongst the cultivable fishes in India, Sea Bass fetches higher price in domestic market varying between Rs.300-500 per kg depending upon the size



7. BIOLOGY OF ASIAN SEA BASS

- a) Sea Bass is commonly called as giant perch, cockup, barramundi
- b) In India, known as "Bhetki" in Bengali & Oriya, "Pandugoppa" in Telugu, "Koduva" or "Kooral" in Tamil, "Kalanji" or "Narimeen" in Malayalam and "Jitada" in Kannada
- c) Sea Bass, a high value fish is carnivorous and feeds on small fishes and crustaceans
- d) Adult fish mature and spawn in the sea
- e) Juveniles enter into the near shore areas, brackishwater, estuaries and further into the freshwater zones
- f) Grows up to 60 kg in the sea and up to 3 kg in confinements (ponds) in one year depending upon the availability of food
- g) A migratory fish moving into the sea for maturation and spawning
- h) It is a protoandrous hermaphrodite where fishes of small size between 2-4 kg are males and later change into females
- i) Sturdy fish capable of withstanding wide environmental fluctuations
- j) Can be farmed in ponds, cages and pens in marine, brackishwater and freshwater ecosystems
- k) Suitable for high density farming and farming through RAS systems

8. STATUS OF SEA BASS FISHERY

- a) Sea Bass is caught from the inshore areas, estuaries and brackishwater system
- b) Mainly forms an artisanal fishery
- c) Caught by hook and line, gill nets and traps
- d) In India no statistical data available on the contribution of Sea Bass to the fishery
- e) May be around 10,000-15,000 tonnes produced through capture and culture fisheries



9. SEABASS FARMING IN INDIA

- a) Sea Bass farming is traditional in East and West coastal areas
- b) Assorted sized juveniles from wild collected and stocked, allowed to grow with other fish and shrimp. Harvested after 6 to 8 months
- c) Production up to 2 tonnes/ha

10. CULTURE TECHNOLOGIES FOR SEA BASS

- a) Technology for controlled breeding and seed production has been standardized.
- b) Feed technology for hatchery and farm has been developed by CIBA.
- c) Culture Technologies for Asian sea bass farming suited for small/medium/large scale farming in ponds and cages have been developed by R&D institutions such as CIBA and RGCA and adopted by farmers.

11. IMPROVED SEA BASS CULTURE

- a) Can be farmed in coastal, brackishwater and freshwater ponds
- b) Extensively farmed in South East Asian countries and Australia
- c) Cultured with forage fishes under Polyculture
- d) Fed with cheap trash fishes in extensive farming
- e) Formulated feed for intensive culture practices
- f) Sea bass farming - a house hold activity
- g) Improved culture practices with uniform size seed stocking. production 4.2 tonnes/ha under polyculture and trash fish feeding.
- h) Major constraint - Cost effective suitable feed availability



12.IMPACT OF THE DEMONSTRATION

- a) The demonstration has motivated the farmer to take up sea bass farming
- b) Farmers have adopted nursery rearing as livelihood option in the areas around the demonstration site
- c) Entrepreneurs have come forward to take up juvenile rearing of sea bass for supplying to prospective cage culture farmers
- d) Demonstration using feed developed by CIBA comparable to other fish feed have motivated feed manufacturers for starting sea bass feed production using CIBA technology. This initiative is in need of support by the NFDB

13.MARKETING PROSPECTS

- a) Nowadays , it is rather difficult to draw a clear line between low, medium and high value species .
- b) Marine fin fish such as groupers, sea bass, snappers, abalone, sea cucumber are the higher value aquaculture products with growing demand
- c) With a different name Asian sea bass has a better image . When marketed as "barramundi" , it sells well at a higher price in Asian and Western markets

14.STATUS OF MARKETING

- a) Traditionally harvested/farmed sea bass fish are sold in fresh condition or as a dry fish
- b) Mainly sold in the retail markets price varying from Rs. 200 to Rs. 600 in fresh condition
- c) Excessive catches are iced and sold or salted
- d) In some cases in the farm site itself based on the demands sold in live condition
- e) Preference to the fish is seen in some ethnic populations who are accustomed for this fish taste and flavour and ready to pay even premium prices



15. PROBLEMS IN MARKETING

- a) High volume production handling is a problem since no strategy for meeting the value chain is available for sea bass in India
- b) Value addition like 1) Grilled fish, 2) Smoked fish, 3) Canned fish, 4) Ready to cook, 5) Ready to eat - Diversified products have not been developed
- c) Other perches like snappers and sciaenids are often sold discreetly in the retail markets as proxy items in the name of sea bass to culpable customers which would demean the brand value in the long run

16. STRATEGY FOR MARKETING

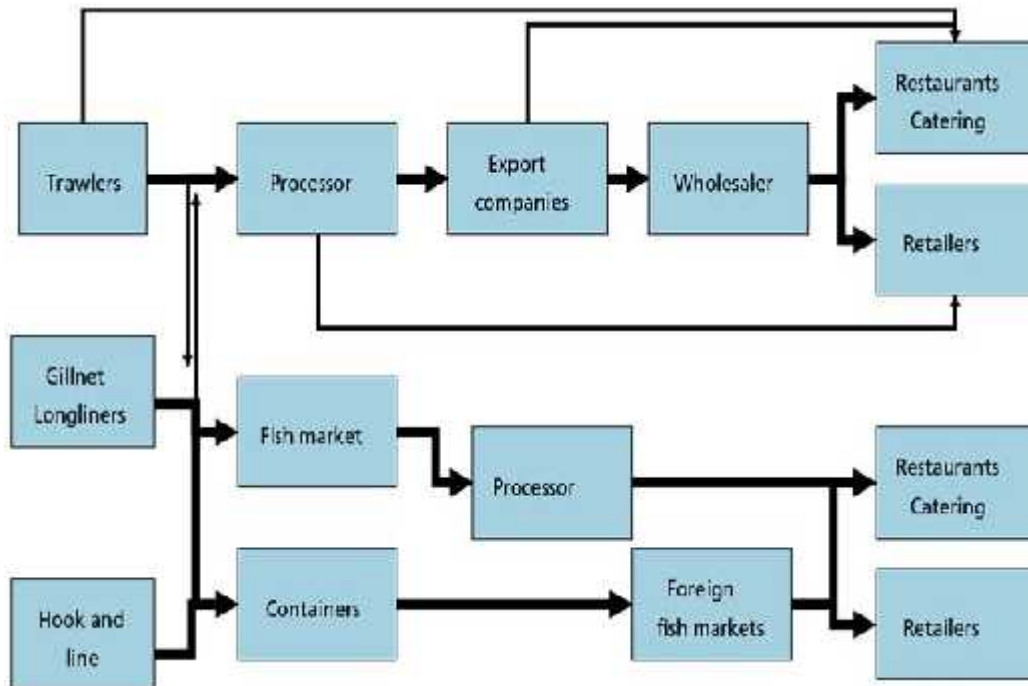
- a) Sea bass as a sturdy fish can be conditioned and marketed alive for premium price
- b) Farming technologies with a reasonable production in cages has been developed and being practiced in shallow waters and open sea cages
- c) Harvest of preferred size for the consumers is possible
- d) Marketing for higher ends demand brands and traceability which is possible in the closed aquaculture practices
- e) Awareness to the consumers on the species identity of Sea bass
- f) Value addition and quality assurance would enhance premium price

17. CONSUMERS EXPECTATIONS

- a) Consumers expect safe and hazard free food
- b) Responsibility is shared by:
 - 1) Food producers, 2) Processors, 3) Purveyors, 4) Regulatory agencies



18.FISH - SUPPLY VALUE CHAIN



Dr. A.R. Thirunavukkarasu (left) receiving the memento from Dr. R. Soundararajan, Former Principal Scientist of NBFGR & FTF's Vice-Chairman



**ECONOMIC PERSPECTIVES ON MARKETING STRATEGIES FOR
NEWLY CULTURED FISHES IN INDIA**



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1.WHY ECONOMICS ?

Focus fish as food

Aspects of 'Choice of food's need to be understood:

- Price (own, substitute's & complements)
- Psychological
- Sociological
- Economic and
- Sensory

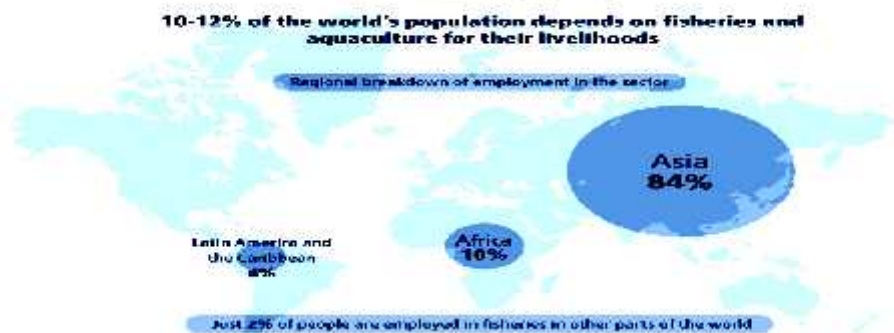
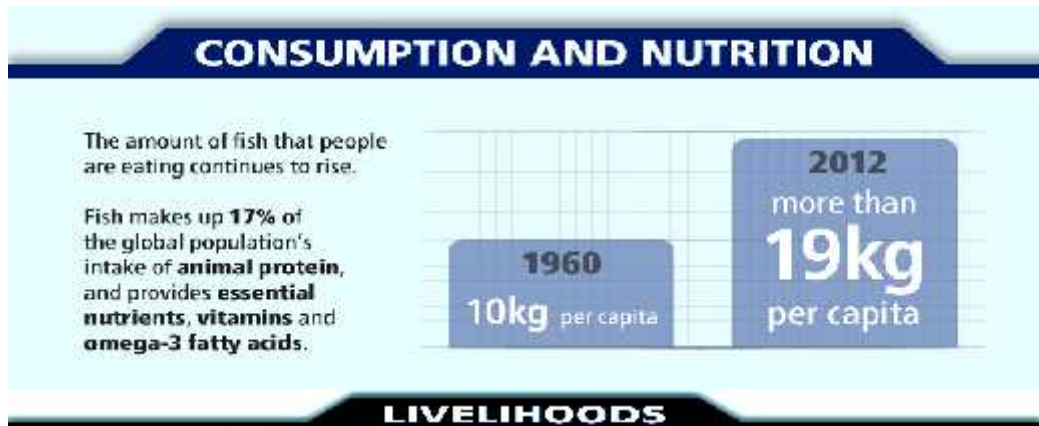
Parameters

- Socio-economic status
- Gender differences
- Age differences
- Environmental influences
- Social influences
- Taste preference
- Dietary restraints

2.MARKETING NEW PRODUCTS (New species of Fish ?)

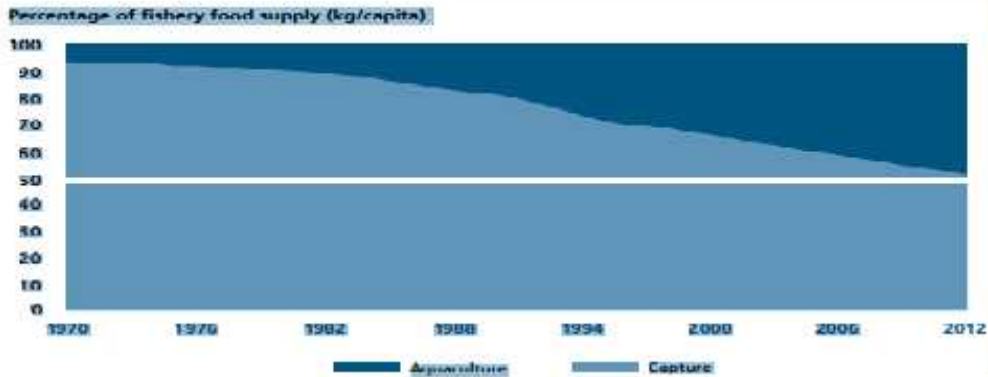
- a) Idea generation
- b) Idea screening
- c) Concept development and testing
- d) Marketing strategy development
- e) Business analysis
- f) Product development
- g) Test marketing
- h) Commercialization

3. GLOBAL FACTS - FAO (2014)



- Global aquaculture production marked a record high of more than 90 million tonnes in 2012, including almost 24 million tonnes of aquatic plants. China accounts for over 60 % of the total share.
- Aquaculture expansion helps improve the diets of many people, especially poor rural areas where the presence of essential nutrients in food is often scarce.
- For sustainable development, aquaculture needs to become less dependent on wild fish for feeds and introduce greater diversity in farmed culture species and practices.
- For example, small-sized species can be an excellent source of essential minerals when consumed whole. However, consumer preference and other factors have seen a switch towards larger species whose bones and heads are often discarded.

