सत्यमेव जयते

मत्स्य भारत
Matsya Bharat

NFDB

Newsletter of the National Fisheries Development Board

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Sustainable livelihood promotion through Fish Drying activity by the SHGs of Batuamukh Community Resource Centres in Dhemaji district, upper Assam

In this Issue

Chief Editor & Publisher:

Shri K.N. Kumar, IAS
Chief Executive
National Fisheries Development Board
Hyderabad – 500 052.

Editorial Board:

Dr. P. Paul Pandian, Executive Director (Tech)
Dr. B. Mary Regina, Sr. Executive (Tech)
Dr. Manne Persis, Sr. Executive (Tech)

Associate Editor:

Dr. K. Ravindranath, Sr. Consultant (Tech)

Days to Remember

Feb 02	World Wetlands Day
March 22	World Water Day
March 23	World Meteorology Day
April 05	National Maritime Day
April 16	World Entrepreneurship Day
April 22	International Mother Earth Day
May 22	International Day for Biological Diversity
May 23	World Turtle Day
May 24	World Fish Migration Day
June 05	World Environment Day
June 08	World Oceans Day
July First Saturday	International Day of Cooperatives
July 10	**National Fish Farmers' Day**
	NFDB Formation Day
July 11	World Population Day
Sept 16	International Day for Preservation of Ozone Layer
Sept 18	World Water Monitoring Day
Sept 26	World Hunting & Fishing Day
Oct First Monday	World Habitat Day
Oct 16	World Food Day
Nov 21	**World Fisheries Day**
Dec 03	World Conservation Day
Dec 14	World Energy Day

Seasonal Fishing Ban/ Closed Season

East Coast of India	15 April to 14 June
West Coast of India	01 June to 31 July

From the Chief Executive

K.N. Kumar, IAS
Chief Executive, NFDB

Time to invest on the Human Resources of Fisheries Sector

The human resource base of the Fisheries sector needs serious upgrading. By upgrading I do not mean any horizontal expansion of the higher level teaching institutions, nor will I argue that total number of fishery graduates in the country be increased in any manner. Both may not be necessary. We did a small exercise at the NFDB to determine the several layers of manpower that inhabit the fishery space in the country and the analysis leads us to some interesting conclusions. Quite clearly, each of these layers has its own distinct needs and current competencies and therefore, will need sophisticated treatment.

(1) The first is the pool of fresh graduates that enters the sector through the 21 Fishery Colleges of the country that produce about 700 graduates every year. There is also a Fisheries Polytechnic that offers a 2 year diploma programme with an intake of 40 students per year. It should be our desire that all these educated youth remain in the sector and contribute to its growth after all the public investment on their education. We may also want that they move toward fishery entrepreneurship and generate wealth and employment. But this aspiration seems to be away from reality. As we learn, most (50%) of these graduates pursue higher education and the rest, seek employment. In other words, only about 350 young graduates should be available for employment in the country. Even that number is not real. One unverified report indicates that only about 60% of the available fisheries graduates seek employment within the sector and the rest move out of it for other kinds of generic jobs viz., Banking, Teaching, Civil Services, etc. Now, that leaves us with only about 200 fresh fisheries graduates for fishery related work within the country. *Is that a very large number to provide jobs for?* Not really. But there is a problem. The recruitment processes in the government are such that most of these graduates wait for years before they are appointed, leading to huge loss of human capacity. Timely availability of manpower is critical for any government's functioning and the youth too waste prime years of their lives waiting for jobs that they need most. The net impact is on the fish farmers who lose out on the valuable services of the government. We need to either loosen the long winding recruitment processes or create alternative models of engaging such youth till they get recruited, maybe we need to do both. On its part, NFDB therefore, is coming up with a scheme to address the requirement of such youth, to be known as 'NFDB Fellows Scheme' which has already received an in-principle approval of the Executive Council. We hope to notify the scheme once the formal approvals are obtained, of the E.C. soon.

(2) Then, it is interesting to note that the 2-year diploma holders, only forty of them in a year, get reasonable employment and therefore stick to the sector. If we look at the public investment that goes into producing a 4-year graduate *vis a vis* a 2-year diploma holder, we will realize that the latter is better value for the money, from the point of view of employment. Fisheries, for the most part, is a hands-on science, so skills are learnt mostly on-job and not in the class room, so early induction is an advantage. There is a clear gain of 2 years and an earlier recruitment into the labour force. And, the wage aspirations of the diploma holders being lower than graduates, the chances of private employment are brighter. Even the governments can induct them at the bottom of the fisheries workforce, with reasonable assurance for the brighter among them to grow within the sector. Last heard, the Government

of Andhra Pradesh is engaging the diploma holders on a contract basis, at a pay of Rs.7500/- per month, which is a good strategy. These diploma holders can interact with the farmers in a much more congenial manner, so there is a social advantage. So, what do we need to focus on from a policy perspective? *I think we need to help the State Governments to establish Fisheries Polytechnics to cater to the manpower requirements of the sector much faster, and much cheaper.* Another positive spin off of this approach would be that a good number of fisheries graduates could be enrolled as trainers in the Fisheries Polytechnics. These polytechnics should be structured in a manner that the most modern fisheries technologies and their grounding will necessarily become a part of the curriculum.

(3) Next, is the issue of near absence of entrepreneurship drive among the fisheries graduates. Not even a fraction of the graduates pursues entrepreneurship in the sector. It is partly because of the absence of an overall ecosystem of entrepreneurship in the country barring states like Gujarat and Maharashtra, and in part due to the limited entrepreneurship orientation in the curricula of the fisheries colleges. Not many are forthcoming to avail of the scheme that the NFDB had notified a few years ago, to support the Fishery Science Graduates to establish enterprises. There are also several systemic bottlenecks relating to the access to low cost credit, under-developed business acumen, non-availability of land in the name of the entrepreneurs, etc. Undeniably, problems galore that act as a deterrent. But the climate is changing all across. Without intending to elaborate any further, *I would like to make one suggestion for the colleges to make changes in their curricula so an entrepreneurship orientation is built from the college itself.* As for the youth, I think they should work for a few years, gain experience and get to start their enterprises. They should not remain stuck to wage employment forever. The NFDB should on its part, minimize the risks such entrepreneurs have to necessarily undertake. The financial models should facilitate that. I have personally witnessed the success of a Fisheries Graduate who had set up a Tilapia unit at Madurai and is now generating wealth, apart from bridging the demand-supply gap. His case is covered in this issue of ***Matsya Bharat***. He is an emerging role model. *Such successful entrepreneurs should be invited to the Colleges for orientating the students toward entrepreneurship.*

(4) The last and the most important segment of the fishery manpower is the youth of the fishing villages. They are the backbone of almost all of the marine fisheries activities and they ought to be our highest priority. It is widely known that the catch from the capture fisheries have more or less plateaued while the numbers of dependant families on capture fisheries have more or less remained the same. It leads to distress and off-season migration, which is unwarranted. At the last count, there are at least 3500 such fishing villages in the country and migrations are reported from several of them. While free and speedy movement of labour across the sectors is the touchstone for any performing economy, migration of under skilled people is always traumatic and unnecessary. Unfortunately, the youth of the fishing villages cannot move away from the fishery sector as they are largely unskilled in other sectors and their movement out of the sector is constrained because of that. While a good percentage of such youth can be utilized for several of the supporting activities for fisheries, as in net-mending, low-cost net manufacture, divers, boat-repairers, etc., it is also necessary that they are weaned out of the fishery sector, so they can become Masons, Plumbers, Electricians, etc., so they integrate themselves with the larger economy. For that the NFDB will need to take responsibility for creating a Skill Development Scheme exclusively for the youth of the traditional fishermen families. Work is being initiated by us at the NFDB in this regard.

The first issue of the ***Matsya Bharat*** has received good feedback, from the design as well as content point of view. We will continue to improve the coverage and the content in the next issues. Do share your feedback with us at ***matsyabharat@gmail.com***

Cover Story

Sustainable Livelihoods Promotion through Fish Drying activity by SHGs at Community Resource Centres in Assam

Fisheries play a major role in the socio-economic development of Assam. With its vast aquatic resources covering about 3.9 lakh hectares, the Fisheries Sector is one of the most promising sectors for alleviating poverty and providing livelihoods in Assam. Fish production in the state has registered an average annual growth of 6.4% during the 11th Plan. The estimated requirement of fish is over 3 lakh tonnes (calculated on the basis of minimum nutritional requirement of 11 kg per capita), while production is about 2.43 lakh tonnes (*Directorate of Fisheries, Govt. of Assam 2013*). A sizable quantity of fish is also preserved by following different traditional methods, by the people of Assam. However, these methods are unhygienic and therefore products have limited shelf-life. As per the official report published by the Department of Fisheries, Assam, 95% of population in the region consumes fish and more than 80% of them relish dry fish, and 100% of the people engaged in dry fish preparation and marketing are tribal and ethnic people of Assam. The products however, fetch lower price due to low shelf life.

The importance and demand for dry fish in the diet of the population of the region led to the emergence of Asia's largest Dry Fish Market at Jagiroad in Morigaon district, Assam. The bilateral agreements between Southeast Asian countries and Govt. of India to revive the great '*Stillwell Road*' (from Ledo in Assam to Kunming in China) may very well turn Assam into future hub or an international market for dry fish and other cured fish products.

However, locally produced dry fish are not much in demand due to rancid odour, brown discolouration, insect infestation and limited shelf-life. To fetch better price, to penetrate urban markets and to create a sustainable market, the traditional preservation methods need to be refined scientifically. Moreover, during fishing season and during floods a large quantity of fish of different species are caught, which generally don't find a ready market. These low-value fish can be better utilized by converting into dry fish and other value added products.

Different varieties of fish that are often sold as dry fish

Considering the existence of a viable market for dry fish and other diversified fish products in the region and scope of exporting such products to South-East Asian countries, the Department Fish Processing Technology, College of Fisheries, Assam Agricultural University, Raha, Nagaon district, Assam, submitted a project proposal to the National Fisheries Development Board (NFDB), Hyderabad, for financial assistance. The Dept. of Fish Processing Technology has been working on documenting '*Indigenous and Traditional Knowledge*' (ITK) in dry fish making in Assam. During survey, it was observed that a herb was used as fish preservative by the local ethnic community called "*Lalung*". Other herbs that were being used by them have tremendous consumer acceptance due to their medicinal properties.

The project funded by NFDB was implemented in three districts located in three different agro-climatic regions of Assam State, namely, *Dhemaji district* in Upper/ Eastern Brahmaputra Valley, *Morigaon district* and *Nagaon district* of Central Brahmaputra Valley, with the following objectives:

(i) To evaluate different herbs as dry fish preservatives and masking agents.

(ii) To disseminate the method of improvised drying using herbs to the target community for livelihood promotion.

(iii) Community mobilization through formation of Self Help Groups and establishment of Community Resource Centres for development of Entrepreneurship skill.

(iv) To evaluate product quality.

The experimental trials were conducted at Fisheries College, Raha. Batch-wise Training & Demonstration to beneficiaries and 'Trainers Training' to Fisheries Extension personnel from various Govt. and Non-Govt. organisation were conducted at the College as well as project sites.

Module-I. Fish Curing and Drying Experiments:

(i) Standardization of Protocol to Mask Flavour of Dry Fish:

Fish
↓
Washing
↓
Brining/ Salting
↓
Preparation of herbal extract
↓
Preparation of different concentrations for different soaking times
↓
Dip treatment
↓
Drying (Solar tent drier)
↓
Panel test
↓
Quality evaluation
↓
Profiling

A control was maintained without any herbal or flavour treatment to compare and evaluate the end product.

