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CPF-TURBO PROGRAM -

Pioneering Successful and Profitable Shrimp Aquaculture



CONTENTS



MPEDA undertakes a trade delegation to China



23

MPEDA opens Seafood India signature stall at Kochi airport



30

'Swachhta Hi Seva Campaign 2019' by NETFISH-MPEDA



35

Workshop for the Refinement of Marine Fishing Regulation Act



|| 37

State-level Brainstorming workshop on "The Refinement of Marine Fisheries Management in Goa"



|| 40

Training Programmes on Diversified Aquaculture



42

Training Programme on eco-friendly shrimp and prawn farming



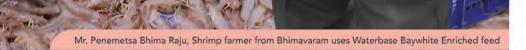




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K. S. Srinivas IAS Chairman

Dear friends.

he change in the weather factors is diminishing the day fishers venture out to the sea. This is precarious situation for the seafood processing units that are mostly depending on the sea catch for their processing and export needs. Though some units are depending on the farmed shrimp loads from the East Coast, the material is not enough to replace everyone's need.

These years, we also see a lot of food fish routed to fish meal manufacturing units in coastal states. The boom in the aquaculture sector, has led to the proliferation of fish meal plants, as fish meal is an inevitable component in aqua feed manufacturing. Reports indicate that almost every trash that is landed finds its way to the fish meal manufacturing facilities. Aquaculture utilizes about 43% of global fish meal production and 85% of fish oil. Fish meal is also used in compound foods for poultry, pigs, pets etc. Most of the world's fish meal is made from whole fish, and pelagic species are used most for this purpose.

There are about 41 fishmeal productions units are registered under MPEDA with a total capacity of 2,663.50 tons per day. The average annual capacity for fish meal production is 5,32,600 tons. The fish meal produced in India is domestically consumed as well as exported to markets such as Middle East, Japan, South East Asia, Bangladesh, Canada etc. Around 78,000 MT of fish meal and fish oil were exported from India during 2018-'19. While analysing the landing data of fishes mainly using for fish meal production by the CMFRI it is evident that the landings of sardines are on a decline. Oil sardine and lesser sardines, which were once the dominant resources of India, showed a constant decline over these years due to overexploitation for fish meal production. Now many other fishes, especially juveniles, are also caught in ring seines, trawls and purse seines. This is an alarming situation as such a fishery of industrial nature takes away the protein source of coastal folk affecting the weaker sections. MPEDA was receiving requests from various quarters to do something in this regard, and hence has decided to do our bit to conserve. The Authority in its last meeting has decided to enforce a moratorium on the establishment of new fish meal and fish oil units with effect from January 1, 2020. The moratorium will also curtail the expansion of the production capacity of the existing fish meal and fish oil units. This is a small step put forth by MPEDA towards encouraging sustainable fishing in addition to our campaigns and financial assistance schemes to reduce juvenile fishing and making our fishery sustainable forever.

MPEDA has also opened its second Seafood Signature Stall in the domestic arrival premises of Cochin International Airport Limited during the month.

Thank you.

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hina has been the world's top fish producer for many years. In 2018, China imported USD 11.92 Billion worth of fish and fishery products. Top suppliers were Russia, USA, Canada, Australia and Norway. Chinese imports are dominated by frozen shrimps. Indeed, import of frozen shrimps represented nearly 11% of the total Chinese import value, in 2018. Russia is the major supplier of seafood, taking around 18% of the market share in value. Other major imports include Live, fresh or chilled rock lobster and other

sea crawfish with Australia as the major supplier, as well as live, fresh or chilled crab, with Russia as the major supplier.

In 2018, China was the largest exporter of fish and fishery products in the world, with an export value of USD 21.55 Billion. Frozen cuttlefish and squid, cod, frozen shrimp and prawn, Alaska Pollock, Pacific salmon, tilapia are the major items of Chinese exports. Frozen cuttlefish and squid constitute 9.84% of total seafood exports.

NUTSHELL

- China imports seafood worth of USD 11.92 Billion, in 2018. Out of this India's contribution is USD 567.05 Million (4.76%).
- China exported fish and fishery products worth of USD 21.55 Billion, in 2018.
- Chinese imports are dominated by frozen shrimps.
- Russia, USA, Canada, Australia & Norway, are the major exporters to this market. India is at sixth position.
- Frozen shrimps are the major item of import from India to China followed by Cephalopods (Frozen cuttlefish and squid) and crabs.
- Import of Frozen shrimps from India shows an increasing trend when we are analyzing last 5 years exports.
- India's contribution in Frozen shrimps import of China accounts for 15.25% and 18.01% in terms of value and quantity, respectively.

A brief country profile of China in relation to fish production and consumption is placed in the table 1 below.

	Table 1. Country profile of China in relation to fish production and consumption				
1	MARINE WATER AREA	EEZ 877,019 sq.km			
2	POPULATION(2017)	1.43 billion			
3	LENGTH OF CONTINENTAL COASTLINE	14500 km			
4	TOTAL PRODUCTION(2017)	69.96 million tons			
5	PER CAPITA FISH CONSUMPTION	41 kg/year/person			
6	AQUACULTURE PRODUCTION (2017)	46.82 million tons USD 140.07 million(value)			
7	PREFERENCES	fresh or chilled fish			
8	SEAFOOD CONSUMPTION PATTERN	High			

Indian marine products export to China was US\$ 567 million contributing 4.76% of the total import of marine products by China (Table 2). The contribution of value added products from India in the Chinese imports is negligible.