Relative contribution of aquaculture and capture fisheries to food fish consumption



Direct human consumption

- increased from about 70 percent in the 1980s to more than 85 percent (136 million tonnes) in 2012.
- With this increasing production and greater availability for consumers, per capita fish consumption continues to rise - up from 10 kg in the 1960s to more than 19 kg in 2012 - driven by higher demand from a growing population, rising incomes, and more efficient distribution channels.

World fish utilization and supply



- Fish accounts for almost 17 percent of the global population's intake of animal protein.
- Fish provided nearly 3 billion people with almost 20 percent of their intake of animal protein, and 4.3 billion people with about 15 percent of such protein.
- Consuming fish is particularly important during pregnancy and the first two years of life and can help lower the risk of coronary heart disease mortality.

4. GLOBAL FISH TRADE - WHERE ARE WE ?

A-3 International trade in fishery commodities by principal importers and exporters
 Commerce international des produits de la pêche par principaux importateurs et exportateurs
 Comercio internacional de productos pesqueros por principales importadores y exportadores USD 1 000

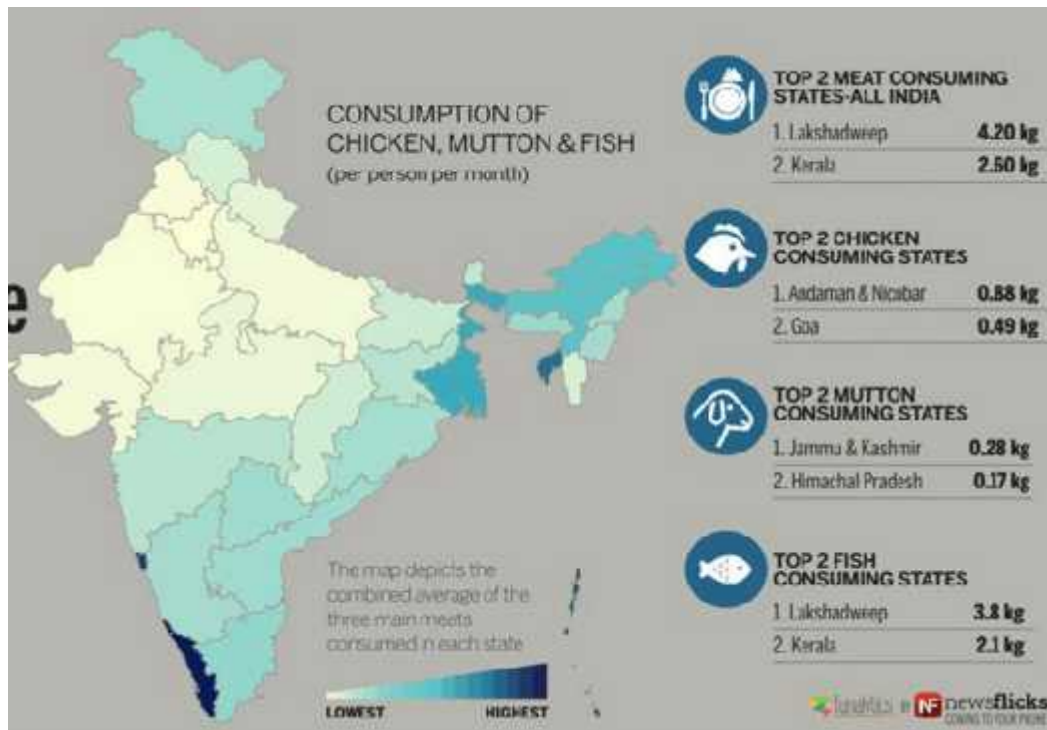
Country or area Pays ou zone País o área	Imports - Importations - Importaciones			Country or area Pays ou zone País o área	Exports - Exportations - Exportaciones		
	2010	2011	2012		2010	2011	2012
Japan	14 851 838	17 340 820	17 568 910	China	13 287 748	16 565 887	18 211 480
USA	15 456 405	17 466 321	17 561 406	Norway	8 815 060	9 456 756	8 856 564
China	6 154 359	7 572 593	7 441 253	Thailand	7 149 828	8 141 815	8 078 892
Spain	6 512 082	7 309 435	6 487 725	Viet Nam	5 108 892	6 241 707	6 277 584
France	5 949 313	6 567 065	6 040 282	USA	4 661 329	5 788 126	5 753 126
Italy	5 373 341	6 211 012	5 863 910	Chile	3 401 223	4 504 660	4 337 307
Germany	4 717 722	5 513 806	5 305 407	Canada	3 847 328	4 196 638	4 213 044
UK	3 714 441	4 257 951	4 252 835	Denmark	4 183 053	4 482 825	4 147 202
Korea, Rep	3 183 153	3 835 286	3 738 715	Spain	3 310 121	4 185 682	3 951 730
China, H Kong	3 040 954	3 613 754	3 663 219	Netherlands	3 205 040	3 545 812	3 878 037
Saudi Ar	3 294 130	3 633 264	3 652 206	Indonesia	2 961 863	3 181 872	3 650 014
Netherlands	2 792 803	3 287 663	3 416 838	India	2 559 255	3 539 109	3 359 624
Denmark	3 004 299	3 216 648	3 117 886	Peru	2 532 083	3 146 509	3 299 471
Thailand	2 137 320	2 717 030	3 107 868	Russian Fed	2 848 141	3 280 955	3 173 579
Russian Fed	2 373 169	2 715 474	2 722 677	Sweden	2 657 887	2 852 067	2 907 116

5. INDIAN STATUS - (Summary findings of Hindu-CNN-IBN State of the Nation Survey and UDSA and FAO and CIBA 2009-2012 surveys):

1. Vegetarianism was most common among the Lingayat, Jain community and then Brahmins at 55%, and less frequent among Muslims (3%) and residents of coastal states.
2. About 40% of the Indian population are vegetarian.

3. 31% of Indians are 'vegetarian', while another 9% also consume eggs (Eggatarian/ovo-vegetarian).
4. Less than 30% of non vegetarian consume it regularly,- reasons are mainly religious/cultural.
5. The recent growth in India's organized retail has also been yielding towards more of vegetarian as some vegetarians are demanding meatless supermarkets.

6. GLOBAL AND INDIAN FISH PRODUCTION & CONSUMPTION

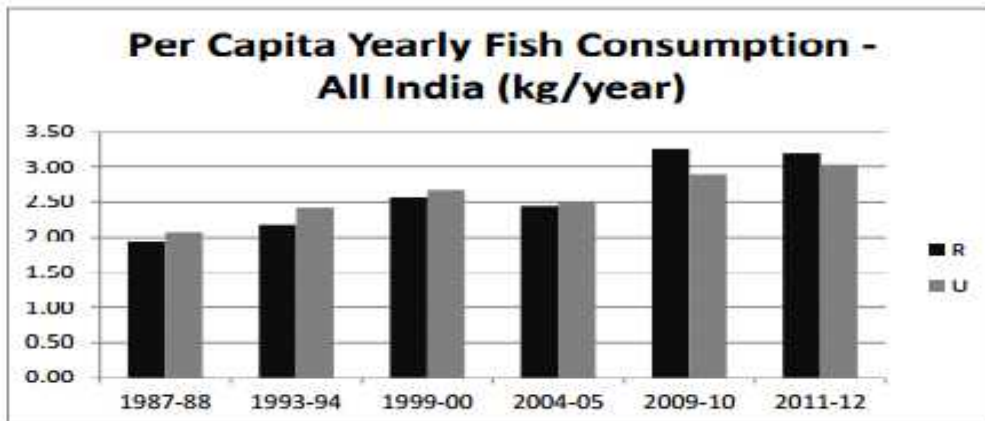


Apart from 59.5 lak tonnes of meat, India also produced 90.40 lakh tonnes of fish in 2012-13.

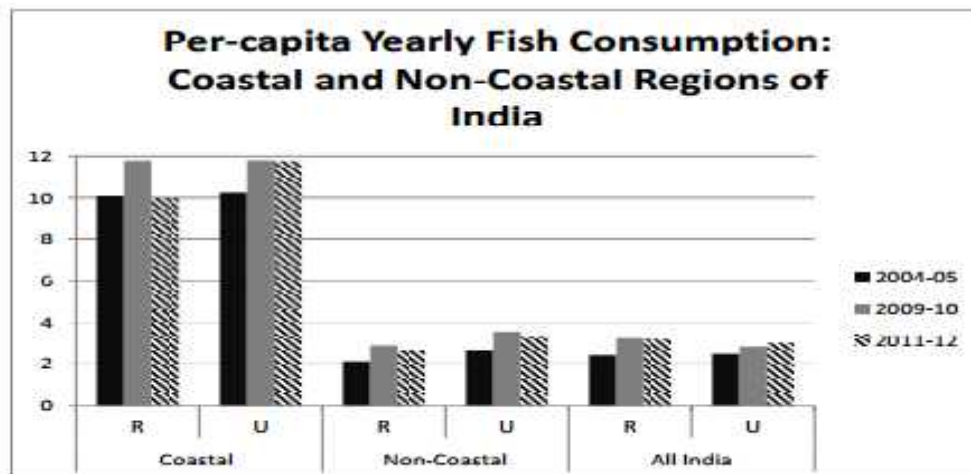
- i) Andhra Pradesh (18.08 lakh tonnes),
- ii) West Bengal (14.90 lakh tonnes) and
- iii) Gujarat (7.88 lakh tonnes)

Global consumption of fish was 19 kg per person per year in 2012, for India it was only 9 kg.

7. QUANTITY OF CONSUMPTION



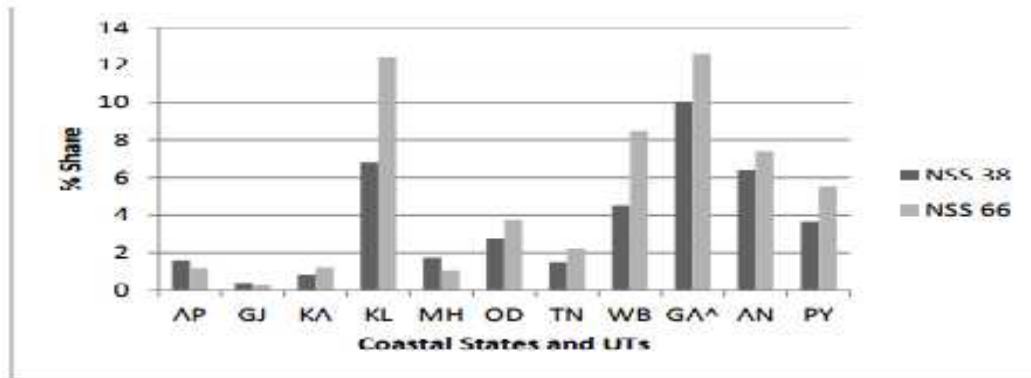
Source: Various NSS Reports.



Source: Various NSS Reports.

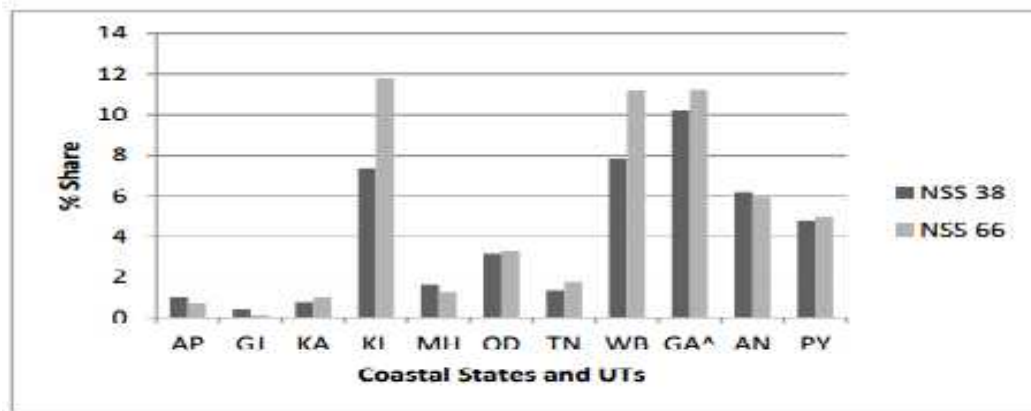
- Kerala and Goa are the top two
- Gujarat has the lowest
- Average monthly per capita quantity of fish consumption for the rural population has fallen among all States and UTs between the two time-periods (or NSS Rounds) except in Kerala and West Bengal, where it has risen.
- In addition to Kerala and West Bengal, average monthly per capita quantity of fish consumption among the urban population has also increased marginally in Tamil Nadu and remained the same in Odisha over-time.

8. BUYING LESS FISH WITH MORE MONEY...



Source: Own calculations based on NSS data.