(ii) Herbal Treated Dry Fish: First of its kind in dry fish preparation was taken up considering the medicinal properties of the selected herbs as masking agents and to add a desirable flavour. Different herbs such as Mint leaf *Mentha spicata*, Tulsi *Ocimum sanctum* were used. The treated fish were then dried in a solar tent drier and packed. After the treatment, bio-chemical analysis, amino acid and fatty acid profiling of products from all three centres was done and evaluated.

Herbs used in curing Dry Fish: Mint and Tulsi

(iii) Masala Flavoured Dry Fish: For the preparation of Masala Flavoured products bigger size fish were selected. They are beheaded, descaled, gutted, washed thoroughly with potable water and sliced into thin pieces. Powder of spices having medicinal properties such as Black Pepper, Garlic, Coriander, Turmeric, Red Chilies and some common salt were added uniformly so that a coating of seasoning remains around the sliced pieces. The pieces were then dried in a solar tent drier and packed.

Spices used as ingredients in making Masala Flavoured Dry Fish

Module-II. Training & Demonstration (Technology Dissemination):

(i) Capacity Building Centre: A capacity Building Centre with all modern facilities for fish drying was established at the College of Fisheries, AAU, Raha for human resource development with the objective of training on using modern scientific equipment during and after the project period.

(ii) Community Resource Centre (CRC): For sustainable, scientific, hygienic dry fish production and better market linkage, establishment of *Model Fish Drying Village* with well equipped *Community Resource Centre* (CRC) was envisioned and three CRCs were established in the above named three districts. They were equipped with a few basic instruments *viz.,* Vacuum Sealing Machine, Hand Sealer, Solar Tent Drier (large scale), Desk Top Computer, etc.

Socio-economic aspects of the stakeholders and their involvement in the dry fish activities were ascertained. After thorough discussion six villages with predominant ST/SC population were selected, namely, (i) *No. 1 & No. 2 Batuamukh* villages in Dhemaji district, (ii) *Kaliajari & Hugultoli* villages in Morigaon district and (iii) *Hariamukh & Bamunia* villages in Nagaon district. A total of 20 households in each village were covered initially. To promote entrepreneurship, two villages were clustered to form a *Community Resource Centre* (CRC) in a district. Thus, a total of 40 households were covered in each of the three districts. In all, 120 households came under the fold of 3 CRCs.

Members of No. 1 & 2 Batuamukh SHG under CRC in Dhemaji district, Assam

Members of Hugultoli & Kaliajari SHG under CRC in Morigaon district, Assam

Members of Hariamukh SHG under CRC in Nagaon district, Assam

Members of Bamunia SHG under CRC in Nagaon district, Assam

For smooth running of the CRCs post-project period, a committee was formed among the Self Help Groups (SHGs). The CRC Committee would generate income by collecting user charges from villagers or fishers for using the instruments/ equipment. Bank accounts in the name of central committee were opened in the nearest Nationalized

Bank. The College of Fisheries, AAU, Raha, monitored from time to time the functioning of the CRCs and the capacity building activities of SHG members.

(iii) Community Participation:

In the first phase, Training & demonstration was conducted at three project sites *viz.*, *Batuamukh* of Dhemaji, *Hugultoli* of Morigaon and *Hariamukh* of Nagaon. Dry fish was prepared using herbal extracts namely pepper, tulsi and mint leaves, etc. Ready-to-fry dry fish were also prepared and demonstrated to the trainees. They were also trained in preparing hygienic dry fish using newly designed solar polythene tent dryers. Demonstration was also made on methods of fish handling, salting, drying and packaging.

Dissemination of low cost technology on fish preservation and value addition among fishers, unemployed youth, women SHGs and women entrepreneurs at different CRCs in Assam

During the 2nd phase, hands-on training was conducted and all necessary equipment including solar tent dryer were installed and handed over to the beneficiaries at their respective project sites.

Cured fish being dried by SHG members in a Solar Tent Drier at Batuamukh village in Dhemaji district, Assam

Dry fish prepared using different curry leaves and spices (left) and hygienically prepared and packaged dry fish (right) by members of SHGs ready for marketing in Assam

Products prepared by the SHG Members were exhibited and sold at 'Assam International Trade and Industrial Fair – 2015', Jorhat, and '2nd International Agri-Horticultural Fair – 2015' held at Guwahati. The products prepared hygienically and packaged attractively received good response from the urban consumers who expressed their deep sense of satisfaction.

Dry fish prepared by SHGs displayed in NFDB Stall at 'Assam International Trade and Industrial Fair – 2015' at Jorhat, Assam

Besides undertaking a market survey, communication was sent to different places of the State for promoting sale of the dry fish products prepared by the SHGs. CRC Committees were linked up with Jagiroad Dry Fish Market, Assam (Asia's largest) to sell their products.

(iv) Economics:

Expenditure, income and profit given below are arrived at taking the case of Morigaon Community Resource Centre (CRC) and are based on prevailing market price of raw materials and processed fish. Cost of equipment, tools, utensils, etc., given to each CRC, which is about Rs. 1,55,000/-, would be apportioned and included in the detailed economics which would be worked out after the trial runs.

The benefit cost ratio (BCR) = 1.63. Profit share of each member of the CRC (1,33,900/ 40) = Rs. 3,347/- per cycle (about one week). The shelf-life of the dry fish products is 12 months.

Sl. No.	Parameter	Quantity (Kg)	Amount (Rs.)
A	Raw fish given to beneficiaries of CRC	1,890	1,40,000
B	Cost of ingredients for value addition	-	72,600
C	**Total Expenditure**	-	2,12,600
D	Raw fish required for production of one kg dry fish	3	-
E	Total quantity of dry fish produced / cycle (1week) (1,890/ 3)	630	-
F	Wholesale price per kg of value added dry fish	-	550
G	**Total Income** (630 kg x Rs. 550)	-	3,46,500
H	**Net Profit of the CRC (G – C)**	-	**1,33,900**

[Source: *Prof. P. J. Sharma, P.I., CoF, AAU, Raha, Assam and Shri Chandan Chetri, Senior Executive (Tech), NFDB, Hyderabad*]

1. North and Northeast Corner

1.1 NFDB to assist further development of Fisheries in Bihar

NFDB had initiated the development of fisheries in the State of Bihar. As a part of this initiative, a survey was undertaken to ascertain the scope and potential for fisheries development in four districts of North Bihar, namely, Madhubani, Muzaffarpur, Darbhanga and Samastipur, besides East Champaran. The four districts are bounded by the Burhi Gandak River and have scope for wetland and riverine fisheries development. Accordingly, Dr. R.Ch. Barman, Officer-in-charge and Senior Executive (Tech), NFDB Regional Centre, Guwahati, along with Shri Kumar Bimal Prasad, District Fishery Officer cum Deputy Director of Fisheries, Darbhanga district, Shri Binay Kumar, District Fishery Officer cum Chief Executive Officer, East Champaran, Dr. Tun Tun Singh, Lecturer, Fisheries Training and Extension Centre, Mithapur, surveyed selected wetlands and natural water bodies in these districts from 17th to 20th September 2015.

During the survey the following wetlands, locally known as *Mauns/ Chours* were visited: (i) *Motipur Maun* (110 ha) in North Bihar, (ii) *Maoti Maun* (80 ha), (iii) *Kararia Maun* (120 ha), (iv) *Rulhi Maun* (80 ha), (v) *Motali Majharia Maun* (65 ha), (vi) *Dalihara Chour* (400 ha), (vii) *Kaushar-Sisaila Chour* (58 ha) and (viii) *Sonmar Chour* (44 ha) and found to have good potential for fisheries development.

Weed infested and derelict Motipur Maun of Muzaffarpur district, Bihar

Kararia Maun – a managed wetland of Motihari, East Champaran district, Bihar

Maoti Maun – a managed wetland of Motihari, East Champaran district, Bihar. O-i-C, NFDB, Guwahati, District Fishery Officer and President, FCS (seen left to right)

Also, a visit was made to 'Kosi Matsya Hatchery' in Madhubani district of Bihar. Shri Ashok Kumar Singh, the owner of the hatchery, is one of the most successful fish breeders in the State. He was selected for the 'Best Fish Farmer in Bihar' award in 2010, by CIFRI (ICAR), Barrackpur, West Bengal. There are a cluster of eight hatcheries in this area, and owing to fish seed activities the socio-economic condition of the entire area changed dramatically. The same model could be replicated in other potential areas in the State which will create additional livelihoods to the poor farmer in a big way.

Kosi Matsya Hatchery' established by Shri Ashok Kumar Singh in Madhubani district, Bihar

Based on the survey, following suggestions are made for overall fisheries development and enhancement of productivity in the above said water bodies of Bihar:

- Direct stocking of advanced fingerlings (80 - 100 mm) @ 2000/ ha/ year.
- Construction of seed Rearing Ponds as well as undertaking Cage-culture and Pen-culture for table fish production in the *Mauns/ Chours*, wherever feasible.
- Development of Wetland/ Aqua Tourism may be taken around the *Mauns* located in the central part of district headquarters.
- Assistance to be provided towards construction of (i) New Fish Ponds, including one-time (1st year) Input Costs, (ii) Fish Seed Hatchery (7 – 8 million fry capacity), (iii) Fish Feed Mill (3 – 5 quintals/ day), (iv) Fish Retail Outlets, (v) Mobile Fish Retail Units (four-wheeler), (vi) Mini Fish Landing Centres, etc., will usher in desirable changes for a holistic fisheries development in the State.

- Establishing a Farmers Training Centre at *Sonmar Chour*, where fish ponds and related infrastructures are already in place, will serve as an excellent training and demonstration centre.
- Need based training and exposure visit to be conducted for the benefit of fishers, farmers and youth.

NFDB has sanctioned an amount of Rs. 46.80 lakh to the Director of Fisheries, Bihar (as 40% subsidy amount of the total estimated project cost of Rs.117.00 lakh) during 2014 -15. Under this scheme, it is proposed to develop around 700 ha of wetland area in the State, by installing 100 Pens for aquaculture in 11 wetlands (*Mauns*).

1.2 NFDB participates in 19th National Exhibition, Kolkata, WB

The Central Calcutta Science & Culture Organization for Youth organized its 19th National Exhibition on the theme 'Make in India – Our Commitment to the Nation' from 9th - 13th September 2015 from 2 pm to 8 pm at the Netaji Maidan, Baranagar, Kolkata, West Bengal. NFDB sponsored and participated in the event. Swami Atmapriyanandaji Maharaj, the Vice-Chancellor of Ramakrishna Mission Vivekananda University, Belur Math, Kolkata inaugurated the National Exhibition on 9th September 2015.

Many Departments/ Organizations from different Ministries of Govt. of India such as Ministry of Science & Technology and Earth Science, Ministry of Mines, Ministry of Defense, State Govt. Departments/ Organizations, State Bank of India, United Bank, and some Self Help Groups have also participated in the exhibition.