Table 2. Percentage Contribution of India in Total Import of China							
	Imported Value in 2018 (USD Million)						
Chapter 03 Sub-heading Sub-heading Total 1604				Percentage contribution of India in Total import	Percentage contribution of India in value addition		
WORLD	11,605.74	110.04	205.28	11,921.05	4 = 0 0/	0.04	
INDIA	565.84	0.71	0.49	567.05	4.76 %	0.38 %	

The major seafood suppliers to China are Russia, USA, Canada, Australia and Norway. India currently holds 6th position (Table 3).

	Table 3. Top 10 seafood exporting nations to China				
Rank	Exporters	Imported value in 2018(USD Million)			
1	Russian Federation	2115.37			
2	United States of America	1255.99			
3	Canada	1010.96			
4	Australia	633.9			
5	Norway	578.91			
6	India	567.05			
7	Viet Nam	557.49			
8	Indonesia	543.40			
9	Ecuador	495.44			
10	Chile	484.68			
10	New Zealand	430.19			
	Others	2960.16			

ranked around 20 among the suppliers of value added records maintained by MPEDA is given below. marine products to China.

Value added products are mostly supplied by Peru, The major item-wise export of marine products from Thailand, South Korea, Japan and Canada. India is India to China during the last 5 years as per the FY

Table 4. ITEM WISE EXPORT OF MARINE PRODUCTS TO CHINA						
	Q: Quantity in M T, V: Value in Rs. Crore, \$: US Dollar Million					
ITEM		2014-15	2015-16	2016-17	2017-18	2018-19*
FROZEN SHRIMP	Q:	4368	8500	6827	11793	65250
	V:	201.37	360.92	301.77	483.70	2624.14
	\$:	33.15	55.92	45.50	75.90	378.04
FROZEN FISH	Q:	35106	26818	24231	23587	134690
	V:	360.25	344.09	318.85	284.29	1834.47
	\$:	58.94	52.81	48.07	44.65	259.20
FR CUTTLE FISH	Q:	564	541	303	407	4488
	V:	7.11	7.11	6.12	9.80	97.93
	\$:	1.16	1.10	0.92	1.54	13.78
FR SQUID	Q:	1512	4755	819	485	6039
	V:	19.85	69.15	17.40	7.70	96.91
	\$:	3.25	10.73	2.63	1.21	13.68
DRIED ITEM	Q:	1346	340	642	1004	1720
	V:	14.14	2.81	3.83	8.96	23.33
	\$:	2.35	0.43	0.58	1.41	3.35
LIVE ITEMS	Q:	1957	1950	2689	2393	2835
	V:	89.72	90.82	126.31	82.86	141.90
	\$:	14.77	13.98	19.00	13.04	20.44
CHILLED ITEMS	Q:	10	38	160	76	135
	V:	0.59	2.12	8.32	4.29	5.75
	\$:	0.10	0.32	1.25	0.67	0.83
OTHERS	Q:	10792	3458	6158	5641	5718
	V:	96.64	48.39	94.79	126.77	185.41
	\$:	15.74	7.45	14.24	19.88	26.43
Total	Q:	55654	46401	41831	45385	220877
	V:	789.65	925.41	877.40	1008.38	5009.82
	\$:	129.47	142.73	132.18	158.30	715.74















Table 5 depicts contribution of India in China's import on specific products.

	Table 5. Contribution of India in China's Import on Specific Products				
Sl.No.	HS code	Description	India's % contribution in terms of value-2018	India's % contribution in terms of quantity-2018	
1	0301 11 00(6 digits)	Freshwater	0.85	1.50	
2	0301 19 00(6 digits)	Other	4.80	6.72	
3	0303 42 00(6 digit)	Yellow fin tunas (Thunnus albacares)	7.87	7.25	
4	0303 43 00(6 digit)	Skipjack or stripe-bellied bonito	0.00	0.00	
5	0303 89 30 (6 digit)	Ribbon fish	-	-	
6	0303 89 50 (6 digit)	Pomfret (white or silver or black)	-	-	
7	0303 89 80 (6 digit)	Croakers, groupers, flounders	-	-	
8	0304 99 00 (6 digit)	Other	13.16	12.51	
9	0306 17 (6digit)	Other Shrimps and prawns	19.63	23.87	
10	0307 43 10(6 digit)	Cuttlefish	3.37	-	
11	0307 43 90 (6 digit)	Other frozen cuttle fish and squid	0.08	0.19	
12	0307 49 90 (6 digit)	Other	0.00	-	
13	0307 52 00	Frozen	10.99	10.99	
14	1604 13 10 (6 digit)	Sardines, Sardinella and brisling	0.00	-	
15	1604 14 10(6 digit)	Tunas	0.64	0.98	
16	1604 15 00 (6 digit)	Mackerel	0.00	_	
17	1604 16 00	Anchovies	0.00	0.00	
18	1604 20 00(6 digit)	Other prepared or preserved fish	1.04	1.09	
19	1605 10 00	Crab	0.00	-	
20	1605 21 00 (6 digit)	Not in Airtight container	0.00	-	
21	1605 29 00	Other	4.19	2.83	
22	1605 54 00	Cuttlefish and squid	0.00	-	
23	1605 55 00	Octopus	0.00	-	