Figure 5: Percentage Share of the Expenditure on Fish to Total Food Expenditure - Rural

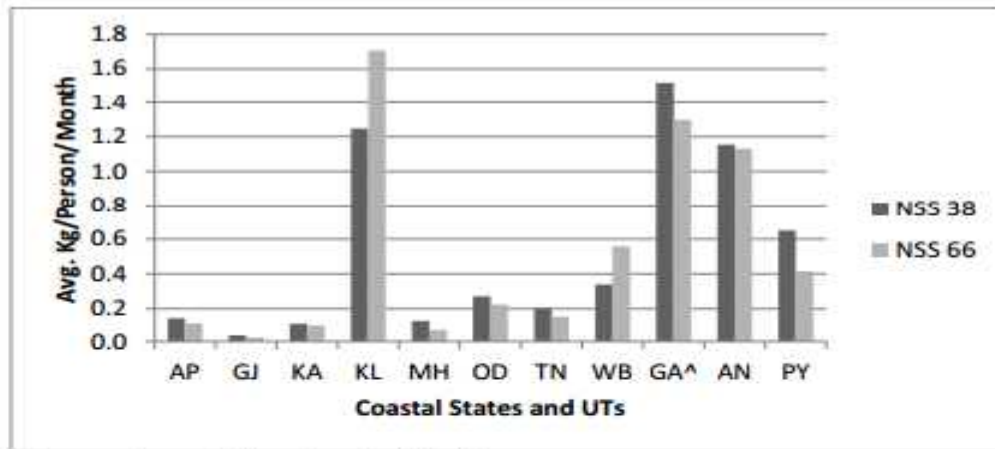


Source: Own calculations based on NSS data.

Figure 6: Percentage Share of the Expenditure on Fish to Total Food Expenditure - Urban

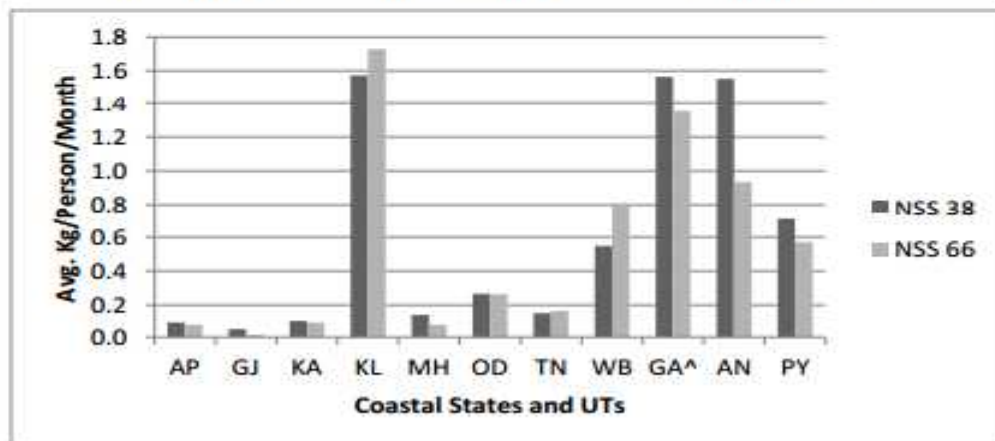
- Karnataka, Odisha, Tamil Nadu, Goa, Andaman and Nicobar Islands and Pondicherry have on average reduced their quantity of fish consumption over time but their expenditure share on fish to total food expenditure has in fact increased over time -- - ...despite spending a larger proportion of their total food budget on fish in 2009-10, they are still unable to consume the same quantity of fish in 2009-10 as they did in 1983. In other words, these States are unable to catch up with the rise in fish prices over time as the quantity consumed does not appear to be commensurate with the increase in the expenditure on fish consumption over time.

9.FIAH CONSUMPTION IN COASTAL AREAS



Source: Own calculations based on NSS data.

Figure 3: Comparison of Average Fish Consumption across Coastal States/UTs and NSS rounds (in Kg/Person/Month) – Rural



Source: Own calculations based on NSS data.

Figure 4: Comparison of Average Fish Consumption across Coastal States/UTs and NSS rounds (in Kg/Person/Month) - Urban

....despite an increase in fish production over time, people living close to the coast in almost all States and UTs report a decline in consumption.

Source: Study from Madras School of Economics, 2015

10.SPATIAL AND TEMPORAL MAPS FOR EACH NEW FISH SPECIES



- Expenditure on fish as food
- Top species of fish consumed
- Taste preferences
- Religious and cultural acceptance
- Price band
- Quality parameters preferred
- Age & gender
- Others

11. ASIAN SEA BASS - MARKET AND SUSTAINABLE INFRASTRUCTURE ESTIMATES (CIBA, 2012)

State/City	NVP (in crores)	FED (no./ annum)	CD (days/ annum)	Demand (tonnes)
Orissa	3.84	201	48	1719
Andhra Pradesh	3.38	161	45	2300
Tamilnadu	4.49	96	15	1969
Kerala	3.25	288	12	327
Karnataka	3.70	144	25	2889
Maharashtra	7.67	120	35	4334
Gujarat	3.20	220	25	550
West Bengal	4.41	229	75	6071
Bengaluru	0.38	144	35	416
Hyderabad	0.39	161	50	295
Chennai	0.31	96	15	136
Kolkata	0.41	229	75	566

NVP- Non-veg population. FED- Fish eating days. CD-Consumer Demand

Table 25. Recommended area for development of seabass farming in identified states with seed and feed requirements

States	Recommended area (ha)	Seed required (million)	Feed required (x 000 tonnes)
West Bengal	3035	7.58	12.14
Orissa	859	2.14	3.43
Andhra Pradesh	1103	2.75	4.41
Tamil Nadu	981	2.45	3.92
Kerala	147	0.36	0.58
Karnataka	1422	3.55	5.68
Maharashtra	2151	5.37	8.60
Gujarat	275	0.68	1.09
Total	9972	24.93	39.89

Demand estimation:

Total demand per annum= 22,000 tonnes (West Bengal, Maharashtra, Karnataka and AP major areas)

Resources

Area recommended =10,000 ha

Avg. productivity= 2 tonnes/ha

Hatcheries 10 to 15 with about 25 million seed capacity per annum

Feed mills = 30 to 40 with 1000 to 2000 TPA capacity

12. SWOT ANALYSIS FOR ASIAN SEA BASS (Ravisankar and Thirunavukkarasu, 2010)

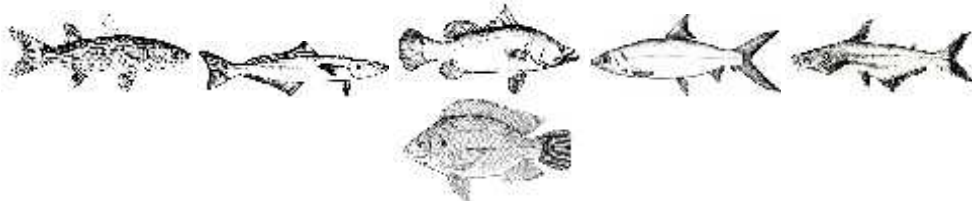
Stage of value chain	Strength	Weakness	Opportunity	Threat
Hatchery - nursery	<ul style="list-style-type: none"> • Technical know-how • Year-round breeding 	<ul style="list-style-type: none"> • Absence of more hatcheries and nucleus nursery centres • Non-availability of adequate number of seeds for stocking 	<ul style="list-style-type: none"> • Availability of educated youth to take up skilled nursery work 	<ul style="list-style-type: none"> • Over development without large area under farming may lead to reduced price
Farming	<ul style="list-style-type: none"> • Large land area available • Availability of low lying land and water bodies 	<ul style="list-style-type: none"> • Comparatively lower profit margins 	<ul style="list-style-type: none"> • Abandoned shrimp ponds • Price crash of shrimps 	<ul style="list-style-type: none"> • Lower domestic market price if large scale farming is taken up without promotion
Processing and value addition	<ul style="list-style-type: none"> • Seabass suitability for filleting • Ethnically liked fish 	<ul style="list-style-type: none"> • Skin, bones of seabass • Ethnic seabass culinary processing technologies are yet to be developed 	<ul style="list-style-type: none"> • Cheaper labour • Excess processing capacity availability 	<ul style="list-style-type: none"> • Acceptability of processed seabass in local markets • Consumer willingness to pay more for value addition
Marketing and consumption	<ul style="list-style-type: none"> • Easy reach to live fish markets - domestic and south-east Asia • Liking for Asian seabass in north European countries 	<ul style="list-style-type: none"> • High food safety standards of EU markets 	<ul style="list-style-type: none"> • Large domestic markets • Indian exposure in European fish markets 	<ul style="list-style-type: none"> • Thailand, Australia, Greece and Turkey are technically well advanced and closer to major consumption centres.

13. BASICS OF WINNING MARKETING STRATEGY

- a) Understanding and responding to competition- globally and locally
- b) Estimation of market size coordinated planning of localized production
- c) Right pricing with Least cost production
- d) Positioning & appeal
- e) Timing - avoid religious/cultural lean demand periods
- f) Designing marketing efforts as per target segments & Effective promotion
- g) Lobbying/influencing mass consumption gateways - College hostels, Defense Mess Midday meal, fish festivals

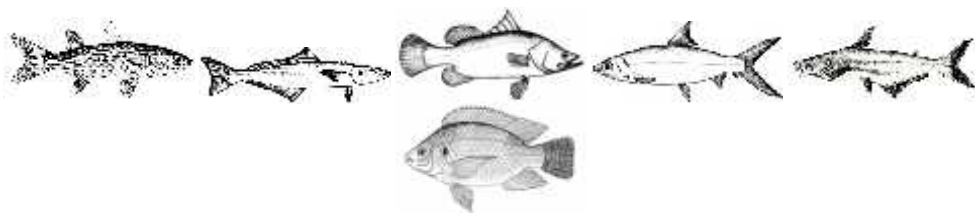


Dr. T. Ravisankar (left) receiving the memento from Mr. K.N. Krishnamurthy, Former Principal Scientist of CIBA & Forum's Member





Dr. V.V. Sugunan (right) who chaired the Technical Session-I, receiving the memento from Mr. M. Kathirvel, Secretary, FTF



TECHNICAL SESSION II

**PRESENT STATUS OF SEED PRODUCTION, NURSERY REARING
AND GROW-OUT CULTURE OF COBIA, MILK FISH, NILE
TILAPIA AND VIETNAMESE CATFISH**



Chairman: Dr. V. Sampath
Former Advisor, Ministry of Earth Sciences, Govt. of India &
FTF's Member

Vice-Chairman: Dr. P. Nammalwar
Former Principal Scientist of CMFRI & FTF's Member

**COBIA (*RACHYCENTRON CANADUM*) SEED
PRODUCTION, CULTURE AND MARKETING**



Dr. A.K. Abdul Nazar
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1. INTRODUCTION

- a) Mariculture has been growing rapidly in recent years on a global basis especially with the development and expansion of sea cage farming.
- b) One of the major reasons for the growth of sea cage farming is the availability of breeding techniques that can produce sufficient quantity of seeds of different high value marine finfish.
- c) Many countries in the Asia-Pacific Region like, Japan, China, Taiwan, the Philippines, Indonesia, Thailand, Malaysia, Vietnam and Australia have made substantial progress in the development of commercial level seed production technologies of high value finfish suitable for sea farming.
- d) In India, seed production technologies for cultivable species of many marine fishes still remain to be commercialised.
- e) In India, the broodstock development and seed production of only Sea Bass, Cobia and Silver Pompano have been standardized for commercial level production, whereas such works on groupers, snappers and breams are under progress.
- f) Aquaculture of cobia gained momentum worldwide, after its successful commercial production in Taiwan.
- g) Fast growth rate, adaptability for captive breeding, good meat quality and increasing domestic market demand are some of the attributes that make cobia an excellent species for aquaculture.
- h) Since late 1990, cobia aquaculture production was steadily expanding in Asia, primarily in Taiwan, Vietnam and China, but also in other Southeast and Indo-Pacific Asian countries including the Philippines, Indonesia, Iran and Reunion Island .
- i) Global aquaculture production of cobia increased rapidly from only 9 tonnes in 1997 to nearly 30,000 tonnes in 2007.