NFDB Stall at the 19th National Exhibition, Netaji Maidan, Baranagar, Kolkata, West Bengal

The NFDB Stall showcased different activities and schemes, booklet on NFDB Schemes along with the Application Form *"Matsya Samridhi"* were distributed to the large number of people who visited the Stall and queries about NFDB and its activities were answered. On the third day, Professor Saugata Roy, Honorable Member of Parliament, Lok Sabha visited the Stall and appreciated different initiatives of NFDB. Dr. Samir Banerjee, Prof. Hiralal Chaudhuri (Retd.) Aquaculture Research Unit, Dept. of Zoology, Calcutta University visited NFDB Stall and shared his experience and enquired about different NFDB schemes suitable for common fish farmers of the State. People from all walks of life – general public, students, teachers, research scholars, entrepreneurs, farmers, etc., visited NFDB Stall.

School children going round the NFDB Stall at the 19th National Exhibition, Netaji Maidan, Baranagar, Kolkata, West Bengal

Shri A. Shamim Ahmed, Consultant, NFDB Regional Centre, Guwahati, participated in the event and also delivered a talk on NFDB Interventions during the National Seminar on 'Make in India – Our Commitment to the Nation'. On the last day His Excellency Shri Tathagata Roy, Hon'ble Governor of Tripura was the Chief Guest for the valedictory and prize distribution ceremony.

1.3 NFDB assisted comprehensive development project for fishers of *Sone Beel*, Karimganj district, Assam becomes operational

NFDB provided assistance to Assam Fisheries Development Corporation (AFDC) Ltd., for the development of Pen Culture in 38 *Beels* in the State of Assam. One among them is *Sone Beel*, situated in the

Karimganj district of Assam; it is one of the largest Beels in Assam. *Sone Beel* is famous for its fishery and it is one of the main sources of fish for all the districts in southern Assam. Maximum water spread area is more than 3,000 ha during rainy season and effective water spread area is 808 ha. The 'Sone Beel Fishermen Cooperative Society' (SFCS) is one of the oldest societies in Assam having more than 5,000 share holders, 20,000 families and more than one lakh SC fishers; their livelihoods completely depend on fisheries activities in this *Beel*. Considering this, the NFDB sanctioned an amount of Rs. 86.60 lakh toward: (i) Community based fish culture in 75 pens (Rs.63.07 lakh), (ii) 110 two-wheel mobile fish retail units (Rs. 14.683 lakh), (iii) Two four-wheel mobile fish retail units (Rs. 6.997), and (iv) Ttraining to 300 fishers (Rs. 2.15 lakh) to AFDC Ltd during 2014-15 for a comprehensive development of *Sone Beel* fisheries through involvement of SC fishers.

On successful implementation of the scheme by AFDC Ltd., a function was arranged on 10th September 2015 to launch the Four-wheel Mobile Fish Retail Units and for Releasing Fish Fingerlings in Pens. The function was graced by Dr. Devashishs Kar, Dean, Faculty of Life Science, Assam Central University, Silchar, Shri Anup Brahma, ACS, Circle Officer, Division of Wetland Fisheries and Aquaculture, Circle Inspector of Police, local social workers, Officer and staff of the AFDC Ltd and members of the SFCS. Dr. R.Ch. Barman, Officer-in-Charge and Senior Executive (Tech), NFDB Regional Centre, Guwahati, participated.

After the inaugural function the four-wheelers were handed over to the Secretary and President of the SFCS Ltd. by Dr. Devashishs Kar in presence of all the dignitaries.

Dr. R.Ch. Barman of NFDB Regional Centre, Guwahati, briefing the dignitaries and fishers of SFCS Ltd., about mobile fish retail units at Karimganj, Assam

Shri M. Barman, Junior Engineer, AFDC Ltd., in his address, informed that installation of all the 75 pens pertaining to the 75 fisher-groups, other related works and release of fish fry in rearing pens, as per the norms under the direction of AFDC, was completed. Subsequently, a few pens were visited, sample harvesting of the rearing pens (0.20 ha each) after a rearing period of 45 days was done, and the advanced fingerlings were released into the grow-out pens (1.00 ha each) for production of table fish. This type of pen-culture practice is gaining much popularity in neighbouring *Beels* too.

Function arranged by AFDC Ltd., Assam on the occasion of launch of Mobile Fish Retail Units and release of fingerlings in Sone Beel at Karimganj, Assam

Fish fingerlings being transferred from rearing pens to grow-out pens in Sone Beel in Karimganj, Assam


View of a grow-out pens (left) and fish sample from a grow-out pen (right) in Sone Beel in Karimganj, Assam

1.4 Fish seed rearing and harvesting in cages demonstrated successfully in a *Beel* in Marigaon district, Assam

A research based pilot project for enhancement of production in *Beels* through cage culture and creation of alternative livelihoods to fishers during seasonal fishing ban/ closed season was implemented by the College of Fisheries (AAU), Raha, Nagaon district, Assam, with financial assistance from NFDB, in *Kasadhara Beel* of Marigaon district of Assam. Total area of the *Beel* is 103.56 ha; it is an open *Beel* with good access from Marigaon town.

Cages installed to rear fish fry in Kasadhara Beel in Marigaon district, Assam

Under the supervision of College of Fisheries, Raha, a total of thirty cages of 4 m x 2 m x 1.5 m size (12 cu m volume) were installed. Fry of IMC and local species like *Labeo bata* and *Labeo gonius* were released in the cages @ 4000 per cage and reared for 45 days. The growth of fish fry in the cages was found to be encouraging; they attained a size of 10-12 cm with an average survival of more than 80%. The fingerlings were ceremonially harvested and released into the parent *Kasadhara Beel* on 3rd October 2015. Dr. R.Ch. Barman, Officer-in-Charge and Senior Executive (Tech) and Dr. B. Lahon, Senior Consultant, NFDB Regional Centre, Guwahti, attended the fish seed harvesting programme.

Fish fingerlings harvested from cages in Kasadhara Beel in Marigaon district, Assam

Associate Dean, College of Fisheries, Director of Research, Assam Agricultural University, Khanapara, also participated in the cage harvesting programme. The visiting team also attended the valedictory function of the three-day training program on '*Beel* fisheries management including sustainable management of cage aquaculture for the benefit of *Beel* users' organized by the College of Fisheries. The Officer-in-Charge of the NFDB regional Centre also gave an on-site demonstration to the students of Dept. of Fisheries of the Community College, Raha on cage aquaculture on the occasion of cage harvesting on that day. Participating students thanked the NFDB for the initiatives.

Meeting organized by Fisheries College, Raha, on the occasion of harvesting fish fingerlings from cages at Kasadhara, Marigaon district, Assam

1.5 NFDB to develop wetland fisheries in Meghalaya

The State of Meghalaya has more than 213 hectares of flood-plain wetlands with potential for enhancing fish production to a desirable level and to create additional livelihoods to the fishermen depending on them. At the instance of NFDB, a team comprising of Dr. R. Ch. Barman, Officer-in-charge & Senior Executive (Tech), and Shri A. Shamim Ahmed, Consultant (Fisheries) of the NFDB Regional Centre, Guwahati, Shri S. R. Marak, Assistant Director of Fisheries, and Shri Moalong K. Marak, Fishery Officer, Tura Head Quarter, Department of Fisheries, Govt. of Meghlaya, visited Tura on 22nd October 2015, to ascertain the scope and potential for fisheries development in selected wetlands in Garo Hills district of Meghalaya State.

A heavily weed infested wetland in Tura Sub-division of Maghalaya

The team visited Boro *Beel*, Katuli *Beel* and Kumligaon (or Toljawa) *Beel* under Tura Sub- Division of Meghalaya. Katuli *Beel* is a tectonic depression bowl-shaped *Beel* while Kumligaon *Beel* and Boro *Beel* are almost like a typical ox-bow shaped *Beels* formed due to change in river course. These three *Beels* are under the administrative control of District Autonomous Council of Garo Hills district. The Kumligaon *Beel* area is leased to Toljawa Fishery Cooperative Society, while the other two are leased to individuals. It must be mentioned that all the three *Beels* are unexplored scientifically; they are heavily weed infested and are located near the Assam-Meghalaya border.

Visit to a wetland in Kumligaon village, South West Garo Hills district, Meghalaya

Except for strengthening bund and installing sluice gate at Kumligaon *Beel,* under Rashtriya Sam Vikas Yojana (RSVY) no developmental works were undertaken. Based on the topography and suitability, various need-based activities such as pond construction for fish seed rearing and table fish production, development water retaining structures, fingerling stocking as well as pen culture, cage culture, mobile fish retail marketing and community mobilization, training cum exposure visit may be taken up. NFDB intervention in these untapped water resources will definitely pave the way toward a Blue Revolution in the State. After the survey, discussions were held with the Director of Fisheries, Meghalaya and it was decided to submit need based project proposals for the development of wetlands in Meghalaya State with NFDB assistance.

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2. Farmers' Note Book

2.1 Lesser Known Freshwater Fish with Good Economic Potential

India possesses several medium and minor indigenous fish species that have high regional demand and often considered as delicacies by the gourmets. Under the head 'Lesser Known Freshwater Fish with Good Economic Potential', 20 species of freshwater fishes were enlisted in the previous issue of 'Matsya Bharat' (July-August 2015, page 12). First in the list was Striped Murrel *Channa striata* (Bloch, 1793). Second in that list is the Spiny Eel, and the species that commonly occurs in India is scientifically known as *Mastacembelus armatus*. In this issue some general information about this much sought after fish is being presented.

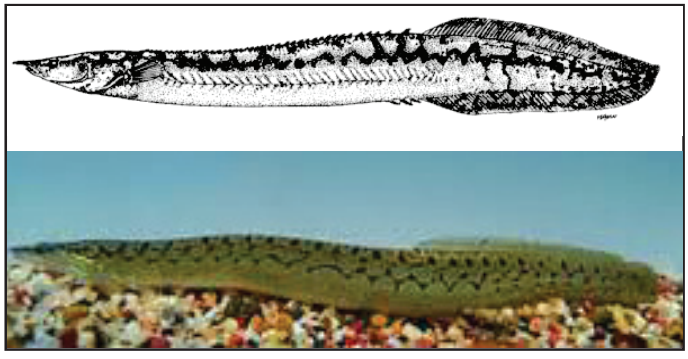
Spiny Eel *Mastacembelus armatus* (Lacepède, 1800)

Common Name

Spiny Eel or Zig-Zag eel.

Vernacular Names

Assamese: Baam-rah
Bengali: Baam, Biem
Bihar: Bami
English: Spiny Eel
Nepali: Chusi-bam
Oriya: Bummi, Gonti
Punjabi: Samp Machli
Tamil: Kul-aral, Shah-ta-rah
Telugu: Mudi Bommidayi



Spiny Eel Mastacembelus armatus (Lacepede, 1800)

Description

Fish are eel-like in shape and locomotion; Dorsal, Caudal and Anal Fins confluent; Dorsal spines 33-40 along more than half of the back; Dorsal soft rays 67-82; Anal spines 3; Anal soft rays 67-83; Pectoral fins present; Ventral fins absent; Vertebrae 87-98. Snout tactile; Buccal-cavity enlarged for air breathing; Body colour dull brown with 1-3 darker, longitudinal zig-zag lines, more or less connected to form a reticulated pattern, and restricted to the dorsal two thirds of the body.

Habit & Habitat

Freshwaters in plains and hills; adults live in highland streams to lowland wetlands. Also occur in still waters, both in coastal marshes and dry zone tanks, and may enter flooded forests as well as brackish-water zones of estuaries. Usually found in streams and rivers with sand, pebble, or boulder substrate. They are demersal (bottom-living) and seldom leave the bottom except when disturbed. Sometimes stay partially buried in fine substrate/ mud. Reported to occur in areas with rocky bottoms in the Mekong River mainstream (Thailand, Laos, Cambodia) during the dry season, but enter canals, lakes and other floodplain areas during the flood season. Feed at night on benthic insect larvae, worms and some submerged plant material.