The increase in the trade seems to have generated related trade issues also. It is understood that China is only permitting to import items which are listed in the General Administration of Customs of the People's Republic of China (GACC) website and many of the Indian species are not included in their website. There are delays in approving establishments for export to China. In addition, there were detention of consignments

due to minor mistakes noticed by Chinese import authorities in the Health Certificates issued by EIAs. In view of the same, with the approval of MOC&I, a trade delegation visit was organized to Qingdao and Beijing in China as a measure to promote the export of Indian marine products to China and to address the trade hurdles that affect the smooth trade.

Trade Delegation

Chairman of MPEDA Mr. K. S. Srinivas IAS has led a trade delegation, comprising of MPEDA and EIC officials, and 40 Indian sea food exporters to participate in Qingdao International Sea Food Expo, and also in a Buyer Seller meet organized by MPEDA jointly with the Embassy of India in Beijing during 30th October to 1st November 2019.

Buyer Seller Meet

Indian Embassy had arranged a presentation event and Buyer Seller meet on 30th October 2019 evening in Qingdao. The meeting was attended by over 25 buyers and 35 Indian exporters. The event began with an introduction by Mr. Prashanth Lokhande, Counsellor (Commerce), EOI, Beijing followed by a detailed presentation by Chairman, MPEDA on the Indian seafood. The slides of the presentation had Chinese text also. Moreover, the presentation was translated real time to Chinese for better involvement of the audience. A corporate video on MPEDA with Chinese subtitles was also played after the presentation. Soon after the presentation, the Buyer Seller Meet started in the adjacent hall. Dinner was also served to the invitees at the closure of the event.

Chairman, MPEDA and other delegate members have also visited the China Fisheries and Seafood Expo held at Expo Center in Qingdao on 31st October 2019 and interacted with buyers and other exhibitors.



Mr. K. S. Srinivas IAS, Chairman, MPEDA makes the presentation of Indian seafood before the buyers



A view of Buyer - Seller meet



Delegation members and Embassy officials with the Vice President of China Chamber of Foodstuff, Native Produce and Animal-By Products

Meeting with CFNA

Chairman, MPEDA flanked by MPEDA and EIC officials, and 3 exporter representatives had meetings with China Chamber of Foodstuff, Native Produce and Animal-By Products (CFNA) and officials of Import and Export Bureau of GACC on 1 November 2019 at Beijing. The list of attendees for the two meetings is enclosed. The delegation first had meeting with Ms. Yu Lu, Vice Chairman of CFNA, and other officials. Chairman, MPEDA has explained that India is emerging as a major exporter of seafood and has introduced many varieties of seafood over the years and now have wide range of fisheries species to offer for exports. India's all exports are domestically produced, and we do not import fisheries for value addition and re-export.

The investment opportunities are available in establishing hatcheries, nurseries were also explained. The sector is open for 100% FDI under automatic route. Since 85% of Indian export is raw, with very little value addition, there is huge scope for improvement and immense opportunities for joint ventures in value addition are available.

Chairman invited CFNA to lead a delegation to participate in India International Seafood Show (IISS) to be held from 7-9 February 2020 in Kochi, in which some Chinese machinery manufacturing companies has confirmed to attend.

CFNA has responded that Zhanjiang Guolian Aquatic is the 3rd biggest Chinese seafood producer, largest shrimp exporter to the US and has presence in India. They have also requested that MPEDA should lead

a delegation next year to attend Anufood China in Shenzhen from 15-17 April 2020.

Shenzhen is a major port-city for import of seafood, and Anufood is a prominent expo in southern China. This will complete 20 years and will have bigger celebration. They have also suggested that MPEDA may organize road show / B2B in 2-3 other cities in advance of Shenzhen Expo, so that Chinese importers in these cities can also be made aware of opportunities of Indian Seafood. MPEDA may also visit some factories to understand development of Chinese seafood industry. CFNA will help organize these events.

Meeting with GACC

After the meeting with CFNA the delegation had a meeting with Mr. Be Kexin, Director General of Import-Export and Food Safety Bureau of GACC.

Mr. Kexin explained that China is a huge market for Indian shrimp. GACC is responsible for ensuring quality and safety of domestic as well as imported sea food including shrimp. Chinese side has shown positive attitude and given great attention towards imports from India. GACC acts according to the consensus reached by leaders of the two sides.