2. BROODSTOCK DEVELOPMENT



Open Sea cages for maintaining broodstock



Stocked Cobia inside the cage



- a) Broodstock development is the vital and time consuming procedure in marine finfish seed production.
- b) It is not easy to obtain broodstock fish directly from the wild and hence broodstock development is mainly done in captivity.
- c) The selection criteria to identify suitable brooders:
 - Body shape, age and colour,
 - Devoid of deformities,
 - Devoid of wounds, haemorrhages, infections and parasites
 - It is advantageous to collect sub-adults for broodstock development. Larger fishes would have crossed the reproductive age and very small fishes will take longer time to reach adulthood
 - In general, Cobia weighing 8-15 kg can be collected for broodstock maintenance.
 - After quarantine, brood fishes are stocked into concrete tanks / FRP tanks with Recirculation Aquaculture Systems (RAS) or sea cages.
 - The sea cages are preferred for reasons of economy and convenience. Circular cages of 6 m diameter and 3.5 m depth with HDPE frame were used for the purpose.
 - The major problem in the maintenance of the brood fishes in sea cages is the risk of contracting diseases and subsequent loss of broodstock.
 - The sudden loss of broodstock will affect the seed production, since the fresh stock of brood fishes will take a long time, depending upon their availability in the wild.





Recirculation system



Recirculation system

- Hence, the on-shore facilities with RAS is advised for development and maintenance of bio-secured broodstock.
- The vital aspects which effect development of broodstock are the photoperiod, temperature and broodstock nutrition.
- Tagging: Physical marking of brood fishes was carried out by PIT (Passive Integrated Transponder) Tagging.
- Cannulation: Flexible sterile catheters can be used for cannulation biopsy.





PIT (Passive Integrated Transponder) Tagging.

- **Broodstock Nutrition:** The viability of the larvae is very much dependent on broodstock nutrition.
- The nutritional components in the diet, feed intake rate or feeding period can all affect spawning, egg and larval quality.
- It has been well established that feeding of brood fishes with squid, cuttlefish or krill meals has beneficial effects.
- Both dry pellets and moist food are also offered during maturation.
- Diet rich in vitamins, poly-unsaturated fatty acids (n- 3 PUFA) and other micro-nutrients are essential for obtaining viable eggs and larvae.
- **Maturation:** The natural process of sexual maturation of the brood fishes can be accelerated by altering the photo-thermal period and it is also possible to obtain viable larvae almost throughout the year.
- Only females with oocytes in the late-vitellogenic stage, with a diameter around 700 μm in *Cobia* are selected. During gonadal maturation, water salinity needs to be 31-35 ppt.
- Normally sex ratio of 1 female: 2 males is maintained for *Cobia*.
- **Induced spawning:** Spawning can be obtained either by natural or inducing with hormonal treatment.
- Induced breeding is commonly practiced in most commercial hatcheries.
- The human chorionic gonadotropin (HCG) is widely used at a dosage of 500 IU per kg of body weight for *Cobia* females and 250 IUG per kg body weight for males.





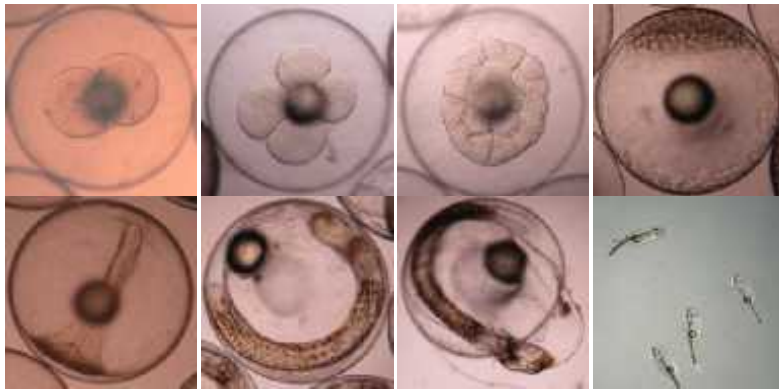
Brooders in the Spawning tank



Spawning behaviour inside the spawning tank

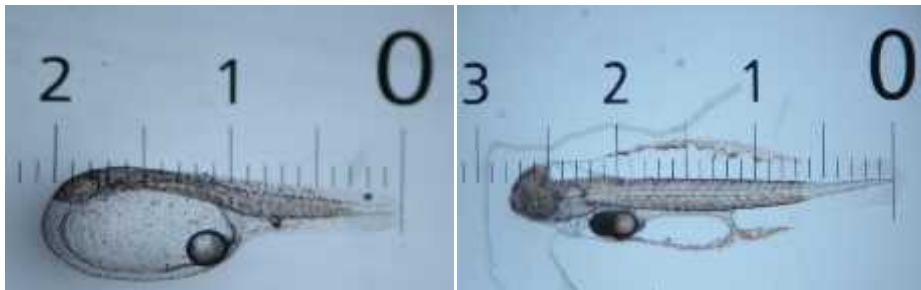
- **Incubation of eggs:** Incubation of eggs can be done either in incubation tanks or in the larval rearing tanks.
- Stocking density can be maintained at a moderate level of 200 to 500 eggs per litre.
- Incubation period lasts from 18 to 24 hours and all the fertilized eggs hatch.
- The development of embryo can be observed at frequent intervals under a stereo binocular microscope.





Embryonic Stages

3.LARVAE



Newly hatched larvae

Larva on 2 dph (days post hatch)



Larva on 3dph with mouth opening



Larvae in the rearing tank on 4 dph



4. LARVICULTURE PROTOCOL

Tank disinfection: 2 days before stocking of eggs/larvae; Liquid chlorine 100-150 ppm

Stocking of water: One day before stocking of eggs / larvae. Chlorinate with 20 - 30 ppt chlorine and dechlorinate later with 50 % Sodium thiosulphate .

Egg & Larval stocking: Eggs: 200 nos/ litre

Newly hatched larvae : 10 nos./litre

Green water: *Nannochloropsis* sp., cell density 1×10^7 /ml; from 1 dph to 18 dph

Mouth opening: From 3-5 dph (Temperature dependant)

Rotifers: 10-15 nos/ml from 3 to 10 dph; 2 times a day

Artemia nauplii: 2-3 nos./ml from 8 to 18 dph; 2 times a day

Weaning: Weaning with formulated feed (INVE, LUCKY STAR, etc.) starts from 15-18 dph

Tank bottom siphoning: Bottom siphoning every day from 1 dph

Water exchange: Preferably No water Exchange up to 7dph; 10 to 50 % from 8 to 15 dph; From 15 - 45 dph: 70-100 %

Grading: Once in 4 days during 10 - 40 dph

5. WATER QUALITY PARAMETERS

Parameters	Value
Temperature (° C)	: 28-32
Salinity (ppt)	: 31-33
pH	: 7.8-8.3.
DO (ppm)	: > 4
Nitrite (ppm)	: < 0.1
Nitrate (ppm)	: < 150
Ammonia (ppm)	: < 0.001

6. IMPORTANCE OF GRADING

- Uniform growth and minimize mortality due to cannibalism



25dph



32 dph





44 ph



70 dph

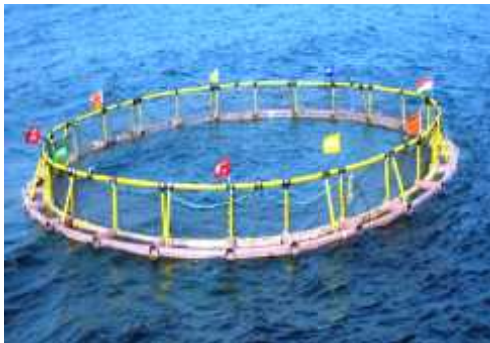


101 dph

7. NURSERY REARING

Duration	Length (cm)	Weight (g)
Week-0	7.1 ± 0.1	2.2 ± 0.1
Week-1	10.0 ± 0.2	4.2 ± 0.1
Week-2	12.0 ± 0.1	5.5 ± 0.2
Week-3	13.5 ± 0.2	13.6 ± 0.6
Week-4	15.2 ± 0.4	23.3 ± 0.6
Week-5	17.1 ± 0.2	37.9 ± 1.3
Week-6	18.9 ± 0.4	43.9 ± 2.0
Week-7	20.2 ± 0.3	49.1 ± 1.8
Week-8	20.8 ± 0.3	57.4 ± 2.0
Week-9	21.4 ± 0.3	66.0 ± 2.2
Week-10	21.5 ± 0.3	70.8 ± 2.4

8. FARMING IN OPEN SEA CAGES



15 m dia. Cage



6 m dia. Cage



- ICAR-CMFRI initiated cage designing during the year 2006 and launched its first locally fabricated HDPE cage (15 meter diameter) in Visakhapatnam, Andhra Pradesh in the year 2007.
- Thereafter, more manageable 6 m diameter HDPE cages were fabricated from the year 2008 and launched at many places in Tamil Nadu, Karnataka, Kerala, Andhra Pradesh, Maharashtra, Goa and Gujarat.
- Low cost cages made of Galvanized Iron (GI) were designed and tested to bring down the initial cost of investment, so as to make it affordable to the fishermen and farmers

9.GROWTH IN OPEN SEA CAGES

Duration	Length (cm)	Weight (g)
Month 0	21.5 ± 0.3	70.8 ± 2.4
Month 1	22.4 ± 0.6	94.1 ± 1.3
Month 2	26.0 ± 0.8	125.3 ± 2.5
Month 3	32.9 ± 1.1	468.5 ± 27.8
Month 4	46.3 v 1.0	1109.3 ± 87.7
Month 5	46.3 v 1.0	1985.5 ± 92.3
Month 6	65.1 ± 0.9	2507.8 ± 92.0
Month 7	73.5 ± 1.0	3316.2 ± 57.6
Month 8	77.9 ± 1.1	4015.4 ± 74.0
Month 9	85.7 ± 0.9	4851.1 ± 88.8
Month 10	90.8 ± 1.2	5622.4 ± 146.5
Month 11	96.6 ± 1.6	6291.8 ± 138.9
Month 12	103.0 ± 1.7	7276.6 ± 148.6

10.MARKETING

- It has a very good demand in Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu and West Bengal.
- The present production level is not yet enough to meet the domestic demand.
- While discussing with processors about export potentials, it was informed that at least one container load per month of fish weighing more than 3.5 kg should be assured for sustaining the export market.
- Though, China is a major producer, it also imports cobia from other countries for domestic consumption.



11.FARM GATE PRICE (SIZE 1.5-3 kg) IN TAMIL NADU

January to March	: Rs. 260-280 per kg
April to May	: Rs. 300-320 pper kg
June to October	: Rs. 210-230 per kg
November to December	: Rs. 280-300 per kg

12.FINANCIAL SUPPORT FOR FISHERMEN

- Open sea cage culture was undertaken by Self-Help Group fishermen of Marakayarpatinam and Rameswaram. In Ramanathapuram district, Tamil Nadu
- Cobia Aquaculture Fisherman Welfare Association, from Rameswaram received 40% subsidy assistance on the capital investment and operational expenses of the first crop from the National Fisheries Development Board (NFDB), Hyderabad.
- Based on the requests received from the fishermen communities, Ramanathapuram district administration of Tamil Nadu has mooted a new scheme during the year 2014 under State Balanced Growth Fund to assist 10 SHG's to take up sea cage farming with 90 per cent subsidy for two cages per group.
- Out of Rs.9.94 lakhs, Rs.8.946 lakhs have been given as subsidy for two cages per group.
- Training on cage farming for these groups was provided by the Mandapam Regional Centre of CMFRI.
- The selected fishermen groups installed their cages in Palk Bay and Gulf of Mannar.
- One of these fishermen from this group received the Best Cage Farmer Award from Hon'ble Union Minister of Agriculture, Government of India, on 21 , November 2015 (World Fisheries Day)



13. CAPITAL INVESTMENT

A. Cages, nets, mooring

Cost of 10 Cages (6 meter dia) made of 'C' class GI Pipe of 1.5 inch dia)	Rs. 5,00,000/-
Mooring materials for 10 cages	Rs. 1,30,000/-
Nets (2 Inner net and one outer net with ballast pipe) for 10 cages	Rs. 6,00,000/-
Subtotal	Rs.12,50,000/-

B. Operational cost

Cost of 6,600 Numbers of cobia seeds @ Rs 15/seed	Rs. 99,000/-
Transportation	Rs. 2,000/-
Cost of 54.24 tonnes of low value fishes @ Rs.15,000/tonne	Rs. 8,13,600/-
Labour Charges @ Rs.10,000/person/month for 2 persons X 7 months	Rs. 1,40,000/-
Boat hire & fuel charges	Rs. 50,000/-
Harvesting charges	Rs. 5,000/-
Miscellaneous expenses	Rs. 25,000/-
Sub Total	Rs.11,34,600/-
Grand Total of Capital & Operational expenditure	Rs.23,84,600/-

14. PRODUCTION

Survival @ 84% - 5,544 fishes
Feed Conversion Ratio 1 : 6
Average size of each fish at the time of harvest:1.63 kg
Total harvest: 9.04 tonnes
Sale price of the produce @ Rs. 310/kg = Rs. 28,02,400/-
Gross Income from the harvest = Rs. 28,02,400/-



15. ECONOMICS

Gross income from Harvest = Rs. 28,02,400/-

Operational expenditure = Rs. 11,34,600/-

Gross income - Operational expenses = Rs. 16,67,800/-

Gross Profit = Rs. 16,67,800/-

Less 100% of Capital Cost (Rs. 12,50,000/-)

Net profit from first crop (after meeting capital and working capital) = Rs. 4,17,800/-

16. ADOPTION OF OPEN SEA CAGE FARMING BY FISHERMEN

Period	No. of Groups	No. of cages
2012-15	95	30



Dr. A. Gopalakrishnan, Director, ICAR-CMFRI (fourth from right) handing over the Cobia fingerlings to the fishermen group





**Dr. A.K. Abdul Nazar (left) receiving the memento from Dr. D.B. James,
Former Principal Scientist of CMFRI & FTF's Member**



**MARKETING STRATEGIES FOR MILKFISH
(*CHANOS CHANOS*)**



Dr. P. Arun Padiyar
Aditya Fish Hatcheries, Kakinada, Andhra Pradesh
Mobile: 09440916428
Email: arunpadiyar@gmail.com



1. Dr ARUN PADIYAR'S CURIOSITY ON MILKFISH

Undertook a private survey in Andhra Pradesh during 2008-2009 to know

- a. What are the problems of farmers and Opportunities?
- b. Outcome
 - i. Idle brackishwater farms
 - ii. Diversification opportunity in Freshwater aquaculture
 - iii. Milkfish was traditionally farmed and loved by local people
 - iv. ICAR institutes worked a lot on this species but discontinued.
 - v. Why NOT MILKFISH? A Challenge
 - vi. In 2009, the author just returned from Indonesia with first hand experience on milkfish farming and hatchery operations.