Size & Weight

Maximum length recorded 90 cm (a male); maximum weight recorded 500 g

Breeding & Life Cycle

Fecundity not reported; but the 'Lesser Spiny Eel' [*Macrognathus aculeatus* (Bloch, 1786)], which grows to a maximum length of 38 cm, is said to produce a minimum of 1,000 eggs. Eggs are laid in open waters, scattered on the substratum and fertilization is external; parents are non-guarders. The species is reported to breed during April, May and June in Thailand.

Migration

Spiny Eels are Potamodromous, i.e., they migrate within freshwater systems (river, streams, canals, lakes).

Distribution

Asia: Pakistan, India, Nepal, Sri Lanka, Bangladesh (fresh and brackish waters), Myanmar, Thailand, China, Laos, Cambodia, Viet Nam and Indonesia.

In India: All Southern, Northern and Northeastern States; Uttaranchal, Uttar Pradesh (Dehra Dun, Tehri, Pauri, Uttarkashi, Chamoli, Nainital, Almora, Pithoragarh) Jharkand, West Bengal, Arunachal Pradesh (Lohit district). Found commonly at quite high altitudes in River Tawi (Jammu) and its tributaries as well as in the Hoogly and Bhagirathi River systems in West Bengal.

Fisheries & Aquacultue

Spiny Eels are commercially important and are common during the summer months. However, there is no large-scale commercial fishery. The fish that come to markets are often taken from basket-trap laid in series across streams and irrigation canals. Spiny Eels are considered to be a very tasty food-fish. In all coastal States, including West Bengal, they are popular food-fish especially when freshly caught. They are sold live for aquarium trade. They are often used as bait in game fishing owing their agility even when on the hook. Culture of Spiny Eels, if successful, would be a profitable proposition.

[Source: *The Wealth of India, CSIR, 1962; www.fishbase.org*]

2.2 Success of rearing fish seed in Cages in *Haors* brings hope to fishers of Cachar district of Barak Valley, Assam

Assam has unique fishery resources in the form of seasonally flooded open water bodies locally called *Haors*. These are the vast area of wetlands and low-lying paddy fields which get inundated during the monsoon months and serve as a major source for capture fishery. The water in the *Haors* lasts for about 6 months and in some locations water depth may be 10-15 feet.

Khelma Part-III village, under Kalian Development Block in Cachar district of Assam, has some 3,000 fisher families (SCs) whose livelihoods depend mainly on capture fisheries (during monsoon) and to some extent on agriculture/ aquaculture (after monsoon). Frequent floods in the area hinder fish farming and paddy cultivation. Besides, fish catch has been declining from *Haors* due to various social and anthropogenic factors. Further, non availability of quality fish seed of desired species, size and at right time is a bottleneck in fish culture in these areas.

With financial assistance from the National Fisheries Development Board (NFDB), Hyderabad, the Krishi Vigyan Kendra (KVK) of Assam Agricultural University (AAU), Cachar, took up demonstration of rearing fish seed in low-cost cages in open water bodies of Cachar district, Assam. NFDB sanctioned Rs. 5.6067 lakh towards installation of 100 cages. The main objective of the demonstration was to impart knowledge and develop skill of cage culture technology and to enhance livelihood opportunities of the poor SC fishers of the region through fish seed rearing in flood affected open water bodies.

The size of each cage is 4.0 m x 2.5 m x 2.0 m having an effective rearing area of 15 cubic metres. The floating cages were constructed with locally available materials such as PVC drum (220 L), HDPE net, bamboo, rope, nails, *etc*. Ten cages constitute one battery. Ten batteries comprising 100 cages were installed in 2014 by KVK, Cachar. One battery (a set of 10 cages) was allotted to three fishers and thus, the 10 batteries (100 cages) were allotted to a total of 30 fishers.

Livelihood enhancement of fisher families through fish seed rearing in Cages, Cachar district, Assam

Seed of different fish (Catla, Rohu, Mrigal, Silver carp, Grass carp and Java Puthi) of 2.0 - 3.0 cm length were stocked in the cages at a density of 250 fry per cubic meter during 1st week of September, 2015. A balanced diet was served at 5% of body weight. After rearing for 60 days, fingerlings attained 6 - 12 cm length and average survival was 73% (2,737 fingerlings).

The capital cost of one battery of 10 cages was about Rs. 44,000/-; cost of fish seed, feed, and rearing one batch of seed was Rs. 16,800/-; gross income was Rs. 68,437/- (27,375 fingerlings sold at Rs. 2.50 each), and net income was Rs. 35,781/-. The life of net & frame will be 2 years and that of PVC drum 5 years. Three rearing cycles can be completed in one season. Thus, fishers can raise three batches of fish fingerlings in a season and will be able to earn up to Rs.1,07,343/- (35,781 x 3) in 6 months from a battery of 10 cage. This was very encouraging and innovative for the fishers and fish farmers of the entire village and the technology has now spread to other regions in the district. Dr. Bipul Kumar Kakati, Subject Matter Specialist (Fisheries), KVK Cachar is providing necessary technical support to the fishers and fish farmers of the region for undertaking such low cost cage culture.

Demonstration of Cage Culture by KVK at Khelma Part-III Gumra village, Cachar district, Assam

Shri Jyotish Chandra Das, an educated unemployed graduate of Khelma Part-III village has been culturing Carp in his 1.3 ha pond for the last four years. High transportation cost, high mortality of fish seed and floods caused heavy losses to him. He at once took interest in the low-cost cage rearing and also encouraged other local people to adopt the new technique. Shri Das became the mentor and group leader of the poor SC fishers and he demonstrated the result of cage rearing by doing it himself. After achieving very good results in a trial last year, Shri Das installed 3 batteries of 30 cages this year and was able to produce 54,000 Carp fingerlings in one batch and earn a net income of Rs. 79,200/-. A second batch of Carp fry were stocked in August 2015. Further, he is now able to supply fingerlings to the local fish farmers. The fishers of the area who had no other means of livelihood except fishing have now a good option for income generation through fish seed rearing in low-cost cages which is easy and affordable to them.

Shri J. C. Das showing fish fingerlings grown in cages to the officials

[Source: *Dr. R.Ch. Barman, Officer-in-charge and Senior Executive (Tech), NFDB Regional Centre, Guwahati*]

2.3 Successful demonstrations of low cost coastal aquaculture technologies in Goa

Goa has extensive coastal water resources of 330 ha suitable for coastal aquaculture. But only a few people in Goa are engaged in coastal aquaculture even though technology is available. There is high demand for finfish and shellfish in Goa. Green Mussel *Perna viridis* a bivalve locally known as "Xinanneo" is relished by the Goan people. A single piece of Green Mussel of 40-60 mm length having an average weight of 30-40 g costs Rs. 10-15 in the retail markets of Goa. Effective transfers of technology and management practices were the need of the hour. To fulfill this, the ICAR-Central Coastal Agricultural Research Institute (CCARI), with financial assistance of Rs. 6.417 lakh provided by NFDB during February 2014, set up a

demonstration unit and conducted training to local fishers and youth, on Rack Culture of *P. viridis* as well as integrating it with capture based finfish culture in semi-enclosed water bodies at Velha Goa and Pernem in Goa, during November 2014 – October 2015.

(i) Rack Culture of Green Mussel *Perna viridis* in Goa:

Sixty muslin bags each filled with 1 kg mussel seed (average length 28 mm and weight 2 g) were suspended on the rack structure. Regular monitoring and advisories were provided and biweekly analysis of the physicochemical and biological parameters of water, sediment and mussel were carried out. The Green Mussels were harvested after six months. The beneficiary farmer was able to get a production of 5,760 mussels having a total weight of 186.125 kg from the initially stocked 60 kg mussel spat (60 bags each with 1 kg spat). Each mussel having an average weight of 33g was sold at a minimum price of Rs.5/piece. Total production cost was around Rs. 14,370. Gross return and net profit were Rs. 28,800 and Rs. 16,510, respectively.

Racks being erected in coastal back-waters of Goa for culture of Green Mussel

Cultured Green Mussel (Perna viridis) harvest

(ii) Capture-based-culture of finfish integrated with *P. viridis* in semi-enclosed water bodies of Goa:

The capture-based-culture of finfish, with which culture of mussels is integrated, is a continuous stocking and harvesting system. Finfish like Red Snapper (*Lutjanus argentimaculatus*) and Pearlspot (*Etroplus suratensis*) were cultured, integrated with Green Mussel (*Perna viridis*), for a period of eight months. Fry/ fingerlings of the two finfish species were obtained as a by-catch during the normal fishing operations and stocked separately in nylon hapas/ cages (2 m x 1.5 m x 2 m) positioned using bamboo poles. Green Mussel seed collected from nearby sluice gates, were stocked in fifteen pres-stitched cotton mosquito-net bags (1kg/bag) centred with a nylon rope for suspending. The bags were hung from the bamboo poles used for fixing the hapas/cages. Red Snapper was fed with chopped discards (unutilised fish catch) and Pearlspot utilised the periphyton (food organisms) that developed on the split bamboo pieces kept inside the hapa/cages. The total cost of culture system (3 hapas/cages) and operational expenses was Rs. 0.14 lakh and gross returns from the system were Rs. 0.66 lakh. The net profit was Rs. 0.52 lakh. These successful demonstrations have laid a new path and infused confidence among fishers/ fish farmers for undertaking aquaculture in coastal back-waters of Goa.

Nylon hapas/cages installed in coastal back-waters of Goa for capture-based-culture of finfish

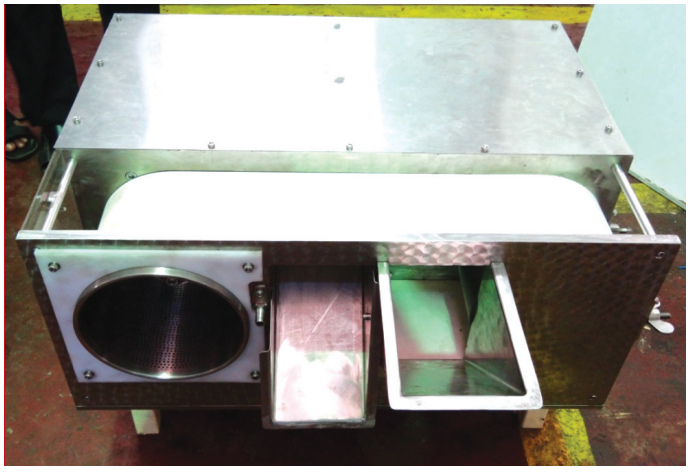
Sample of Red Snapper (Lutjanus argentimaculatus) and Pearlspot (Etroplus suratensis) harvested from capture-based-culture system in Goa

[Source: *Ms. N. Manju Lekshmi, Central Coastal Agricultural Research Institute (ICAR), Goa*]

3. New/ Innovative Technologies in Fisheries

3.1 NFDB assists development of small-scale fish processing equipment

Of late, owing to fast pace of life, individual consumers and food industries such as restaurants, hotels, and eateries are preferring deboned fish flesh for preparing products like fish-cutlets, fish-burgers, fish-fingers, fish meat balls, fish rolls, fish sausages, etc. With a view to promote fish consumption in the country, NFDB provided financial assistance, under Technology Up-gradation Project (TUP), to Central Food Technological Research Institute (CFTRI), CSIR, Mysore, Karnataka, for the development of small-scale fish processing equipment and development of value added fish products. CFTRI developed prototypes of fish meat-bone separator, fish filleter, fish scaler, fish fryer, etc., which can be locally fabricated. A brief description and pictures of the prototype of 'Fish Bone Separator' are given in this issue.