Chairman, MPEDA raised the three trade issues faced by Indian seafood exporters with GACC. DG, GACC has responded that he will examine the issues and do the needful. GACC Chief informed that his inspectors may visit India for inspection of Indian establishments and based on inspectors' recommendation will approve establishments. Chairman, MPEDA invited DG Bi Kexin



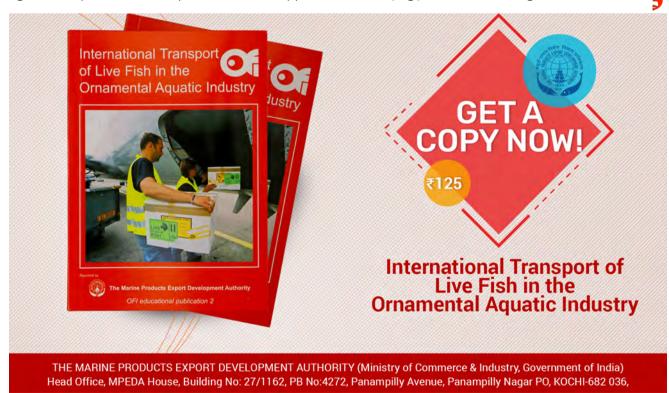
Chairman, MPEDA greets Director General, Import-Export and Food Safety Bureau, General Administration of Customs of the People's Republic of China

to visit India and participate in IISS, and offered a visit to Indian fisheries related infrastructure, inspection and quarantine facilities and laboratories etc.

GACC accepted MPEDA invitation of visiting India, and has also offered training on fishery-import related Chinese regulatory framework for Indian fisheries establishments, through seminars and DVCs. Such training can be organized when GACC delegation visits India. GACC also suggested an MOU between inspection authorities for training and other cooperation. Counsellor (E&C) thanked GACC for its support for expediting market access procedures for various Indian agricultural products. He requested GACC to approve

the 40 fishery species without waiting for GACC expert visits to India, which can be done subsequently.

The meetings with CFNA were attended by Mr. K. S. Srinivas IAS, Chairman, MPEDA, Mr. Rajesh Parihar IFS, First Secretary (E&C), EOI, Beijing, Dr. Ram Mohan M. K., Joint Director (Marketing), MPEDA, Mr. Jayapalan G., Deputy Director, Export Inspection Agency, Kochi, Mr. Jagdish V. Fofandi, President, Seafood Exporter Association of India (SEAI), Mr. Karshan R. Salet, Member, MPEDA and Managing Committee Member, SEAI, and Mr. Alex K. Ninan, Regional President Kerala, SEAI. Mr Prashant Lokhande IAS, Counsellor, (E&C), EOI, Beijing joined the meeting with GACC.



MPEDA at the China Fisheries and Seafood Expo (CFSE) 2019



Front view of the MPEDA pavilion

he 24th Annual China Fisheries and Seafood Expo (CFSE) was held at Qingdao International Expo Center, Qingdao City, China, from October 30 to November 1, 2019. The event featured almost 1,600 business exhibiting companies from 53 countries and Region, including 22 overseas national and regional pavilions.

The objective of the expo was to enhance the globalisation of seafood market and industry chain integration and contribute more to the fishery development of the world. With about 45,108 square meters of exhibit space, China Fisheries and Seafood Expo has grown to become the largest seafood trade show in the world. More than 33,000 visitors from 100 countries attended CFSE 2019.

The participants were government officials, business communities, exhibitors and professional purchasers across the world. MPEDA, along with 18 exporters,

participated in the expo. List of companies, which participated in CFSE 2019, is given below. Dr. Shine Kumar C.S., Deputy Director, MPEDA Kochi and Dr. Sreenath P.G, Deputy Director, MPEDA New Delhi represented MPEDA in CFSE 2019. The list of trade enquires received during the expo is also given below.



Dr. Shine Kumar C. S. and Dr. P. G. Sreenath, Deputy Directors, MPEDA attends to a buyer

Sl. No.	Company	City	
1	M/s Amaravathi Aqua Exports Pvt. Ltd.	Vijayawada, Andhra Pradesh	
2	M/s Baby Marine Eastern Exports	Mandapam, Tamil Nadu	
3	M/s Castlerock Pvt. Ltd.	Mumbai, Maharashtra	
4	M/s Coastal Corporation Ltd.	Visakhapatnam, Andhra Pradesh	
5	M/s Favourite Exports	Veraval, Gujarat	
6	M/s Gadre Marine Export	Ratnagiri, Maharashtra	
7	M/s Goan Fresh Marine Exports Pvt. Ltd.	Udupi, Karnataka	
8	M/s Halal Exports	Veraval, Gujarat	
9	M/s Mourya Aquex Pvt. Ltd.	Bhimavaram, Andhra Pradesh	
10	M/s Rupsha Fish Pvt. Ltd.	Kolkata, West Bengal	
11	M/s SS Seafood Pvt. Ltd.	Kolkata, West Bengal	
12	M/s Sashmi Foods Pvt. Ltd.	Bangalore, Karnataka	
13	M/s Shafi Marine	Veraval, Gujarat	
14	M/s SS International	Veraval, Gujarat	
15	M/s Suryamitra Exim Pvt. Ltd.	Bhimavaram, Andhra Pradesh	
16	M/s. Sun Exports	Veraval, Gujarat	
17	M/s Vasista Marine	Bhimavaram, Andhra Pradesh	
18	M/s Salet Seafoods Pvt. Ltd.	Porbandar, Gujarat	





Stalls of Indian seafood companies at CFSE 2019





Stalls of Indian seafood companies at CFSE 2019















Visit to Eon Super Market at Qingdao

During the visit to Qingdao, the MPEDA team visited Eon Super Market, where different types of seafood products were displayed. It was noticed that major seafood items were sold in the form of live, fresh, frozen



Frozen Argentine Red Shrimp on Retail pack





and dried in Eon super market. It will be beneficial for Indian exporters, if they are able to market the

seafood directly to the Chinese supermarket chains

like Carrefour, Jusco, Metro and Wal-Mart. This will help

to avoid the middlemen and traders in the sector for

better realization of value for Indian seafood in China.