For the Point III above on traditional farming of milkfish in Andhra



One of the editors (MK) visited Bhimavaram in August 1988 along with Mr. M.S. Muthu, the then Principal Scientist and Dr. G. Sudhakara Rao, the then Senior Scientist of CMFRI. At 7 A.M. a fisherman was seen running and carrying two Aluminium vessels which contained live juveniles of milkfish. To our dismay, that fishermen refused to divulge either the source of fish or the place where it was being cultivated, fearing the competition from the freshwater fish farmers of that region.

2. CURRENT STATUS OF MILKFISH

Milkfish is relatively new to

- a. Consumers in India
- b. Farmers in India
- c. Position in which segment ?
- d. Challenge is huge
- e. Develop partnerships with as many as possible
- f. Where is the Seed ?
- g. Develop broodstock bank (7-10 years)
- h. Breeding technology available
- i. Partnership with CIBA for local refinement of hatchery technology
- j. Where is the Feed ?
- k. Many Extruded Fish Feed Companies since 2008
- l. Where is the Market ?
- m. Conduct a thorough market survey
- n. Partnership with CIFT, Visakhapatnam for fish quality testing.
- o. Perceptions are Not always the facts
- p. Popular Perception among Fisheries Experts is that Indian customers need boneless fish
- q. Then Why we produce and eat about 45 lakh tonnes of Bony Carps? It forms >50% of domestic consumption with CAGR of 6-7%.
- r. Why demand and price of Bony Hilsa is skyrocketing?
- s. Why market for Pangasius has stagnated or decreasing?
- t. Focus on high value and exportable species

3. MARKET PROSPECTS

Market Survey Method (Period: 2010-2013 (4 years))

- Own farm
 - Assured quantity, quality and regular supply.
 - 20 acres in Andhra (Supply to Eastern Market)
 - 20 Acres in Karnataka (Supply to Mumbai to Kochi Market)



- Select a few important fish markets:
 - Good and Reliable Logistics
Kolkata, Guwahati, Bangalore, Mumbai, Goa, Kochi, Mangalore
- Tie-up with Retailers: Spar, Metro Cash and Carry, Reliance, Tata Star Bazar, Spencer, Matsyafed, KFDC
 - To get direct customer feedback
 - Estimate the market share and future projections
- Tie-up wholesalers: Howrah, Siliguri, Guwahati and Goa market
 - To understand pricing possibilities
 - To understand Big Market Wholesaler perspectives
 - Continuous supply of fish to any given point for 1-4 years
 - Make sure the product is available in 365 days of a year
 - Reference wholesale price 160 Rs/kg at door delivery to sales point. Retail price 180-210 Rs/kg.
 - Regular Direct feedback from the retailers, wholesalers and fish cutters
 - Consumer survey at fag end of period (2013)
 - Our own team (With the help from IIM-Bangalore)
 - Hired Third Party (A Reputed Market Services Agency from Mumbai)

4. OUTCOME OF TEST MARKETING



Milkfish at market



- No decrease in sales at any given outlet
- 2-3% of market share by volume in Hyper Marts
- 60% Repeat Buyers
- Main buyers - Bengalis, NE people, Malayalis, Goans
- Bigger size (>800 g) is preferred in Hyper-Marts.
- Auction price in Goa market reached Rs. 230/kg
- Retail Price in Eastern market is at least Rs. 30-50 higher than carps.
- Small size Milkfish of <200-250 g has soft and hairy bones. Easy to eat.
- Medium size (250-750 g) has hard bones spread in middle of the meat: OK for hard-core fish eaters
- Big size (>750 g) has hard bones near the skin. Easy to pick / remove while eating.

5. LESSONS LEARNT

- Indian Consumers liked Milkfish due to affordability, attractiveness, good meat quality and taste.
- Bony fish is not an issue in the mass market and hardcore fish consumers.
- Bony fish is an issue with Hyper-Marts sector (Hotel, Restaurant and Catering), Amateur Fish Eaters and Rich class people.

6. FUTURE PLANS

- Focus on Commercial Hatchery Seed production
- Focus on Growing Medium Size fish (4-5 pcs/kg) in 4 months.
- Focus on Production near to the Market
 - West Bengal
 - Kerala
- Extension support to farmers
- Demonstrations
- On and off farm technical support
- Market support
- 2020 - 1 lakh tonnes (1% of Indian Fish Production)



- 2025 - 5 lakh tonnes (3% of Total Fish production by then)
- By 2025, create 4-5 lakh new jobs in Farm based Value Chain.
- Uplift 2-3 lakh households in rural India, especially Eastern India from Poverty by providing milkfish farming livelihood.
- Provide a sustainable choice of fish to 70 crore fish consumers in India at affordable price.
- Milkfish farming will be one of the major activities under the Government vision on "Fish For All" or otherwise known as "Blue Revolution".

7. STEPS TAKEN



- a) Established a broodstock and hatchery facility near Kakinada in Andhra Pradesh
- b) Farming in earthen ponds in Andhra Pradesh and Karnataka to cater the domestic market demand





**Dr. P. Arun Padiyar (left) receiving the memento from Dr. M. Rajagopalan,
Former Principal Scientist of CMFRI & FTF's Member**



**OPEN SEA CAGE CULTURE EXPERIMENTS OF
NATIONAL INSTITUTE OF OCEAN TECHNOLOGY,
CHENNAI**



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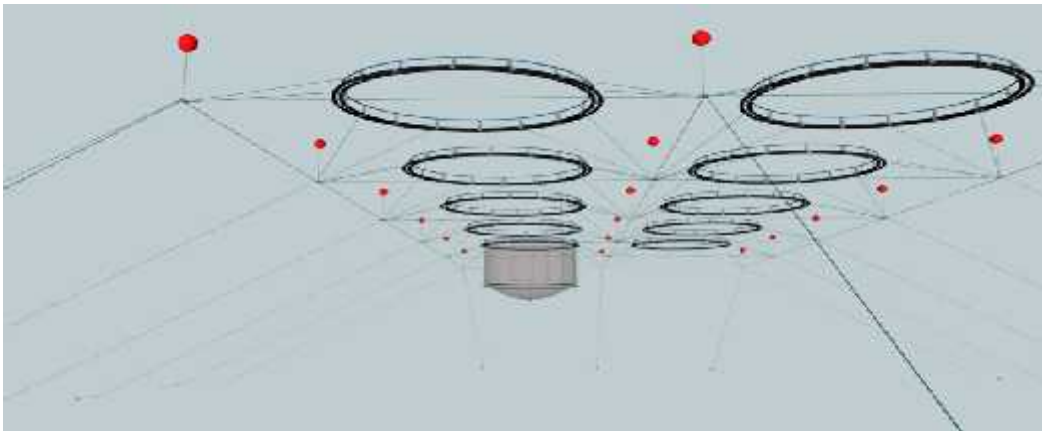
1.OBJECTIVES

- Design, development and testing of cages suitable for Indian open sea conditions.
- Demonstration and technology transfer of marine fin fish farming in open sea cages.

2.OPEN SEA CAGE CULTURE SITES

Location	Nature of site
a) Olaikuda, off Rameswaram, Tamil Nadu	Semi-protected
b) Kothasathiram, off Kavali, Andhra Pradesh	Open sea
c) North Bay, off Port Blair, South Andaman	Protected bay

3.MULTIPOINT MOORING



Cage components as customized by NIOT were fabricated as 9 m Ø cages at North Bay of South Andaman (4 nos.), Kothachathiram (2 nos.) and Olaikuda (4 nos.). The fabricated cages were deployed in the respective sites with multi point mooring system.

4. SPECIES PERFORMANCE

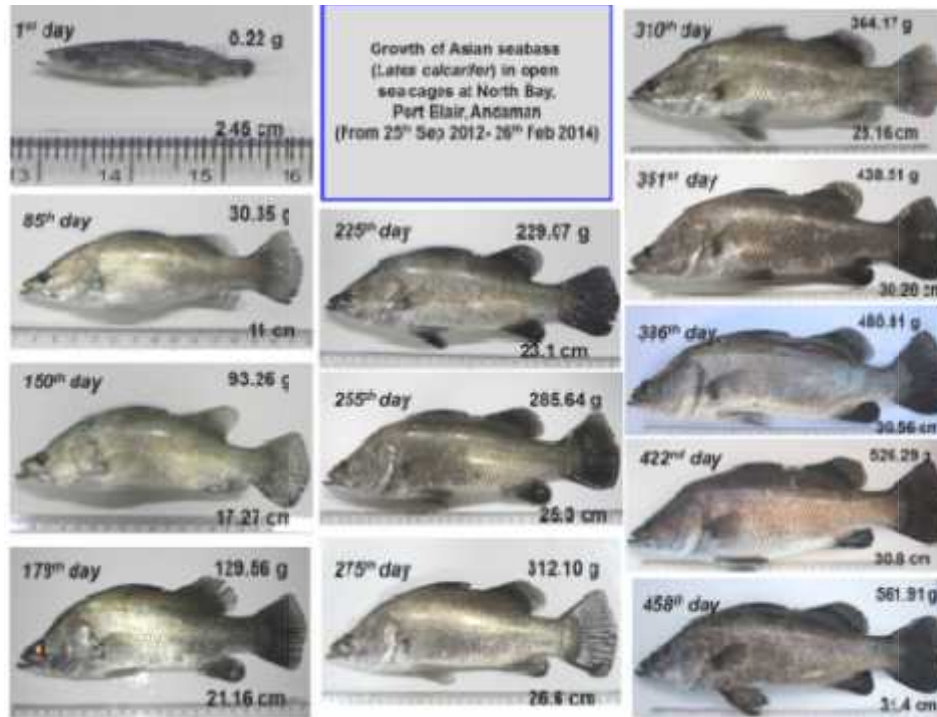
Species	Av.growth per day (g)	Survival (%)	Disease resistance	Farm gate price/kg (Rs.)
Milkfish <i>Chanos chanos</i>	3.2	85	Excellent	60-75
Parrat fish <i>Scarus ghobban</i>	0.9	95.4	Excellent	175-250
Sea Bass <i>Lates calcarifer</i>	2	34.8	Moderate	85-90
Cobia <i>Rachycentron canadum</i>	15.4	84	Good	230-325
Silver Pompano <i>Trachinotus blochii</i>	0.8	10	Poor	150-200

5. NURSERY REARING IN OPEN SEA CAGES



- 0.2 g to 25 g in 65th day in protected bay (South Andaman)
- 6 g to 24 g in 45 days in open sea condition (Andhra Pradesh)

6. GROWTH PERFORMANCE OF SEA BASS



7. COMMUNITY BASED OPEN SEA CAGE CULTURE

- The fishermen of Olaikuda were overwhelmed by the commendable performance of cobia and initiated cage farming of cobia with the technical support of NIOT.
- NIOT encouraged the enthusiastic youths of Olaikuda (a group of 85 people) to form a Self Help Group to take up sea farming of cobia initially in the cages deployed by NIOT.
- Assisted the group in obtaining cobia seeds from RGCA Pozhiyoor and initiated the culture.
- **Objective:** To assess the economic viability of cage culture using 3 different species
- Species attempted:
 - Milkfish (32,000 nos. of seeds from wild)
 - Cobia (1,000 nos.) from RGCA hatchery
 - Silver Pompano (5,000 nos.) from CMFRI hatchery