Prototype of 'Fish Bone Separator' developed by CFTRI, Mysore, with NFDB funding

The equipment is aesthetically designed. All the contact points/ surfaces are made of food grade stainless steel. A standard 1.0 HP (735 W) electric geared motor drives the equipment. A flexible conveyor belt, having a linear velocity of 19-22 m per min, can accommodate different geometrically shaped fishes. Motor speed, conveyer belt tension and compression can be varied. The fish meat and bone separation capacity is 50 kg per hour and efficiency is 75 – 80%.

Output of 'Fish Bone Separator' – fish meat (at left) and fish bones & skin (at right)

CFTRI is in the process of fine-tuning the technology, improving the design, reducing the cost and tying up with a fabricator for commercial production of the equipment.

[Source: *CSIR-Central Food Technological Research Institute, Mysore, Karnataka. E-mail: ttbd@cftri.res.in*]

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4. NFDB Initiatives

4.1 NFDB to provide Improved/ Quality Breeder Fish Seed to States and UTs

On 6th October 2015, the National Fisheries Development Board had communicated to the Commissioners/ Directors of Fisheries of all States and Union Territories informing availability of fingerlings of Improved/ Quality Breeder Fish Seed of the following species for transfer through the National Freshwater Fish Brood Bank (NFFBB) at Bhubaneswar, Odisha, to their State Level Fish Brood Banks:

Sl. No.	Species	Breeder Seed Available
1	*Macrobrachium rosenbergii*	1,500
2	*Clarius batrachus*	1,500
3	*Puntius gonionotus*	1,500
4	*Puntius sarana*	1,500
5	*Labeo fimbriatus*	1,500
6	*Labeo gonius*	1,500
7	*Labeo calabasu*	2,000

5. Important Events

5.1 Executive Council (EC) Meeting held at NFDB, Hyderabad

The 27th Executive Council (EC) Meeting of the NFDB was held at the NFDB, Hyderabad on 3rd September 2015. The EC Meeting was chaired by Shri Ashok Kumar Angurana, IAS, Secretary, Ministry of Agriculture & Farmers Welfare (MoA&FW), Govt. of India, New Delhi.

Members of the EC are: (1) Ms. Leena Nair, I.A.S., Chairman, Marine Products Export Development Authority, Kochi, (2) Dr. P. Ravichandran, Member Secretary, Coastal Aquaculture Authority, Chennai, (3) Shri Aditya Kumar Joshi, I.F.S., Joint Secretary (Fisheries), Dept. of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, Govt. of India, New Delhi, (4) Dr. Jai Prakash Mishra, Advisor (Agriculture), Planning Commission, Govt. of India, New Delhi, (5) Shri K. N. Kumar, I.A.S, Chief Executive & Member-Secretary, National Fisheries Development Board, Hyderabad (6) Dr. K. K. Vijayan Director, CIBA, Chennai, representing The Deputy Director General (Fisheries) Indian Council of Agriculture Research, New Delhi, (7) Dr. K. Palanisamy, Deputy General Manager, NABARD, representing The Managing Director, NABARD, Mumbai, and (8) Shri U.K. Purohit, Director, (Fisheries), representing Shri Arun Tiwari, I.A.S., Principal Secretary, Dept. of Fishermen Welfare and Fisheries Development, Govt. of Madhya Pradesh, Bhopal.

The 27th Executive Council Meeting held at NFDB, Hyderabad, presided by Shri Ashok Kumar Angurana, Secretary, MoA&FW (above) and Members: Ms. Leena Nair, Dr. P. Ravichandran, Shri Aditya Kumar Joshi, Joint Secretary (Fisheries), MoA&FW (below)

Some of the proposals the EC considered include: 'Engaging NFDB Fellows' on contract to work at project sites in different States; promoting Ornamental Fish Clubs in Schools; establishing Ornamental Fish Backyard Hatcheries; Training/ Skill-development of Fish Farmers; etc.

5.2 Third Guest Lecture 'Solid & Liquid Waste Management (SLRM)' held at NFDB

Under the series 'Guest Lectures' being organized monthly at NFDB, besides topics pertaining to fisheries and

aquaculture, the need to create awareness and sensitize the stakeholders on aspects that have an impact on environment and the ecosystems was also felt. A case in question is management of Fish Waste/ Offal.

Accordingly, on Friday 11th September 2015, a special presentation-cum-demonstration on ''Integrated & Sustainable Solid & Liquid Resource Management (SLRM) with special reference to Fish Markets" by Shri C. Srinivasan (popularly known as Vellore Srinivasan), Project Director & Consultant, Indian Green Services (IGS), Vellore, Tamil Nadu, was arranged.

The Chief Executive in his opening remarks spoke about the importance of waste recycling, generating wealth from waste, and the need for incorporating fish waste management infrastructure in the design of Modern Fish Markets. As a back drop for the presentation on SLRM, a short slide show on "Fish Offal at Retail Fish Markets" was presented by Dr. K. Ravindranath, Sr. Consultatnt (Tech), NFDB.

Shri K. N. Kumar, CE, NFDB with Shri C. Srinivasan (above left), presentation on SLRM (above right) and participants (below) at NFDB, Hyderabad.

Shri C. Srinivasan made a detailed and lengthy presentation for over three hours covering a wide variety of topics: (i) types of garbage; (ii) types of recycling – composting, zero waste management, garbage to gold; (iii) Fish market and slaughterhouse waste management in Vellore city; (iv) Composting of fish market waste, generation of maggots and their utilization by chicken during the day and by frogs at night; (v) Eco-friendly compost pit where the worms are consumed by fish in the water tank below; (vi) Feeding fresh fish waste to ducks and production of duck eggs and ducklings; (vii) Integrated High-tech Markets, coming up in Gujarat and Tamil Nadu, where all types of solid and liquid wastes are automatically transferred to multi-level underground bio-digesters that generate biogas; (viii) Practical demonstration involving all the participants on how garbage that is generated at home can be segregated and recycled gainfully; and (ix) Scope and Economics of generating enormous wealth from garbage in cities like Karaikud, Coimbatore, and Bangalore. According to Shri Srinivasan, the garbage generated in Bangalore city could yield revenue of Rs. 27 crore per annum.

Demonstration to participants by Shri C. Srinivasan on domestic solid waste generation, segregation and its recycling

Besides the officers and technical Staff of NFDB, invitees who participated include:

Shri R. Lyttan, Executive Engineer, Shri A. Lyngdoh, Asst. Engineer and Shri L. Kharkongor, Jr. Engineer from Directorate of Fisheries, Meghalaya, Shri K. Gopal, Dept. of Fisheries, Andaman & Nicobar, Shri A.K. Mahishwar

and Shri P.K. Bharti, Dept. of Fisheries, Chhattisgarh, Shri Kannan, TNFDC, Tamil Nadu, Dr. Sarala and Shri Sudarshan Murthy, TSFCOF, Hyderabad, Prof. Sivaram and Shri Ramesh, NIRD-RTP, Rajendranagar, Hyderabad, progressive farmer Shri Bh. R. Viswanadha Raju of M/s Anjali Aquaponics, Gundedu village, Mahboobnagar district (TS) and his associates Shri Ramu Rudraraju, Shri Siva Kondapalli, Dr. T. Krantiraj.

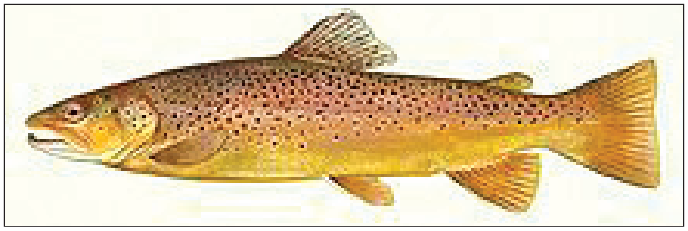
A video of the Guest Lecture is posted on NFDB Website: *http://nfdb.gov.in*

5.3 NFDB Sponsored National Consultation on Rainbow Trout Farming held at DCFR, Bhimtal, Uttarakhand

A two-day National Consultation on "Rainbow Trout Farming: Prospects and Challenges for Strategic Development" was held during 20th – 21st September 2015 at the Directorate of Coldwater Fisheries Research (ICAR), Bhimtal, Nainital district, Uttarakhand, in collaboration with National Fisheries Development Board, Hyderabad and Department of Biotechnology, New Delhi. The meet was chaired by Shri Aditya Kumar Joshi, Joint Secretary, Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers Welfare. Trout growers, scientists from different institutes and State Agricultural Universities from trout producing States such as Himachal Pradesh, Sikkim, Arunachal Pradesh and Uttarakhand participated in the programme.

Shri Aditya Kumar Joshi, Joint Secretary, DAHD&F, Dr. A.K. Singh, Director, DCFR and other dignitaries at the National Consultation on Rainbow Trout at Bhimtal, Uttarakhand

The National Consultation was aimed at addressing the problems and challenges of invigorating the Rainbow Trout (*Oncorhynchus mykiss*) farming in the country. In his keynote address, Dr. A.K. Singh, Director, ICAR-DCFR highlighted the importance of rainbow trout as a coldwater cultivable species, its global and national status. He emphasized upon need for bridging the technology gaps and strengthening of efforts initiated by ICAR-DCFR with the support of state fisheries departments and stakeholders. He also reiterated that rainbow trout, being a commercial cultivable species needs adequate attention in the areas of farm management practices, culture system, inputs and trout marketing by development organization and policymakers.



Rainbow Trout Oncorhynchus mykiss (Walbaum, 1792)

During the National Consultation, interactions between different stakeholders were held to highlight the prospects and challenges in trout farming. Issues related to research, planning and policies were discussed and a national strategy was formulated for expansion of trout farming in India. Low cost trout feed, disease surveillance, GIS based planning and establishing of seed and brood bank were main issues to be addressed in order to achieving the target production. After thorough discussion with all stakeholders, a road map was prepared to enhance the productivity and production of rainbow trout in Himalyan States based on the projections for next five years. [Source: *Directorate of Coldwater Fisheries Research, Uttarakhand*]

5.4 Review Meeting on 'Technology Up-gradation Projects' held at NFDB, Hyderabad

A two-day Meeting of the Principal Investigators (PIs)/ Co-Principal Investigators (Co-PIs) of Technology Up-gradation Projects (TUPs), sanctioned over the last nine years by NFDB to various Fisheries Research and Training Institutes of ICAR, Fisheries Colleges and Universities in different States of the country, was held at NFDB, Hyderabad on 29th – 30th September 2015.

Shri K. N. Kumar, Chief Executive, NFDB, Chaired the meeting while Dr. A.G. Ponniah, Emeritus Scientist, CMFRI, Chennai, Dr. B. Ganesh Kumar, Principal Scientist, NAARM, Rajendranagar, Hyderabad and Dr. P. Chandra Shekara, Director, Agricultural Extension, National Institute of Agricultural Extension Management

(MANAGE), Rajendranagar, Hyderabad were the Technical Experts invited to review the implementation, progress, performance and outcome of the Technology Up-gradation Projects.