Frozen Pantagonian Toothfish Steaks in Retail pack



Atlantic salmon portion and Crispy Seaweed Shrimps



Live Crab with Retail Price

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Highlights of marine fish landings in selected harbours of India during August 2019

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

NETFISH records boat arrivals and marine fish landings happening at the major harbours of India to facilitate the Catch Certification Scheme of MPEDA. This report presents the results of the analysis of harbour data obtained during August 2019.

Data Collection & Analysis

Fish landings and boat arrivals occurred at the 96 selected harbours across the 9 maritime States of India (see Table 1) were obtained on a day-to-day basis through the Harbour Data Collectors deployed at the harbours. The name, registration number and type of fishing vessels arrived as well as the approximate quantity of major fishery items landed at the harbour were recorded by primary and secondary modes. The data were further analysed using online applications and MS office (Excel) tools to arrive at species-wise, region-wise, State-wise and harbour-wise estimations.

Table 1. List of landing sites selected for data collection

Sl. No.	State	Harbour
1		Dholai
2		Dwarka Rupen
3		Ghoghla
4		Jafrabad
5		Kotada
6	Gujarat	Mangrol
7	J	Porbandar
8		Sutrapada
9		Umargam
10		Vanakbara
11		Veraval

12		Alibagh Koliwada	
13		Arnala	
14		Vasai	
15		Dahanu	
16		Harne	
17		Malvan	
18	Maharashtra	New Ferry Wharf	
19	Manarasilia	Onni Bhatti Dabhol	
20		Ratnagiri	
21		Sakharinate	
22		Sasoon Dock	
23		Satpati	
24		Taramumbri Devgad	
25		Uttan	
26		Versova	
27		Cutbona	
28		Malim	
29	Goa	Vasco	
30		Chapora	
31		Amdalli	
32		Belekeri	
33		Bhatkal	
34		Gangolli	
35	Karnataka	Honnavar	
36		Karwar	
37		Malpe	
38		Mangalore	
39		Tadri	

40		Reynore	
		Beypore Chellanam	
41			
42		Cheruvathur	
43		Chettuva	
44		Kayamkulam	
45		Koyilandi	
46		Mopla Bay	
47		Munambam	
48	Kerala	Neendakara	
49		Ponnani	
50		Puthiyappa	
51		Sakthikulangara	
52		Thangassery	
53		Thoppumpady	
54		Thottappally	
55		Vaadi	
56		Vizhinjam	
57		Vypin	
58		Chennai	
59		Chinnamuttom	
60		Colachel	
61		Cuddalore	
62		Karaikal	
63		Kodiyakarai	
64		Kottaipatnam	
65		Mallipatnam	
66		Mandapam	
67	Tamil Nadu	Mudasalodai	
68	Tarriit Nauu	Nagapattinam	
69		Pamban	
70		Pazhayar	
71		Pondicherry	
72		Poompuhar	
73		Pulicat	
74		Rameswaram	
75		Tharuvaikulam	
76		Thengaipattinam	

78		Kakinada	
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96		Soula	

Estimation of fish landings

A total of 62,639.18 tons of landings of marine fishery resources was recorded from 96 landing sites during August 2019, which was comprised of 22,597.75 tons (36 per cent) of Pelagic finfish resources, 15,616.20 tons (25 per cent) of Demersal finfishes and 24,425.22 tons (39 per cent) of shellfish resources (Fig.1).

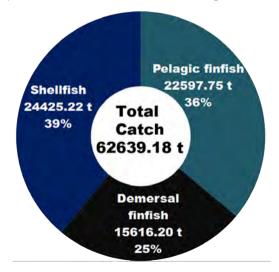


Fig.1. Category-wise fish landings during August 2019

About 256 species of fishery items have contributed to the total landings, of which the top five species namely Karikkadi Shrimp (Parapenaeopsis stylifera), Pharaoh cuttlefish (Sepia pharaonis), Japanese thread fin bream (Nemipterus japonicus), Squid (Uroteuthis duvaucelii) and Ribbon fish (Lepturacanthus savala) together formed about 30 per cent of the total catch (Fig. 2.).

The other major species recorded were the Bombay duck (*Harpadon nehereus*), Croaker (*Johnius Spp*) and Indian Mackerel (Rastrelliger kanagurta), each contributing more than 2000 tons to the total catch.

The Coral Grouper (*Plectropomus leopardus*) with a quantity of 0.01 tons was the species that registered least landing during the month.

Table 2 presents the quantity-wise catch of various categories of fishery items recorded during August

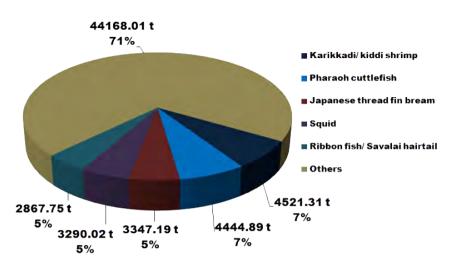


Fig. 2. Major fishery items landed during August 2019

2019. Among the Pelagic finfish resources, Ribbon fish, Bombay duck and Indian Mackerel were the major contributors and in the case of Demersal finfishes, it was Threadfin breams, Croakers and Pomfrets that contributed more. Major items among Shellfishes were Coastal shrimps, Cuttlefish and Squid.