8. PRECAUTIONS DURING HARVEST

- Do not feed 1 day before harvest
- Inspect cage nets before lifting
- Untie the net and slowly lift from one side to concentrate fish in one corner
- Use soft and knotless scoop nets to avoid scale loss
- Use cold water to avoid active movement and injury

9. HARVEST

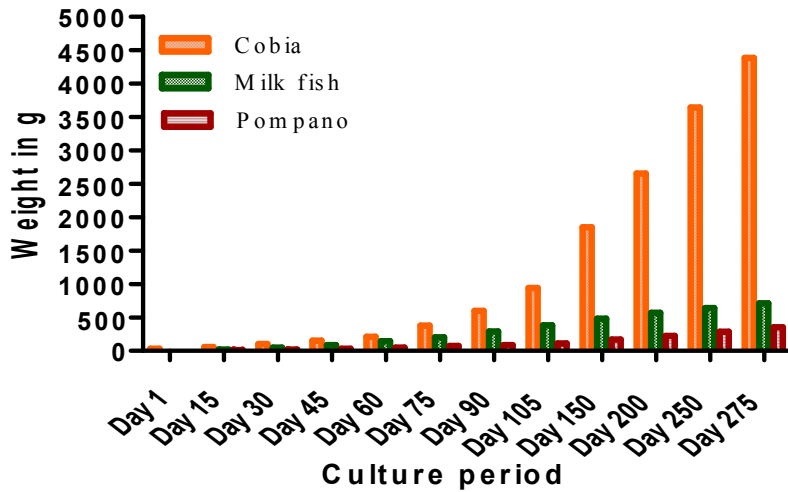


**A portion of Cobia harvested A portion of Milkfish harvested
at Olaikudaat Olaikuda**

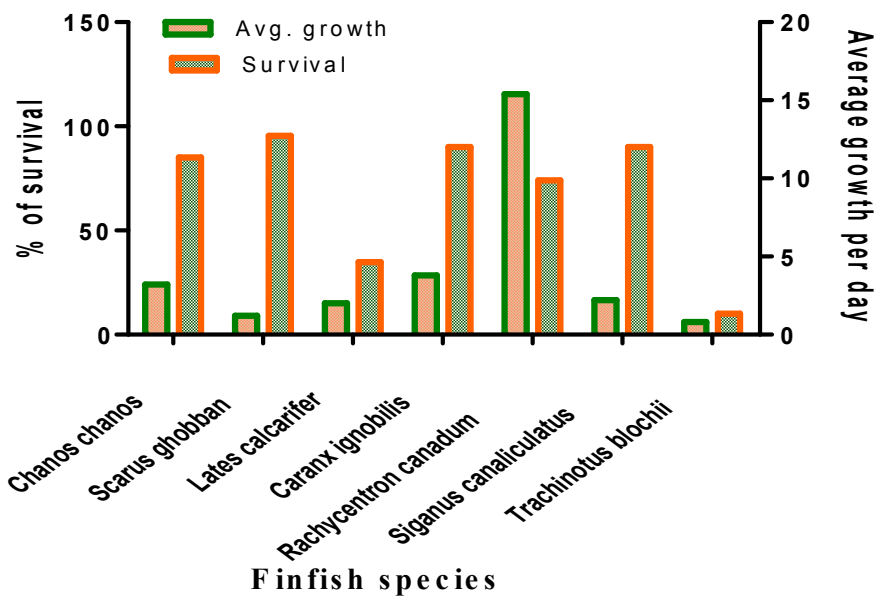
- Cage culture was carried out for 12 months without any seasonal breaks even during the north east monsoon conditions (Nov. and Dec.) at Olaikuda.
- The harvest was done (12th May, 2014) during the fishing ban season and cobia and milkfish fetched Rs. 325/kg and Rs. 65/kg, respectively at the farm gate.
- The total harvest was 6.5 tonnes and the species-wise contribution of Milkfish, Silver Pompano and Cobia were 3.25, 0.25 and 3.0 tonnes, respectively. The average species-wise weight of Milkfish, Pompano and Cobia fishes was 0.7, 0.35 and 4.0 kg, respectively.

10.GROWTH AND SURVIVAL OF MARINE FINFISHES IN OPEN SEA CAGE CULTURE

Comparative growth performance



Comparative growth performance and Survival of cultured fishes



11. UNHEALTHY STATUS OF OF HARVESTED FISH AFFECTS MARKETING



Loss of scales in Milkfish

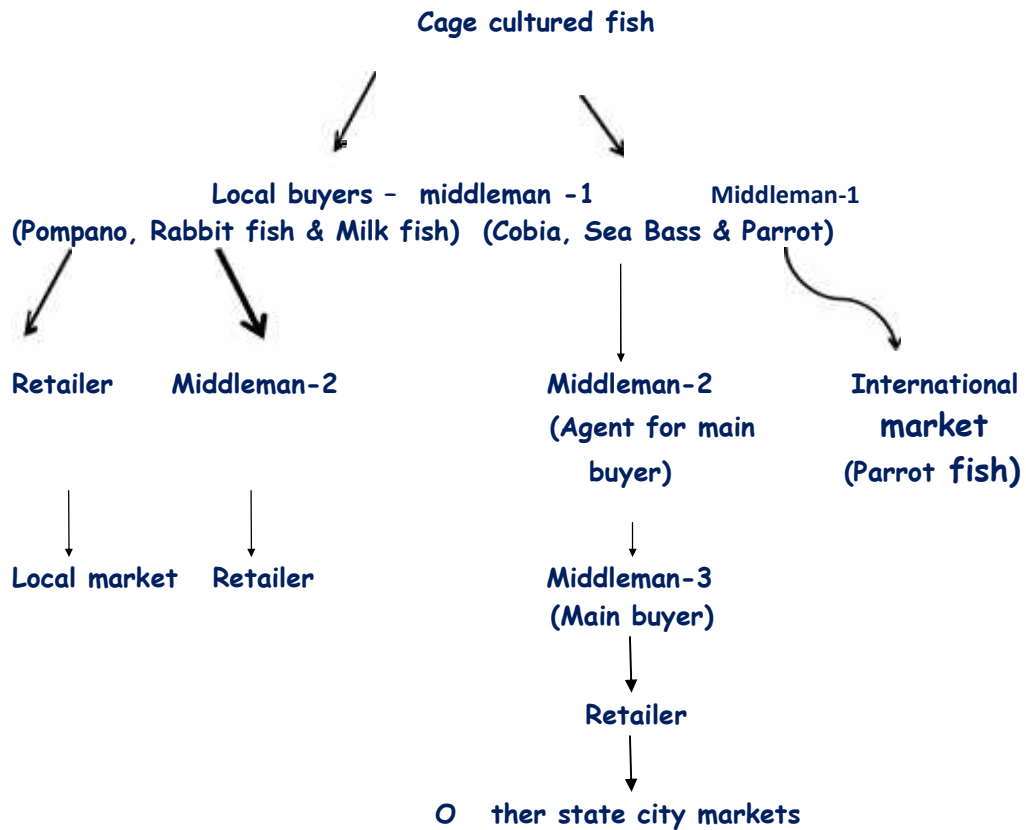


Reddening in snout and operculum



Fraying of fins in Sea Bass

12. EXISTING MARKET SYSTEM



13. TRAINING ON OPEN SEA CAGE CULTURE



- On 4th November 2014 , training on open sea cage culture was conducted in Olaikuda near Rameswaram
- A total of 85 fishermen from various places like Chennai, Kalpakkam, Nagapattinam, Pudukottai, Thondi and Rameswaram were participated
- During training, the experts from various scientific institutions gave lectures on fish seed production, nursery rearing, cage culture operation, economics and disease management

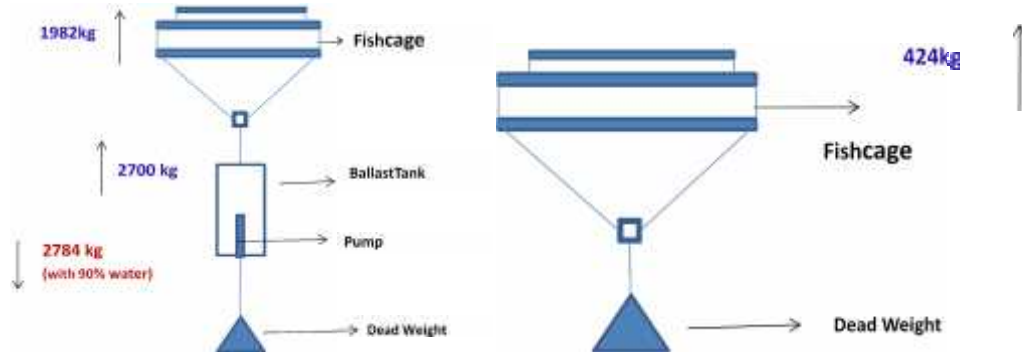
14. SUBMERSIBLE CAGE DEVELOPMENT



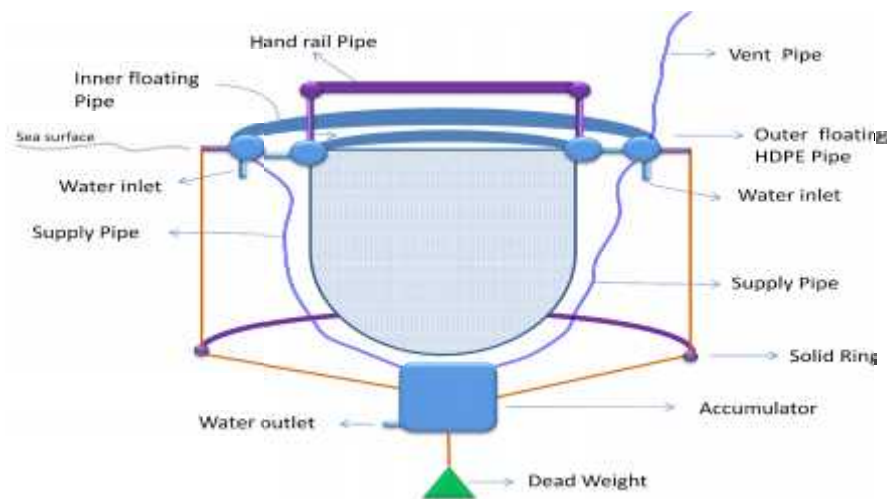


- These cages will float in the surface during normal weather conditions and can be submerged up to 15-20 m depth by adjusting ballast during bad weather conditions through remote command from the shore.

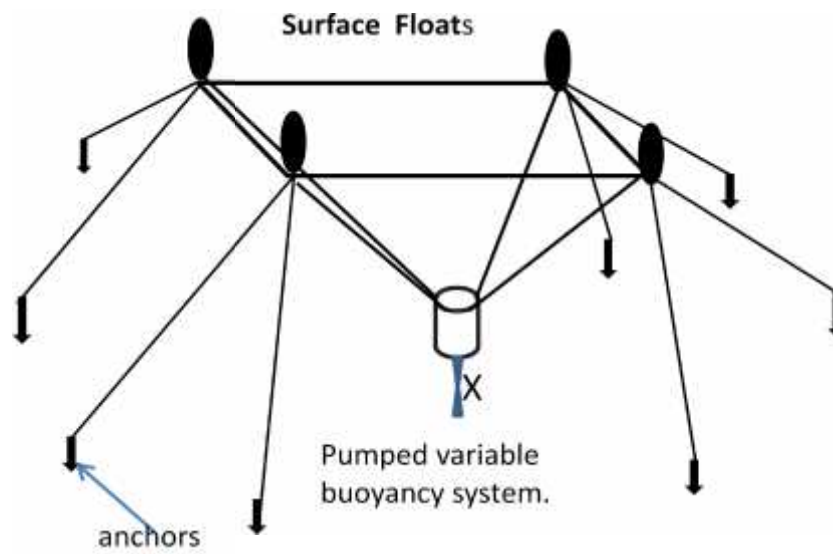
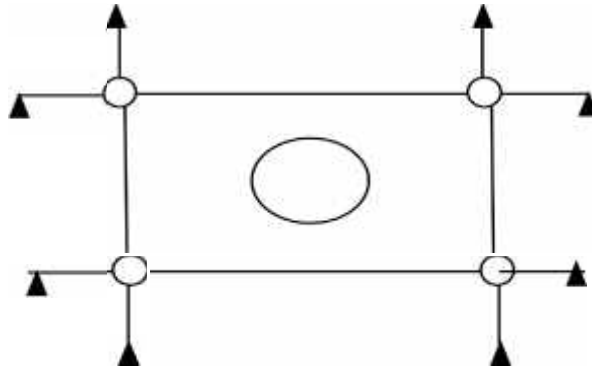
15.SUBMERSIBLE CAGE CONCEPT