Shri K.N. Kumar, CE, NFDB, flanked by Experts Dr. A.G. Ponniah, Dr. B. Ganesh Kumar and Dr. P. Chandra Shekara at Review Meeting on TUPs held at NFDB, Hyderabad

The PIs/ Co-PIs of the TUPs were asked to make presentations on their projects and to also submit documentation related to the deliverables and Utilization Certificates, with physical and financial progress report. Detailed presentations were made on the following NFDB funded TUPs:

1. Development of brood stock bank for Scampi.
2. Development of brood stock bank for Common Carp (Amur).
3. Development of community participated enhanced fisheries management model for the *Chaur* (flood plains) and *Maun* (Ox-bow lakes).
4. Project on Fisheries enhancement in Maharashtra through seed production and pen culture in rivers Vaitarna and Bhatsa for livelihoods and nutritional security among the tribal community.
5. Establishment of hatchery and seed production facilities of *P. hypophthalmus* in Andhra Pradesh, Penamaluru, Vijayawada.
6. TUP on stock improvement and quality seed production of important freshwater carps, catfish and prawn: Pre-requisite for NFFBB.
7. Risk and benefit analysis of an illegally introduced fish species Pacu – *Piaractus barchypomus* in India.
8. Community based reservoir fisheries management in Dimbhe reservoir, Maharashtra.
9. Development and assistance for development of cage culture technology in reservoir for raising table fish.
10. Zero water exchange shrimp culture with Bioremediation and Integral disease management.
11. Up-scaling of production technology and large scale field demonstration of indigenously developed immunostimulant CIBASTIM for Penaeid shrimp.
12. Standardization of aerator usage in shrimp farming through improving the efficiency and operational pattern of the aeration system in use, automation and use of alternate energy.
13. Technology refinement of nutrient dense nursery rearing and grow out of *L. vannamei* in periphyton and bio-floc based systems.
14. Up-gradation of breeding and culture technology of Indian white shrimp *F. indicus* through stock evaluation and culture demonstration.
15. Technology demonstration on mariculture for improving the livelihood status of youth & women in Goa through demonstration of 4 units of mussel culture and training to 60 fishers.
16. Development of value added fish meat based products and designing of small-scale fish processing equipments required.
17. Research project on studies and refinement of live-fish carrier system for mass transportation of table fish, brooders, fingerlings and aquarium fishes.

PIs of the following two TUPs could not attend:

18. Fish genetic conservation of Mahseer fish through live gene banking.
19. Construction of demonstration cum seed production unit of Rainbow Trout at Kyongsala in East Sikkim.

One of the Presentations during Review Meeting on TUPs held at NFDB, Hyderabad, PIs, Co-PIs and a section of the participants

Some of the major decisions taken during the meeting after deliberating on the TUPs are:

(i) Steps to be taken to involve private organization in PPP mode for development of Scampi brood stock banks. A document on polyculture of Carps and Scampi to be published by CIFA, Bhubaneswar, for dissemination of technology.

(ii) Amur Carp to be popularized in North Eastern States by encouraging hatcheries there to produce its seed. Accordingly, Workshop to be conducted in NE States/ Meghalaya.

(iii) CIFE, Mumbai to enter into an MOU with concerned NGOs for fisheries enhancement through seed production and pen culture in rivers for livelihoods and nutritional security of Tribal Communities in Maharashtra.

(iv) CIFA to include *Pangasianodon hypophthalmus* as candidate species for development of brood stock at National Freshwater Fish Brood Bank (NFFBB) of NFDB at Bhubaneswar.

(v) CIFA to compile package of all practices (breeding, seed rearing and grow-out culture) for 20 species of major carps, minor carps, cold water fishes, which NFDB would send to all States and UTs for translation into local languages and disseminate to fish farmers.

(vi) NBFGR, Lucknow to assess availability and demand of the fish Pacu (Roopchand) *Piaractus brachypomus* in UP, determine whether the fish would mature and breed in ponds and wild, and whether it is suitable for polyculture with Indian Major Carps.

(vii) CIFRI, Barrackpore (WB) to workout cost-benefit ratio of cage culture of different species of fishes and unit economics of different models of cages, and prepare a book on guidelines for cage culture along with a documentary film, to facilitate formulation of a Scheme by NFDB.

(viii) Third-party evaluation to be taken up for validation of technology on 'zero water exchange shrimp culture with bioremediation and integral disease management' developed by Cochin University of Science & Technology.

(ix) Success stories of field demonstration of indigenously developed immunostimulant 'CIBASTIM' for Penaeid Shrimp by CIBA, Chennai, to be documented for dissemination to farmers, technology of its production to be commercialized under an MOU with NFDB, and further field trials to be undertaken through ICAR-/ SAU- KVKs wherever Fisheries Extension Specialists exist.

(x) CIBA and CIFA to come up with a comprehensive proposal for creating awareness about judicious usage of aerators to save energy and cost of production in brackishwater and freshwater culture systems.

(xi) Promoting rearing of *Litopenaeus vannamei* seed in biofloc nursery to overcome incidence of Early Mortality Syndrome (EMS).

(xii) CIBA to plan strategically and with strong evaluation methods for selecting stocks of Indian white shrimp *Fenneropenaeus indicus* from coastal waters of different maritime States.

(xiii) CMFRI Centre at Goa to undertake training of 60 fisher youth (men & women) in mussel culture at the four demonstrations units developed with NFDB assistance for improving their livelihoods.

(xiv) CFTRI, Mysore to demonstrate the prototype of 'small-scale fish processing equipment' to a group of Directors of State Fisheries Depts., at NFDB, and to commercialize the same.

(xv) CIPHET, Ludhiana, to generate data on pay-back period for different sizes and type of containers for live-fish transportation, to conform the battery operated vehicle to approved designs of three-wheeled transport vehicles, and to abandon use of thermocol containers as they are polluting the environment.

Group Photo of the participants of Two-day Review Meeting on TUPs held at NFDB, Hyderabad, on 29th - 30th September 2015

5.5 Entrepreneur of a Vertically Integrated Fisheries Project interacts with NFDB Officers

Shri Raju Samtani of M/s Indepesca, Mumbai visited NFDB, Hyderabad on 7th October 2015 and interacted with the Chief Executive and the Officers of NFDB. Shri Raju made a presentation about the operations of his enterprise in different States in India and in Ghana and Nigeria in Africa. M/s Indepesca is a part of the Triton Group of Companies with business interests in the field of Seafood Distribution, Trade, Processing and Produce (Aqua Farming & Poultry). Shri Raju Samtani pioneered commercial production of Tilapia & Pangasius in cages in Maharashtra and Madhya Pradesh for which he was presented with Best Farmer Award by CIFRI in 2015.

The Chief Executive and Officers interacting with Shri Raju Samtani of M/s Indepesca at NFDB, Hyderabad

5.6 One-day National Workshop on Murrel Culture held at NFDB, Hyderabad

Aquaculture production in India is based on a relatively limited number of species – some 20 species of fish and shellfish. However, the country has several cultivable species that have high regional demand. Several lesser known freshwater fish with good economic potential have been identified and NFDB proposes to popularize their farming.

The Striped Murrel *Channa striata* is a much sought after fish that commands premium price in markets across the country. There is every need to promote and popularize Murrel Culture among the fish farmers.

A national level "One-day Workshop on Breeding, Farming and Management Practices of Striped Murrel (*Channa striata*)" was held at NFDB, Hyderabad, on 9th October 2015, from 9:30 AM to 6:00 PM, with the objective of taking stock of the technologies available and package of practices being adopted, to formulate a transferable technology and to suggest 'Best Management Practices'.

Shri K. N. Kumar, CE, NFDB, offering opening remarks at the Workshop on Murrel Channa striata

Scientists from Fisheries Research Institutes of the ICAR, researchers and academicians from Universities, technocrats, entrepreneurs, Murrel fish farmers, fisheries functionaries from Dept. of Fisheries, etc. participated and deliberated at length. Eleven presentations on various aspects of Murrels, *viz.*, captive breeding, seed production, larval rearing, nutrition and feed formulation, grow-out, diseases, integration with aquaponics systems, preparation of value added products, etc., were made. Every presentation was followed by discussion and queries of Murrel farmers were answered by the experts.

A presentation on Murrel in progress (above) and participants at the Workshop (below)

At the end of the Workshop the following action points were generated: (1) Use of Murrel pituitary gland extract instead of synthetic hormones for induced breeding; (2) Establishing Murrel Hatcheries at (i) KVK Jammikunta, Karimnagar district, Telangana, (ii) at a suitable place and district in Andhra Pradesh, and (iii) Vidyasagar University, Medinipur district, West Bengal; (3) Development of Murrel culture in water logged/ wetland areas in Telangana; (4) Establishing satellite trash fish (forage fish) production centres involving self-help group members; (5) Recording success stories and printing farmer-friendly 'Training Manual on Murrel Farming'; and (6) Organizing training programmes for farmers on Murrel breeding and farming at (i) CIFA (ICAR), Bhubaneswar, Odisha, (ii) Fisheries Research Station (SVVU), Palair, Khammam district, Telangana, (iii) Fisheries Research Station (SVVU), Undi, West Godavari district, Andhra Pradesh, for which NFDB would provide financial assistance.

Group Photo of participants who attended the One-day National Workshop on Murrel at NFDB, Hyderabad on 9th October 2015

5.7 Govt. of Bihar Officers Interact with Officials of NFDB at Hyderabad

Shri Narmadeshwar Lal, IAS, Secretary, AHD&F and Shri Nishat Ahmed, Director of Fisheries, Govt. of Bihar, visited NFDB on 16th October 2015 and interacted with officials of NFDB. After a brief presentation on NFDB Schemes by Shri Gopi Reddy, Senior Executive (Tech), the Secretary, Govt. of Bihar was keen to learn about the NFDB Schemes that could be implemented in Bihar. The Director of Fisheries, Bihar, gave an over view of the status of fish production as well as the potential in the State of Bihar. He emphasized that Bihar has the potential to increase annual fish production by 1.0 lakh tons. He further stated that the assistance provided by NFDB in earlier years has increased fish production in Reservoirs and Wetlands, and requested NFDB for consideration of proposal submitted for stocking fish fingerlings in small and medium reservoirs for subsequent years too. The Director of Fisheries also requested NFDB to consider proposals submitted for Pen Culture in Wetlands of Bihar.

Shri Narmadeshwar Lal, Secretary AHD&F and Shri Nishat Ahmed, Director of Fisheries, Govt. of Bihar interacting with officers of NFDB at Hyderabad

5.8 Second Meeting of the Joint Working Group (JWG) on Fisheries, between India and Bangladesh, held at Goa

The Second Meeting of the Joint Working Group (JWG) between India and Bangladesh on Co-operation in the field of Fisheries was held in Goa, India on 28th - 29th October 2015. The Indian Delegation was led by Shri Aditya Kumar Joshi, Joint Secretary (Fisheries), Department of Animal Husbandry, Dairying and Fisheries (DAHD&F), Ministry of Agriculture and Farmers Welfare, Govt. of India. The Bangladesh Delegation was led by Mr. Md. Anisur Rahman, Additional Secretary, Ministry of Fisheries & Livestock, Govt. of the People's Republic of Bangladesh.