Table 2. Category-wise Landing of various fishery items during August 2019

Fishery item	Quantity in tons	% of total catch
Pelagic finfishes		
Ribbon fish	5940.41	9.48
Bombay duck	2790.44	4.45
Indian mackerel	2665.85	4.26
Tuna	2453.59	3.92
Scad	1821.02	2.91
Indian oil sardine	1664.78	2.66
Shad	1218.06	1.94
Anchovies	1025.26	1.64
Lesser sardines	686.61	1.10
Seerfish	453.62	0.72
Barracuda	414.85	0.66
Trevally	288.05	0.46
Sword fish	252.65	0.40
Mullet	194.12	0.31
False trevally	156.82	0.25
Indian salmon	147.33	0.24

Herrings	77.12	0.12	
Cobia	58.21	0.09	
Dolphin fish	56.42	0.09	
Sail fish	53.11	0.08	
Silver sillago	37.11	0.06	
Halfbeak	30.33	0.05	
Marlins	23.45	0.04	
Needlefish	18.07	0.03	
Silver biddies	17.34	0.03	
Queenfish	14.73	0.02	
Surgeon fish	13.10	0.02	
White sardine	12.22	0.02	
Barramundi	7.15	0.01	
Milk fish	3.11	0.00	
Indian threadfish	1.15	0.00	
Flyingfish	0.86	0.00	
Snubnose pompano	0.53	0.00	
Oriental bonito	0.10	0.00	

Pacific whiting	0.10	0.00			
Painted sweet lip	0.10	0.00			
Total	22597.75	36.08			
Demersal finfishes					
Thread fin breams	4201.84	6.71			
Croakers	3156.14	5.04			
Pomfrets	2624.28	4.19			
Lizard fishes	1481.94	2.37			
Catfishes	965.24	1.54			
Sole fishes	757.85	1.21			
Rays	426.59	0.68			
Snappers	315.48	0.50			
Bull's eyes	289.37	0.46			
Reef cods	248.44	0.40			
Pony fishes	221.45	0.35			
Goatfishes	197.97	0.32			
Eels	171.97	0.27			
Groupers	113.49	0.18			
Dog shark	97.05	0.15			
Triggerfishes	75.80	0.12			
Milk shark	62.72	0.10			
Moon fish	40.76	0.07			
Indian threadfin	35.92	0.06			
Indian halibut	29.00	0.05			

Region-wise landings

In August 2019, the maximum quantity of fish landings was recorded from the South West coast, where a total of 21,940.68 tons (35 per cent of total catch) was reported from the selected harbours of Kerala, Karnataka and Goa. The North-West coast comprised of Maharashtra and Gujarat had contributed 15,330.51 tons (24 per cent) to the total catch. In South-East coast, landings recorded from the selected harbours in Tamil Nadu and Andhra Pradesh were totalled to 11,058.48 tons (18 per cent), whereas along the North-East coast 14,309.51 tons (23 per cent) of fish catch was recorded altogether from the selected harbours of West Bengal and Odisha (Fig. 3).

State-wise landings

Among State-wise landings, Kerala recorded the

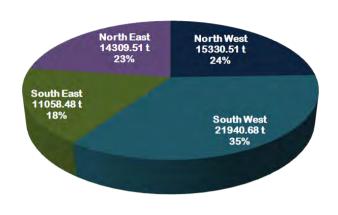
Rabbit fishes	24.68	0.04
Emperors	24.07	0.04
Perches	18.32	0.03
Unicorn leatherjacket	14.42	0.02
Parrot fish	8.54	0.01
Seabreams	7.00	0.01
Surgeonfish	1.78	0.00
Flat head	1.59	0.00
Sillago	1.54	0.00
Tomato hind	0.74	0.00
Drift fishes	0.20	0.00
Spade fish	0.03	0.00
Total	15616.20	24.93
Shellfishes		
Coastal shrimps	10721.38	17.12
Cuttlefish	5735.17	9.16
Squid	4625.61	7.38
Octopus	1680.02	2.68
Sea crab	1235.20	1.97
Deep sea shrimps	389.90	0.62
Lobsters	23.42	0.04
Mud crab	14.52	0.02
Total shellfishes	24425.22	38.99
Grand Total	62639.18	100.00

maximum landing, which was to the tune of 18,159.94 tons (29 per cent of total catch) (Fig. 4). This was followed by West Bengal with 9,981.22 tons (16 per cent) and then by Tamil Nadu with a contribution of 9,477.98 tons (15 per cent). The State that reported least landing during the period was Goa, where only 56.73 tons of marine fish catch was recorded.

Harbour-wise landings

Figures 5 and 6 represent the fish landings recorded during the month at the selected harbours of West coast and East coast respectively. Of the 96 harbours, Veraval harbour registered the maximum landing of 5,004.09 tons (8 per cent) and it was followed by Sakthikulangara with a landing of 4,496.00 tons (7.2 per cent).