16.SCHEMATIC VIEW OF SUBMERSILE CAGE

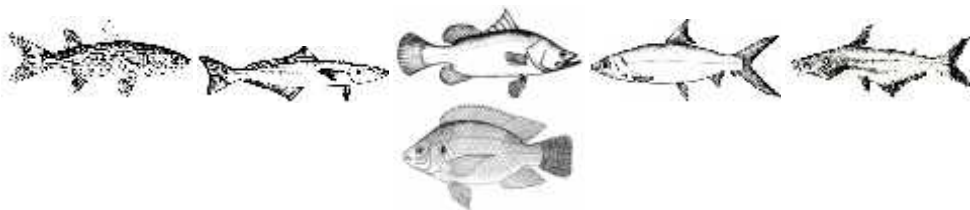


17. SCHEMATIC VIEW OF SUBMERSIBLE CAGE MOORING





Dr. J. Santhanakumar (left) receiving the memento from Dr. P. Gandheeswari, Former Reader, Dept. of Zoology, Queen Mary's College, Chennai & FTF's Member



PRESENT STATUS OF GIFT TILAPIA IN INDIA



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1. INTRODUCTION

- Tilapia is one of the most important farmed fishes today,
- Worldwide production of 4.8 million metric tonnes (from over 85 countries) in 2014
- Growing at the rate of 10 to 12%
- Tilapia has become the second most farmed food fish in aquaculture after carp and is someday soon expected to surpass Carp production with its global consumer & production base.
- Tilapia finds its way into high value markets and expensive restaurants across the world
- a. Tilapia is also accepted as a generic white fish because of its mild taste
- Industrial preparations better than most other white fish
- Described by FAO as one of the most important food fish for the 21st century,
- Tilapia is commonly referred as "Aquatic Chicken".
- China contributes approximately one third of the total global tilapia aquaculture production.
- It is also widely farmed in countries such as Egypt, Indonesia, Thailand, Philippines, Brazil, Bangladesh, Vietnam, Columbia and Malaysia.
- Recently permitted for commercial seed production and farming in India.
- Permission granted by Govt. of India for culture of All Male Nile Tilapia
- GIFT (Genetically Improved Farmed Tilapia)
- Strains of Red Tilapia
- Hybrids of Tilapia
- Why guidelines is required? (Issued by Ministry of Agriculture)
- Exotic Fish
- Prolific breeder
- Adaptability to a wide range of environmental conditions
- It is likely to affect fisheries of Reservoirs, Lakes and River bodies
- Permitted farming systems in India
- Water based system-Cage farming & Land based system-Ponds & Intensive tanks



2. BIOSECURITY MEASURES

- The bund height should be high enough to meet situations like flooding, high enough to avoid fish escape.
- Outlet water should be screened with proper mesh before released into drains/canals.
- Sluice gates must be provided with appropriate mesh to prevent escape of fish/eggs/fry.
- Water released subsequent to harvest should be also screened.
- Bird fencing or bird scaring net is mandatory for availing approval for farming.

3. PRESENT ACTIVITIES

- All male seed production and supply
- Selective breeding
- Training programmes
- Technical assistance for the establishment of satellite breeding centres

4. GIFT SEED PRODUCTION AND SUPPLY

- Commenced during the year 2012-13
- Presently supply all-Male tilapia seeds to various state Fisheries Departments and farmers who have been issued licenses for Tilapia Farming.
- Around 5.0 million seeds supplied so far



5. FLOW CHART FOR PRODUCTION

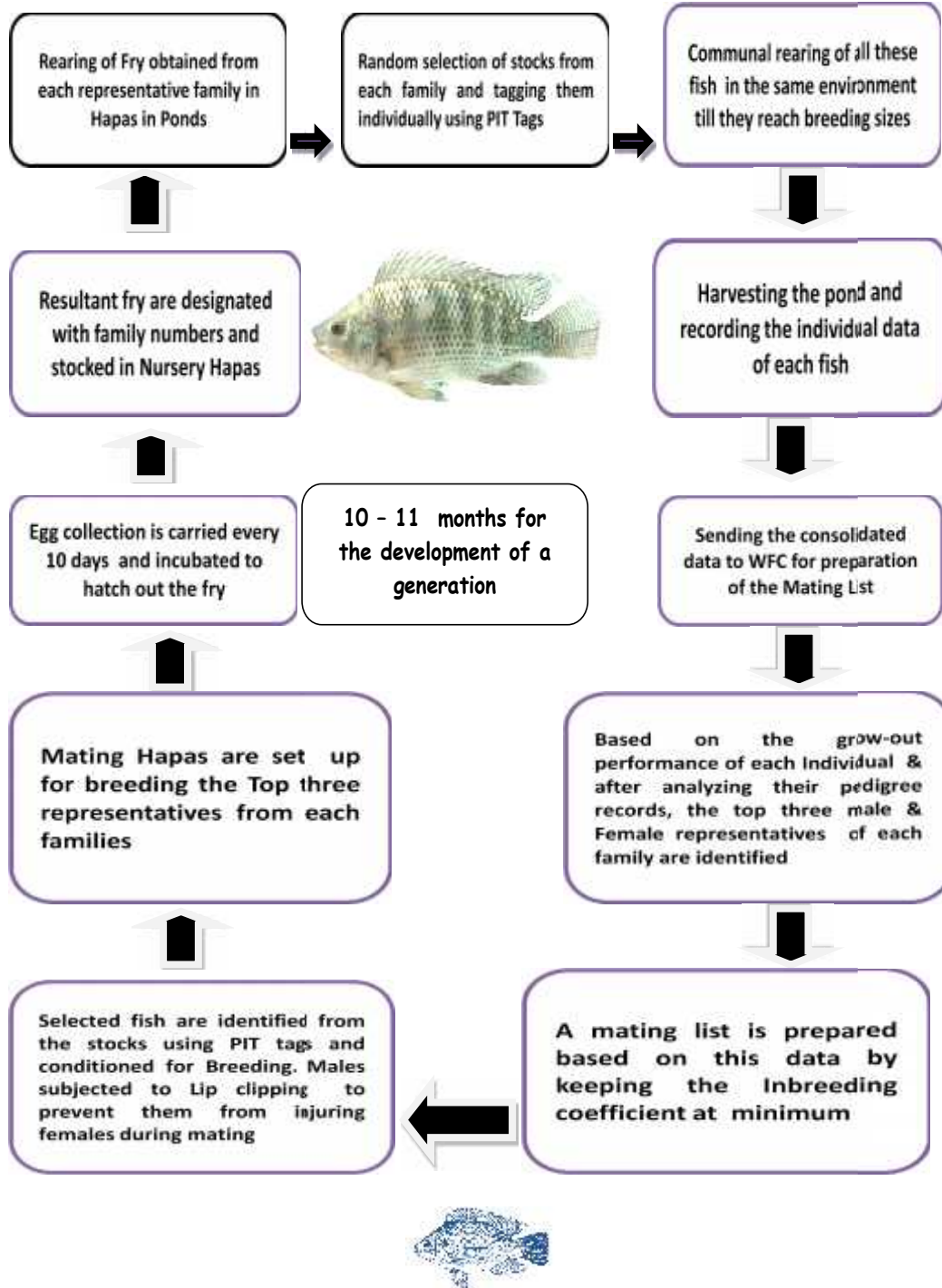
Tilapia Production Scheme



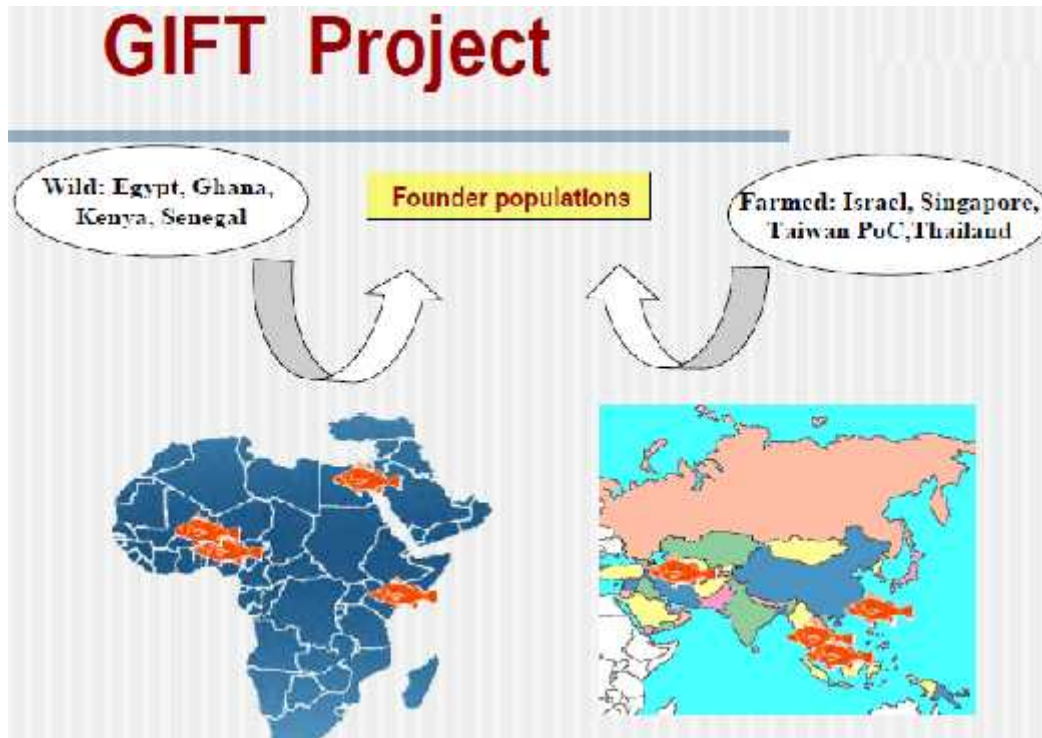
6. ALL MALE SEED PRODUCTION PROCESS FLOW



7. SELECTIVE BREEDING - PROCESS FLOW

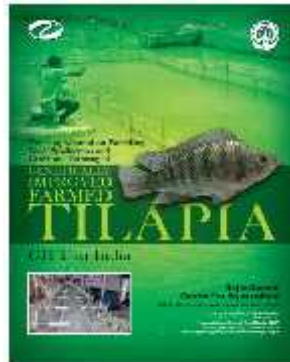


8. GIFT PROJECT



9. TRAINING PROGRAMME

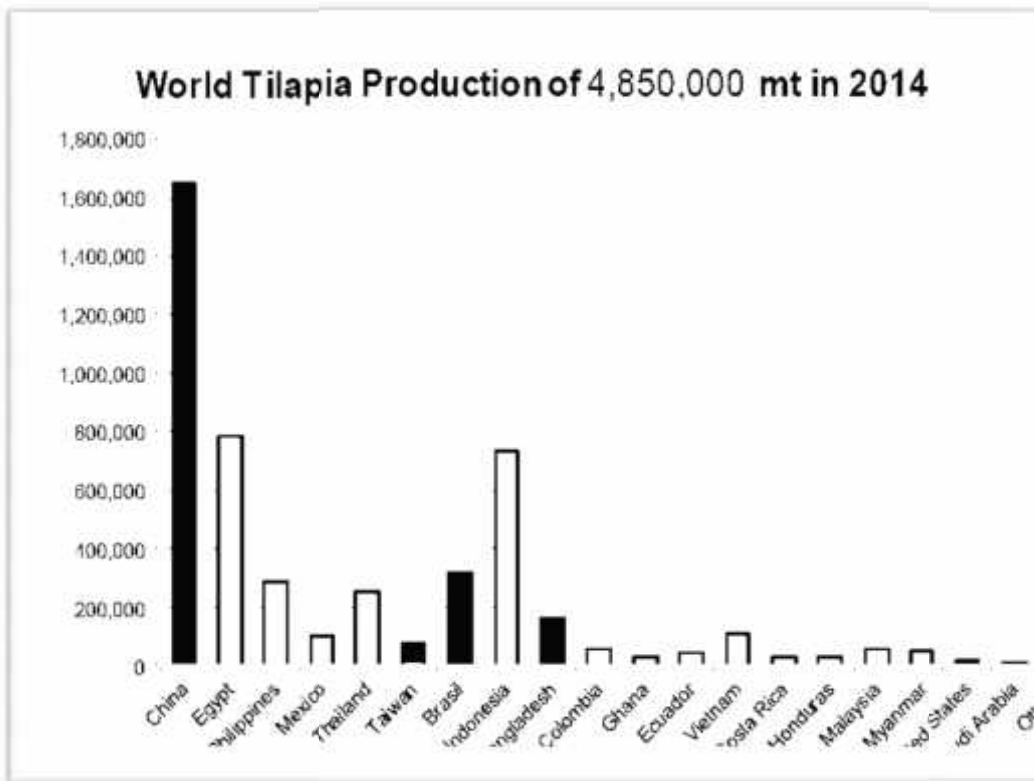
- 5-day hands on training programmes in "Breeding, Seed production and Grow out farming of Genetically Improved Farmed Tilapia" at project site at Manikonda, Krishna District, Andhra Pradesh.
- A total of 238 personnel in 19 batches including Fishery officers, Farmers and entrepreneurs from different states were trained



10. TRANSFER OF TECHNOLOGY

- One Memorandum of Understanding (MoU) was signed between RGCA and Dept of Fisheries Tamil Nadu for establishing satellite breeding centre at Krishnagiri which will serve the needs of the farmers in Tamil Nadu.
- Another MoU has also been signed between RGCA and Andhra Pradesh State Fisheries Department for satellite breeding centre at Ananthapur.