Participants of Joint Working Group Meeting on Fisheries, between India and Bangladesh, held at Goa

Detailed discussions were held on (i) Coordinated management approach to conserve Hilsa (*Tenualosa ilisha*) and other common fishery resources; (ii) Collaboration in the field of aquaculture, especially exchange of germplasm of identified fish species Jayanti Rohu (*Labeo rohita*), Sea bass (*Lates calcarifer*) Tiger shrimp (*Paeneus monodon*), Halda River Catla (*Catla catla*) and GIFT Tilapia (*Oreochromis niloticus*); (iii) Joint stock assessment of marine fisheries resources including trans-boundary species in a holistic manner; (iv) Exchange of aquaculture and fisheries information and publications, Trans-boundary issues; (v) Exchange visits and capacity building/ skill development programmes; (vi) Expeditious repatriation of astray fishermen; (vii) sponsoring of Fellowship for undergoing higher studies in India on fisheries aspects in the Fisheries Institutions including Central Institute of Fisheries Education (CIFE), Mumbai, and sharing pearl culture technology for both inland and marine species.

6. NFDB Field Notes

6.1 Chief Executive inspects NFDB funded Tilapia Project launched by a Fishery Science Graduate in Madurai district, Tamil Nadu

Under the scheme 'Promotion of Fishery Science Graduates as Entrepreneurs' NFDB sanctioned subsidy assistance of Rs. 37.45 lakh to Shri S. Vaitheeswaran and Shri S. Alagu Ravi (M/s Svara Biotechnovations) for establishing (i) 'Intensive Pond Culture of Tilapia' at Therku Pethampatti village, Madurai North Taluk, Madurai district and (ii) 'Tilapia Hatchery' at Natham Village, Natham Taluk, Dindugal district, Tamil Nadu. First instalment of Rs. 18.725 lakh was released to them through the Department of Fisheries, Govt of Tamil Nadu, in July 2014. Shri K. N. Kumar, Chief Executive, accompanied by Dr. Paul Pandian, Executive Director (Tech), NFDB, and officers of the Dept. of Fisheries, Govt. of Tamil Nadu, undertook a physical inspection of the project on 16th September 2015. Shri Vaitheeswaran briefed the objectives of the project and activities undertaken and the current status of the work completion and commencement of the project.

Infrastructure facilities for brood stock development, genetic work, breeding and hatching (tank based), fry rearing (tank based), lined nursery ponds, lined grow-out ponds, etc. were developed at the project site. Monosex Nile Tilapia, *Oreochromis niloticus* (Chitralada strain) and Red Tilapia are from Aresen Bio-Tech & Farms India Private Ltd, Vijayawada and from the RGCA, Vijayawada. The project is under implementation as per the original proposal in a perfect scientific manner with latest state-of-the art and advanced technologies.

Shri Vaitheeswaran briefing the Chief Executive and Executive Director, NFDB, at his Tilapia Farm in Therukupethampatti village, Madurai district, Tamil Nadu

The officers from the Department of Fisheries, Govt of Tamil Nadu issued necessary permission for undertaking the farming activities and accordingly the entrepreneur stocked Monosex Nile Tilapia and Red Tilapia in the lined grow-out ponds. Farming is being carried out in an intensive, feed based and scientific manner with all bio-security measures as per guidelines issued by the DAHD&F, Govt. of India. Seed production activity at their Tilapia Hatchery facility is yet to commence. Discussion was held with the entrepreneur and officers of the Dept of Fisheries for further course of action and marketing activities.

6.2 Chief Executive and Officers inspect NFDB Site in North coastal district of Srikakulam, Andhra Pradesh

Govt. of Andhra Pradesh allotted about 100 acres of coastal land to NFDB at Moolapolam village in Sompet Mandal of Srikakulam district, for establishing a Shrimp Hatchery for production of Specific Pathogen Free (SPF) Seed of the Pacific White Shrimp *Litopenaeus vannamei*. The Chief Executive accompanied by Executive Director (Tech), Senior Executive (Infra), Senior Executive (Tech) and Executive (Tech) of the NFDB inspected the site on 21st and 22nd September 2015. They were assisted and accompanied by a host of officers from the district Revenue Dept. and Fisheries Dept., Divisional Revenue Office, Divisional Forest Office, Engineers from CPWD, Visakhapatnam, village head and some farmers.

Chief Executive and officers of NFDB interacting with CPWD engineers, Revenue officials and Shrimp Farmers at NFDB Site in Moolapolam village, Srikakulam district, Andhra Pradesh

After going round the site, pegs were fixed along the boundaries with the help of surveyors and village revenue assistants. The approach road laid by NFDB was also inspected.

On 23rd September 2015, in the afternoon, the Chief Executive and Officers of NFDB, met the District Collector and Magistrate, Srikakulam district in his chamber and discussed the pending issues pertaining to the NFDB site. District Officials from the Depts. of Revenue, Forest, Fisheries and Engineers from CPWD also participated in the discussions.

6.3 NFDB officers inspect sites and fish farms proposed to be developed in Assam and Meghalaya

A team of officers comprising of Shri Chandan Chetri, Dr. Manne Persis, Senior Executives (Tech) and Smt. Madhuri Allu, Executive (Tech) from NFDB, Hyderabad, undertook inspection of some sites and farms in the States of Assam and Meghalaya for development purpose.

In Assam they were accompanied by Smt. Suranjana Senapati, ACS, Executive Megistrate, Shri Kiran Das, Supervisor, Kanonga, Shri Paban Das (Land Recorder/ Laat Mandal) from Revenue Department, Government of Assam, and the Deputy Director of Fisheries, DoF, Govt. of Assam; and Dr. Ramendra Ch. Barman, Officer-in-Charge, NFDB-RC, Guwahati. On 14th October 2015, they inspected the site in Kachari Allibari village, Kamrup district, for its suitability to establish the NFDB Regional Centre for North Eastern Region, at Guwahati. The site, having an extent of

32 bighas (about 10 acres) belongs to the Dept. of Fisheries, Govt. of Assam,

NFDB, Revenue and Fisheries officers inspecting the site and land records at the site in Kachari Allibari village, Kamrup district, Assam, for locating NFDB Regional Centre for North Eastern Region

Later, NFDB officers visited Meghalaya State. Accompanied by Shri Lucas Kharkongor, JE, DoF and Shri Precious Suting, FO (Ribhoi), Department of Fishery, Govt. of Meghalaya, they inspected a site at Umsning village, Ribhoi district, measuring 3.47 ha (about 8.57 acres) for suitability to establish the NFDB Regional Centre for North Eastern Region.

Site at Umsning, Ribhoi district, Meghalaya, offered for locating NFDB Regional Centre for North Eastern Region

On 15th October 2015 they visited a site having an extent of 1.2 acres at Saiden-Mawdaron village, Ribhoi district, for ascertaining its suitability for establishing a Wholesale-cum-Retail Fish Market. Land belongs to the village committee and they are ready to hand it over to the Dept. of Fisheries free of cost for constructing a market. The site is close to National Highway No. 40 connecting Guwahati, Nongpoh and Shillong; the market is expected to receive 4 tons of fresh fish per day, and there is a perennial source of stream water.

The team later visited Meghalaya State Fisheries Research and Training Institute and Fish Farm at Mawpun, and interacted with the Principal and 40 farmers attending the NFDB funded training programme. Farmers expressed satisfaction and were happy to receive training on modern methods of aquaculture practices. The Principal demonstrated the growth of GIFT Tilapia achieved in one of the farm ponds and informed that it fetches around Rs. 250 per kg in the local market. He stated that the farm has stocks of Amur Carp, IMC and Exotic Carps and has been producing seed of Common Carps and *Labeo gonius* and planning to breed IMC and Exotic carps next year in the circular hatchery established in the farm.

Fisheries Research & Training Institute, Mawpun, Meghalaya

The team also visited Meghalaya State Fish Brood Bank at Umktieh, Ribhoi district, Meghalaya. The officials informed that the Brood Bank will be exclusively utilized for raising quality brooders for production of quality seed, and that they have stocks of Amur carp and Jayanti Rohu.

State Fish Brood Bank at Umktieh, Ri-Bhoi district, Meghalaya

On 16th October 2015 the team visited a fish farm in Shillong, proposed to be developed as a Mahseer Farm. The care taker of the farm informed that Mahseer is being reared in two cemented tanks and they plan to breed it utilizing the race way facility available in the farm.

Mahseer farm with Raceways in Shillong, Meghalaya

NFDB provided assistance of Rs. 25.00 lakh to the Director of Fisheries, Government of Meghalaya during 2013-14 for organizing fish festivals in 11 districts of Meghalaya. On 16th October 2015 'Aqua Fest – 2015' was held at Central Library Complex, Shillong, Meghalaya. The festival was inaugurated by the Hon'ble Chief Minister of Meghalaya, Dr. Mukul Sangma, in the presence of Hon'ble Minister for Urban Development, Hon'ble Parliamentary Secretary, Addl. Chief Secretary, Director of Fisheries and fish farmers from Meghalaya. The DoF, welcomed the delegates, participants and spoke about the objective of the festival. The Chief Minister in his speech stressed the need for development of fisheries sector for livelihood, employment and empowerment of women. He lauded the efforts of the fisheries department for organizing such a programme and providing a common platform for the fisheries professionals, technocrats and farmers to come together and showcase, promote and share the experiences. He mentioned the great role played by Meghalaya State Aquaculture Mission (MSAM) in fulfilling the objective and achieving the target of narrowing the demand and supply gap, and expressed that soon Meghalaya would become self-reliant in fish production and stop importing fish from other states. He informed that the Govt. of Meghalaya would be lending loan to small-scale fish farmers at 7% annual interest through Apex Bank. The Hon'ble Chief Minister thanked NFDB for sponsoring the 'Aqua Fest – 2015'.

NFDB Officers and Director of Fisheries Mrs I.R. Sangma (left), interacting with Hon'ble Chief Minister of Meghalaya, Dr. Mukul Sangma (middle), at the 'Aqua Fest – 2015', in Shillong

Fisherwomen displaying and selling fresh fish in a Stall at the 'Aqua Fest – 2015', Shillong, Meghalaya. Note the large, red Bighead Carp Hypophthalmichthys (=Aristichthys) nobilis (Richardson, 1845)

On 17th October 2015, the team visited Guwahati University to review the works of Integrated Ornamental Fish Unit established at the University Campus with NFDB assistance of Rs 13.50 lakh during 2014-15. Installation of glass aquariums and cement tanks with shower facility have been completed. Six varieties of endemic ornamental fish were stocked for breeding purpose.

Integrated Ornamental Fish Breeding Unit funded by NFDB, at Guwahati University, Guwahati, Assam

Dr. Dandadhar Sarma, Zoology Dept., explained the objectives and informed that they have successfully bred Rainbow Snakehead *Channa bleheri*. Further, they have taken up culture of Indian River Shad *Gudusia chapra* exclusively in a pond, and planning to take up captive breeding and larval rearing of Reba Carp *Cirrhinus reba,* Mola Carplet *Amblypharyngodon mola* and Olive Barb *Puntius sarana*.

7. Fishers & Farmers News

7.1 NFDB assisted Training Programme in Ornamental Fish Culture and Breeding organized at KVK Lam, Guntur, Andhra Pradesh

Krishi Vigyan Kendra (KVK), S.V. Veterinary University, Lam, Guntur district, Andhra Pradesh organized a five-day training programme on "Ornamental Fish Culture and Breeding" from 22nd to 26th September 2015 which was Sponsored by the National Fisheries Development Board (NFDB), Hyderabad. A total of 20 persons from different villages of Guntur district registered and participated in the training programme.