The least quantity of marine fish catch was recorded from Chapora harbour in Goa (0.84 tons).



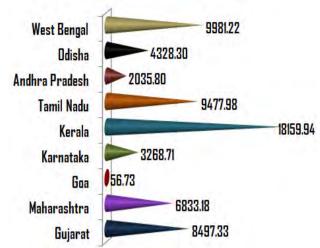


Fig. 3. Region-wise landings (in tons) recorded during August 2019

Fig. 4. State-wise fish Landings (in tons) during August 2019

Table 3. Harbours which recorded maximum landing in each state

Sl. No.	State	Harbour	Qty.	% of Total Catch
1	Gujarat	Veraval	5004.09	7.99
2	Maharashtra	New ferry Wharf	3215.87	5.13
3	Goa	Vasco	40.50	0.06
4	Karnataka	Mangalore	2388.94	3.81
5	Kerala	Sakthikulangara	4496.00	7.18
6	Tamil Nadu	Chennai	3713.17	5.93
7	Andhra Pradesh	Visakhapatnam	1086.01	1.73
8	Odisha	Dhamara	1432.73	2.29
9	West Bengal	Namkhana	2653.90	4.24





Fig. 5. & 6. Landings (in tons) recorded at harbours in West & East coasts during August 2019

Estimations on boat arrivals

A total of 33,673 boat arrivals were recorded during August 2019, of which the highest recording was from Sakthikulangara harbour (1,433) and it was followed by Deshapran harbour with 1,122 boat arrivals and Neendakara harbour with 1,118 boats. The Chinnamuttom harbour had registered the least boat arrival (3) during the month.

Summary

In August 2019, a total landing of 62,639.18 tons of

marine fishery resources was registered from the 96 major fishing harbours of India, where in shellfish was the major contributor and the *Karikkadi* shrimp was the species which reported the highest quantity. The contribution from West coast was about 20 per cent more than that from East coast and the South West coast registered the maximum landings. Kerala recorded the highest landing during the month, whereas, considering harbour-wise quantity the highest contributor was Veraval harbour in Gujarat. Of the 33,673 boat arrivals recorded during the month, the maximum record was from Sakthikulangara harbour.



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MPEDA opens Seafood India signature stall at Kochi airport



Inauguration of the Seafood India Signature stall

he Marine Products Export Development Authority (MPEDA) opened its second signature stall at the Cochin International Airport on 3rd October 2019 under its 'Seafood India' project launched ten months ago.

The new stall at the airport premises in Nedumbassery, 40 km north of the city, will sell ready-to-cook and ready-to-eat value-added products from 10 exporters. The MPEDA had started the 'Seafood India' signature stall in December last year when Union Commerce and Industry Minister Mr. Suresh Prabhu inaugurated the 1700-square-feet facility at Panampally Nagar in downtown Ernakulam.

The second stage of this initiative is found with the opening of the stall at the airport. MPEDA Chairman Mr. K. S. Srinivas IAS said that the signature stall is opened in the Cochin airport as a part of MPEDA's brand promotion campaign for Indian seafood, considering the airport's importance in the traffic of international tourists as well as Non-Resident Keralites.

"Moreover, MPEDA signature stall helps the domestic consumers also get familiarised to export-quality value-added seafood products," he added.

The stall at the Panampilly Nagar 'Seafood India' facility

currently displays around 100 value-added products of various companies across India. The items for sale span a range of ready-to-eat, ready-to-fry and ready-to-cook items.

MPEDA is to set up similar signature stalls in other international airports as well, Mr Srinivas added.

'Seafood India' stall in the MPEDA headquarters at Panampilly Nagar, exhibit products developed by prominent fisheries research institutions such as CMFRI, CIFT and NIFPHATT besides selling and displaying value-added marine products of exporters. It also provides literature on the activities of MPEDA and its societies such as NETFISH, RGCA and NaCSA. Enabled with information kiosks to browse the details about each product, the stall provides information ranging from its production, processing, cooking and nutritional content.

MPEDA, established in 1972 as a statutory body under the Union Government's Ministry of Commerce and Industry, coordinates with different Union and State government establishments engaged in fishery production and allied activities. It works for increasing the exports of marine products through interventions in fishing, aquaculture, processing, marketing, extension, quality assurance, R&D and training in various aspects. www.indianseafoodexpo.com









India welcomes the world to the biggest seafood event

India International Seafood Show 2020.

Date: 7th to 9th February 2020

Venue: Lulu International Convention Center, Kochi

The 22nd edition of IISS is an ideal platform for active interaction of manufacturers and suppliers of marine products, processing machinery, packaging systems, certifying and testing agencies, processing ingredient dealers, cold chain systems and logistics. The show will showcase various technologies, products and value added systainable seafood from India



JOINTLY ORGANISED BY



THE MARINE PRODUCTS EXPORT DEVELOPMENT AUTHORITY
Ministry of Commerce & Industry, Government of India
MPEDA House, Panampilly Avenue
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SEAFOOD EXPORTS ASSOCIATION OF INDIA

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Kochi to host the India International Seafood Show 2020

arine Products Export Development Authority (MPEDA), in association with Seafood Exporters Association of India, will organise the 22nd India International Seafood Show 2020 at Hotel Grand Hyatt, Kochi, Kerala from February 7 to 9, 2020. The biennial show is one of the most acclaimed seafood events in the world.