11. GLOBAL PRODUCTION



12. CURRENT GLOBAL TREND IN TILAPIA CONSUMPTION

- Increase in demand for all forms of tilapia (Live, Whole, fillets, fresh and frozen, smoked, surimi)
- Demand & price increase is the greatest for fresh fillets
- Prices have been constant for several years and are likely to remain stable for all other forms
- US and EU growers concentrate on live sales and highly processed forms

13. INTERNATIONAL SUPPLIERS

- China is the leading supplier to the world
- Southeast Asia and Latin America are primary suppliers to the US
- Africa, Latin America and Caribbean supply EU
- Colombia, Cuba, Brazil and Mexico are supplying strong domestic markets
- Ecuador has surpassed Costa Rica as supplier of fillets to US
- The Philippines is big producer and some quantity has been exported to Japan

14. PRODUCTS OF TILAPIA



15. DOMESTIC MARKET IN INDIA

- Commercial Tilapia farming is yet to take off in India
- As a result, only small sized Tilapia (both *O. mossambicus* and *O. niloticus*) are exploited
- Mostly dark and unattractive,
 - A. caught from creeks, canals, lakes and reservoirs reach the domestic markets
 - B. Inferior taste and meat texture.
- Low consumer preference except in states such as Kerala and West Bengal

16. MARKETING STRATEGIES

- Increase domestic production & demand
- Provide processing points near production areas
- Provide variety to local markets
- Market tilapia as ecologically efficient and sustainable
- Popularize in restaurants
- Make available in Super markets in live, fresh & value added forms suitable for Indian taste
- Compete with price and taste advantage



Mr. P. Srinivasa Rao (left) receiving the memento from Mr. V. Ravichandran, Chairman, South Tamil Nadu branch of FTF



PANGASIUUS IN INDIA



Mr. B. Rambabu

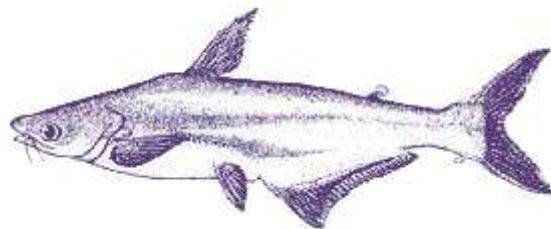
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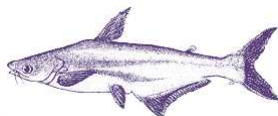
- *Pangasiushypophthalmus* and *P. sutchi* are cultured in India.
- Seed source: Mainly from Bangladesh and parts of India.
- Freshwater fish, but can tolerate up to 5 ppt salinity.
- Hardy species for culture (can survive in low dissolved oxygen too).
- Most preferred fish for farming due to its faster growth rate.
- Omnivorous and adoptable to formulated diets with good FCR.
- Cheaper protein source for the poor
- Suitable for cage farming too.
- Single bone fish (Higher yield on filleting).

2. MARKET SIZE-2015

SOUTH INDIA			NORTH INDIA		
Nursery (Mn)	Grow-out (Mn)	Culture area (Acres)	Nursery (Mn)	Grow-out (Mn)	Culture area (Acres)
80	105	10,000	20	37.5	Not available

- Av. stocking density: 7,000 - 10,000 per Acre
- Av. harvestable size: 0.7 - 1.5 kg
- Av. crop period: 8 - 10 months
- Av. production: 10 - 15 tonnes per acre
- Total production: 3.0 lakh tonnes (approx.)
- ❖ Total feed requirement (formulated): 4.5 lakh tonnes (approx.)
- Av. Feed Conversion Ratio: 1:1.5

NOTE : 90 % formulated diets and 10 % mash slaughter waste, etc.



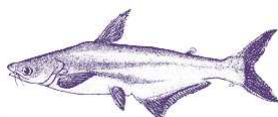
3. COST OF PRODUCTION

Production cost/kg	2010 (Rs.)	2015 (Rs.)	Remarks
Seed	2	5	
Feed (20% protein)	24.5	45	FCR 1.3 (2010) & 1.5 (2015)
Chemicals & Probiotics	1	2	
Fertilizers	0	0.5	
Lease	1	5	
Labour	0.5	1	
Electricity	0.25	0.5	
Water pumping	0.5	1	
Harvest	0.25	0.5	
Interest on capital	0.25	1	
Total	30.25	61.5	

NOTE : Feed Price in 2010 - Rs. 19/- per kg and in 2015 - Rs. 30/- per kg

4. MARKET TREND 2010-2015

Year	Fish Production (Lakh m, t)	Feed Consumption (lakh m, t)	Av. FCR	Farm gate Price Rs./kg	Feed Rs./kg (28% protein)	Production cost per
2010	2.3	3	1.13	35	10	30.25
2011	2.68	3.49	1.13	40	22	35
2012	3.08	4.32	1.14	44	23.5	40
2013	4.19	5.87	1.14	52	25	50
2014	3.06	5.95	1.15	50.5	27	55
2015	2.00	4.36	1.15	61	30	61.5
Total	19.11	26.99				



5.FISH QUALITY BEFORE 2010

CULTURE IN INFANT STAGE DUE TO....

- Non availability of adequate quality seed
- No formulated diets
- Poor market acceptance due to poor fish quality
- Poor fish quality due to mash slaughter waste...
- Labour problem (reluctant to feed fish with chicken waste)
- Myth on health issues on consuming `Panga` (People may be prone to Arthritis due to its high fat depositions in fish body)
- Environmental issues

6.FISH QUALITY AFTER 2010

- Revolution in production due to balanced formulated diets
- Quality of fish greatly improved
- Excellent market acceptance
- Ease of culture practices
- Higher yields
- Less disease instances
- All myths were wiped off

7.DISEASES



RED DISEASE:

CAUSATIVE AGENT: *Aeromonas sp.*

SYMPTOMS: Hemorrhages on stomach and anus..

TREATMENT: Water treatment with Sanitizer 1-2lit/ac. Feeding with Enrofloxacin 10 g/tonne of fish.



DROPSY :

CAUSATIVE AGENT: *Aeromonas hydrophila*

SYMPTOMS: Hemorrhages on eyes, body and fins. Eyes may pop out and swollen belly.

TREATMENT: Water treatment with Sanitizer 1-2lit/ac. Feeding with Enrofloxacin 10 g and Doxycycline 10 g/tonne of fish.



COLUMNARIS:

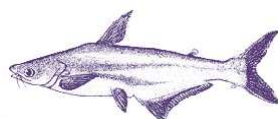
CAUSATIVE AGENT: *Flexibactor columnaris*

SYMPTOMS: Grayish white marks or patches on the body. Brown patches on the gill filaments. white spots in the kidney, spleen and liver. Fin erosion and gill necrosis.

TREATMENT: Water treatment with Sanitizer 1-2lit/ac. Feeding with Sulphamethoxazole 10 g and Trimethoprim 2 g/tonne of fish.

8. MARKETING

A. Whole fish - mostly household



Year	Potential (tonnes) (Demand)	Production (tonnes) (Supply)	Remarks
2010	1.5 lakhs	2.3 lakhs	Price crisis
2015	2.5 lakhs	2.9 lakhs	Fairly stable price

B. FISH FILLET - MOSTLY RESTAURENT & HYPER MARKET



- Ready to cook ...
- Boneless
- Higher fillet yield (fresh water fish) - 35-40%

C. CHALLENGES

IMPORTED VIETNAMESE BASA FILLETS

CHALLENGING PRICE:

- Rs 180/- to 200/kg (Viet basa) Vs Rs 250/-270/kg (Indian Panga fillet)
- Approx 10,000 mt fillets imported to India in 2015
- Approx 30,000 mt (whole fish) local produce market effected

QUALITY CONSTRAINTS:

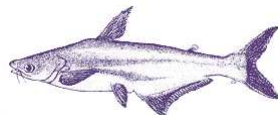
- Bleached ...??
- Over glazing - as high as 40% ?
- Phosphate treatment - 15-20% ???

AVAILABILITY OF QUALITY SEED:

- No established hatchery facilities
- Not sure of the genetic strains of Pangasius stocks

YELLOW MEAT COLOUR OF FILLET (INDIAN):

- Maize based feeds ??
- Meat quality ?? (Spoiled ?)



9.PROMOTIONS AND SUGGESTION

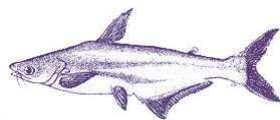
- Govt. & Private sectors to form consortium to promote Fish widely in domestic market like NECC
- Awareness among public about the benefits of consuming fish through media ...
- 'Fish Melas' across India - At least 10 melas/annum for a period of 3-5 years
- Subsidies to fish processing units
- Focus on live fish market
- Control over import of Vietnamese Basa fillets with respect to quality and pricing to support local produce

10.CONCLUSION

- Target - 5.0 lakh tonnes (domestic consumption) by 2018
- If this is achieved, farmers get better price at harvest
- Targeted segment - Young population

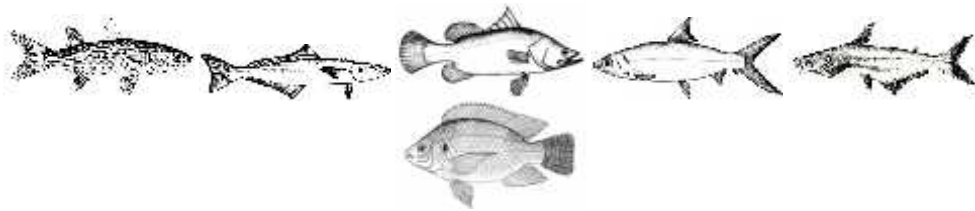


Mr. B. Rambabu (left) receiving the memento from Dr. P. Nammalwar, Former Principal Scientist of CMFRI & FTF's Member





Dr. V. Sampath (right), who chaired the Technical Session-II, receiving the memento from Mr. V. Ramamoorthy, Former Deputy Director of Fisheries, Govt. of Tamil Nadu & FTF's Member



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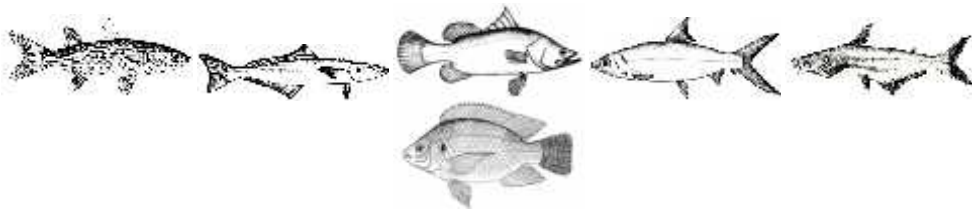
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SUMMARY OF PARTICIPATION

1. ICAR-CIBA, Chennai	: 44
2. CAA, Chennai	: 02
3. NFDB, Hyderabad	: 01
4. ICAR-Mandapam Regional Centre of CMFRI	: 01
5. RGCA, Andhra Pradesh	: 01
6. ICAR-Madras Research Centre of CMFRI	: 11
7. NIOT, Chennai	: 01
8. MPEDA, Chennai	: 02
9. Dept. of Fisheries, Govt. of Tamil Nadu	: 05
10. Aquaculture Industry	: 05
11. Fish Marketing Sector	: 03
12. College Professors/Students	: 08
13. FTF, Chennai	: 26
14. FTF. Madurai	: 02
15. All India Radio, Press & Television reporters	: 17
Total	: 130



TELEVISION COVERAGE OF THE EVENTS OF THE WORKSHOP



Dr. K.K. Vijayan, Director, CIBA



Dr. A.R.T. Arasu, Chairman, FTF



Dr. P. Ravichandran, Member-Secretary, CAA



Dr. M. Kumaran, Principal Scientist, CIBA Milk fish fry being handed over to a fish farmer



A section of participants