Ornamental Fish Culture and Breeding training class at KVK, Lam, Guntur district, Andhra Pradesh

Shri P. Anand Prasad, the Training Organizer, explained about viviparous and oviparous fishes, how the egg-layers lay eggs and live-bearers giving birth to the young ones, how fishes exhibiting parental care take care of their eggs and young ones, examples for egg-layers, live-bearers and dominating fishes, solitary fishes etc. Shri C. Prabhanjan Kumar Reddy, Scientist and Resource Person, Fisheries Research Station, Palair, Khammam district, explained the requirements of ornamental fish culture, maintenance and trading procedure of ornamental fish. Dr. Chandra Sekhar Rao, Assitant Professor and Resource Person, College of Fishery Science, Muthukur, Nellore district explained about where to keep an aquarium, types of fishes that are kept in aquaria, and varieties of freshwater aquarium fish. He also explained about aquarium maintenance, water quality, diseases that afflict aquarium fishes, caring of breeders, breeding habits of marine ornamental fishes and differentiating egg-layers and live-bearers of marine ornamental fishes. Shri J. Yaswanth, Extension Specialist and Resource Person, KVK, Ghantasala, Krishna district, discussed about freshwater and marine ornamental fish species, their habits, freshwater fish breeding and their

necessities, colouration of ornamental fishes and how colour is acquired by consuming live feed, etc. An evaluation test for the participants was conducted on the 4th day. The training programme received wide coverage in the local press as well by Doordarshan TV.

Shri P. Anand Prasad, Training Organizer briefing to Doordarshan TV about the programme on Ornamental Fish Culture & Breeding at KVK, Lam, Guntur district

On the last day participants were taken on a field visit to an Ornamental Fish Farm at Gollapudi village, near Vijayawada. The ornamental farm manager Shri K.V. Sudheer answered all the queries of the participants and explained to them the inputs and budget required for establishing and maintaining an ornamental fish farm.

Trainees on a visit to a commercial Ornamental Fish Farm at Gollapudi near Vijayawada, Andhra Pradesh

After completion of the 5-day training programme all the participants felt very happy and expressed that they learnt many things about freshwater and marine ornamental fishes, and it has created in them an interest to become entrepreneurs in future.

Participant expressing opinion about the training programme at KVK, Lam, Guntur district, Andhra Pradesh

7.2 Training Programme on Ornamental Fish Culture and Breeding organized in Jharkhand

A training programme on 'Ornamental Fish Culture and Breeding' was organized under the auspices of the Dept. of Fisheries, East Sighbhum district and the Fish Farmers Training Centre, Ranchi, from 21st to 25th September 2015 at Jamshedpur, Jharkhand. Twenty five fisherwomen and prospective young women-entrepreneurs were trained in various aspects of ornamental fish culture and breeding. On the last day, Dr. B.C. Jha, Sr. Consultant (Tech), NFDB, was the chief guest; he addressed the participants and gave away the Certificates.

Dr. B.C. Jha, Sr. Consultant (Tech), NFDB, addressing the participants on the conclusion day of the training programme at Jamshedpur, Jharkhand

8. Fisheries & Aquaculture Industry News

8.1 AQF at Neelankarai, Chennai, opens up High Capacity Premium Quarantine Cubicles

The NFDB funded Aquatic Quarantine Facility (AQF) for Pacific White Shrimp *Litopenaeus vannamei* at Neelankarai, Chennai, operated by the Rajiv Gandhi Centre for Aquaculture (RGCA) of the Marine Products Exports Development Authority (MPEDA), has geared up to upgrade its existing quarantine cubicles to accommodate enhanced biomass of *L. vannamei* broodstock. To start with, the facility would be upgrading two cubicles – 11 & 12 with the requisite supporting systems to accommodate & quarantine 25 kg biomass/ cubicle, of SPF shrimp broodstock. Stakeholders can reserve the premium cubicles @ Rs. 1,15,000/- per cubicle (Rs. One lakh fifteen thousand only) for the month of November 2015. Provision to reserve these cubicles was made available from 20th July 2015 onwards. All *L. vannamei* hatchery operators are encouraged to avail this facility. Online Aquatic Quarantine Monitoring System facilitates (i) Cubicle space reservation, (ii) Payment through secured gateway, (iii) Monitoring of quarantine process, etc. [Source: *www.rgca.org.in*]

9. NFDB News

9.1 The Secretary, Ministry of Agriculture & Farmers Welfare, Govt. of India, interacts with Staff of NFDB

Shri Ashok Kumar Angurana, IAS, Secretary, Ministry of Agriculture & Farmers Welfare (MoA&FW), Govt. of India, New Delhi and Shri Aditya Kumar Joshi, IFS, Joint Secretary (Fisheries), MoA&FW, on a visit to NFDB, Hyderabad, interacted with the Staff of NFDB on 2nd September 2015. The Secretary reminded that Fisheries, Livelihoods and Nutritional Security have taken centre stage under the 'Blue Revolution' initiatives of the Govt., and therefore NFDB has to have the right blend of Technology, Managers and Finance. He urged the Staff to keep in view the Charter/ Mandate of NFDB and strive to achieve the goals. He also emphasized that, in view of the fact that things are now very dynamic and moving fast, there is a need for ever new policy interventions and a need to work in close coordination with the Ministry.

The Chief Executive later led the Secretary and Joint Secretary round the NFDB Office housed in the iconic 'Fish Building' and other facilities in the NFDB Campus.

Shri Ashok Kumar Angurana, Secretary MoA&FW, flanked by Shri K.N. Kumar, CE, NFDB and Shri Aditya Kumar Joshi, JS (Fisheries) interacting with Staff at NFDB, Hyderabad

9.2 Hindi Sapthah –2015 observed at NFDB

Hindi Sapthah was observed from 14th to 21st September 2015 at NFDB. The Officers and Staff actively participated in the various programmes, competitions, *viz.,* 'Vad-Vivad, Lekh Patthan, Sulekh Prathiyogitha, etc., which were coordinated by Sri Amit Bharadwaj, Executive (Tech), and Dr. Raj Naresh Gopal, Sr. Executive (Tech), NFDB. The jury comprised of Dr. G. Neeraja, Dr. (Smt.) Balbinder Kaur from Dakshin Bharat Hindi Prachar Sabha, Hyderabad and Dr. Venkateshwarlu from Kendriya Hindi Sansthan, MHRD, GoI, Hyderabad.

The Chief Executive inaugurating the Hindi Sapthah at NFDB, Hyderabad

Technical Staff (above) and Non-technical Staff (below) participating in the Hindi literary competitions during Hindi Sapthah

9.3 Hindi Classes conducted for Staff at NFDB

To promote the use of Hindi in administration and official correspondence by the Administrative and Technical Staff of NFDB, Hindi Classes were conducted from 10th September to 19th November 2015.

9.4 Shri J.E. Prabhakar Raj, Senior Executive (Tech) repatriated

Shri J.E. Prabhakar Raj who has been on deputation and serving as Senior Executive (Tech) at NFDB, Hyderabad for the last five years, was repatriated to the Ministry of Agriculture & Farmers Welfare, Govt. of India. Shri Prabhakar Raj got relieved on 30th September 2015.

9.5 Dr. P. Paul Pandian, Executive Director (Tech) repatriated

Dr. P. Paul Pandian, who has been on deputation and serving as Executive Director (Tech) at NFDB, Hyderabad for the last four years, was repatriated to the Ministry of Agriculture & Farmers Welfare, Govt. of India. Dr. Pandian got relieved on 6th October 2015. He has been selected to the Post of Fisheries Development Commissioner (FDC), Ministry of Agriculture & Farmers Welfare, Govt. of India, New Delhi. The Chief Executive and Staff of NFDB congratulated Dr. Pandian for his promotion and bid him a warm farewell.

The Chief Executive, NFDB and Staff bid farewell to Dr. Paul Pandian

9.6 NFDB Executive Awarded PG Diplomas

Smt. Allu Venkata Madhuri, Executive (Technical) registered for the one year course "Post-graduate Diploma in Agriculture Extension Management (PGDAEM), offered by the National Institute of Agricultural Extension Management (MANAGE), Hyderabad, and the course "Post-graduate Diploma in Sustainable Rural Development (PGD-SRD) offered by National Institute of Rural Development & Panchayati Raj (NIRD&PR), Hyderabad.

She completed both the courses successfully and 'Passed with Distinction'. The Chief Executive, Officers and staff of NFDB congratulated her on acquiring additional qualifications while in service.

10. Announcements

10.1 Middle East & Central Asia Aquaculture – 2015

The 'Middle East & Central Asia Aquaculture 2015' is being organized from 14-16 December 2015 at Teheran, Iran, under the auspices of World Aquaculture Society. [Source: *www.marevent.com*]

10.2 The 20th India International Seafood Show - 2016, Chennai

The '20th India International Seafood Show – 2016' would be organized by the MPEDA from 22nd to 24th January 2016 at Chennai, Tamil Nadu. India International Seafood Show (IISS) is one of the largest Seafood Fairs in Asia. It is a biennial show and a common forum for Seafood processors, Exporters, Importers, Aquaculturists, Processing Machinery manufacturers and allied industries to meet under one roof. The show attracts a large number of seafood trading people and enables them to find out suitable means of strengthening the seafood trade for mutual benefits. The very objective of organizing the IISS is to highlight India's immense fishery potential and the rapid progress made by the country in the fisheries sector. The IISS offers immense opportunity to the participants to exchange ideas for mutual benefits and explore further possibility in strengthening the trade relation. [Source: *www.indianseafoodexpo.com*]

10.3 Training/ Skill Development Programmes sanctioned by NFDB

During the period September-October 2015, NFDB sanctioned the following Training/ Skill Development Programmes to various States:

Table: Training/ Skill Development Programmes Sanctioned by NFDB

Sl. No.	State/ UT	Implementing Agency	Title of Programme	Duration	Number of Trainees
1	**Maharashtra**	Marine Biological Research Station, Dr. Balasaheb Sawant Konkan Krishi Vidhyapeet, Zadgaon, Ratnagiri	"Ornamental Fish Breeding, Culture, Trade and Aquaria Services"	5 days	20 Trainees (50% unemployed youth, 50% SHG members)
2	**Tamil Nadu**	Tamil Nadu Apex Fisheries Cooperative Federation (AFCOFED), Chennai	"Seamanship, navigation, electronic equipments and maintenance of marine engines for deep-sea-going fishermen of Tamil Nadu"	5 days	500 deep-sea-going fishermen (25 per batch x 20 batches)
3	**Uttarakhand**	Directorate of Coldwater Fisheries Research (ICAR), Bhimtal, Nainital	(i) "Hatchery management practices for seed production of Golden & Chocolate Mahseer" (ii) "Advances in Rainbow Trout farming" (iii) "Three pronged fish farming techniques for development of coldwater fisheries in Meghalaya" (iv) "Fish health management in hill aquaculture practices"	5 days	20 - 25 Officers of Fisheries Depts. of all Hill States, for each of the four training programmes

National Fisheries Development Board

(Department of Animal Husbandry, Dairying & Fisheries,
Ministry of Agriculture and Farmers Welfare, Govt. of India)
Fish Building, Pillar No. 235, P.V. Narsimha Rao Expressway
Sardar Vallabhai Patel National Police Academy (SVP NPA) Post,
HYDERABAD – 500 052

Ph: 040-24000201; Fax: 040-24015568, 24015552
Toll Free Number: 1800-425-1660
Website: http://nfdb.gov.in

Give your feedback to:
matsyabharat@gmail.com