The upcoming event will have more than 350 stalls to showcase various pre-processing, processing and storage technologies in the seafood industry. It will also act as an ideal platform for one-to-one interaction with seafood importers and exporters. More than 5000 delegates from India and abroad are expected to participate in IISS 2020. Major seafood buyers, retailers and food service industry experts, wholesalers, distributors, processors, people representing packaging, machinery/equipment, cold storage, importers and exporters, bankers, investors, shipping lines, cargo and logistics, technocrats and policy makers will be participating in the event.

Kochi is known for its coastal beauty, multiculturalism and was the centre of Indian spice trade for hundreds of

years. The Queen of Arabian Sea, as the city is known, blends modernity with tradition.

Kochi has been chosen by the online international travel guide, 'Lonely Planet' as one of the top 10 destinations for 2020. Lulu Bolgatty International Convention Center is one of the largest venues in the country located on an island with stunning backwater and city views.

India Fact File

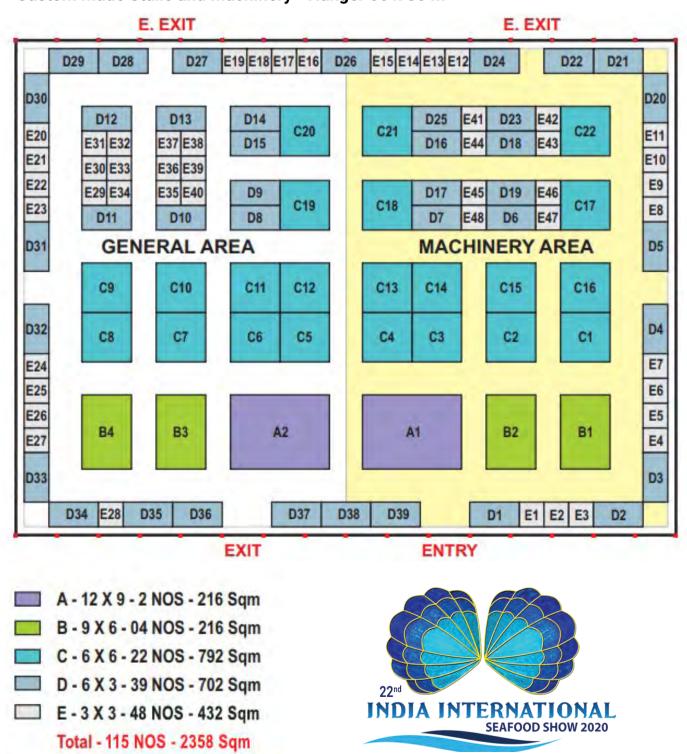
- Coastline spanning over 8000 kilometres
- Seafood exports worth over USD 7 billion
- Third largest fish producer
- Second largest aquaculture producer
- > Fourth largest seafood exporter
- Largest shrimp supplier to the USA



22ND INDIA INTERNATIONAL

INDIA INTERNATIONAL S

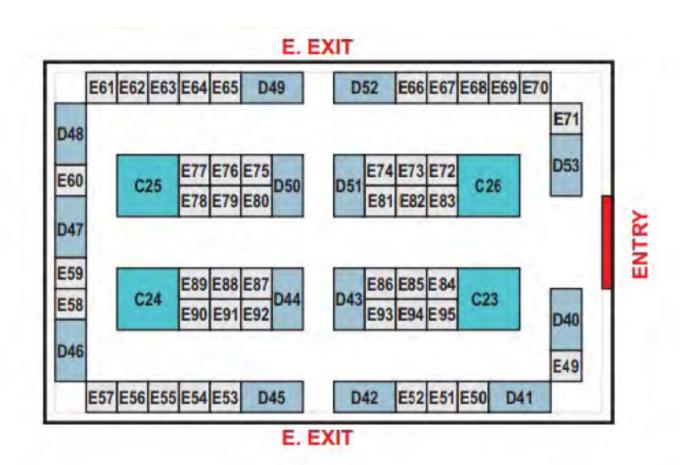
Custom Made Stalls and Machinery - Hanger 60 x 80 m



SEAFOOD SHOW 2020

L SEAFOOD SHOW - LAYOUT

Shell Scheme Stalls only - Exhibition Hall 35 x 55 m



C - 6 X 6 - 04 NOS - 144 Sqm
D - 6 X 3 - 14 NOS - 252 Sqm
E - 3 X 3 - 47 NOS - 423 Sqm
Total - 65 NOS - 819 Sqm

Consultative Workshop on "The Refinement of Marine Fisheries Management in Andhra Pradesh"

he rich marine fishery resources of Indian seas are reported to be in declining path, owing to climate change. The situation is compounded with illegal and uncontrolled fishing practices. Time has come to a condition that every marine State has to take tangible measures to control the fishing pressure exerted in our waters. Realizing the grave situation, the Government of Kerala amended the 'Kerala Marine Fisheries Regulation Act 1980' last year, encompassing effective control measures to facilitate responsible fishing practices towards achieving sustainable fishing in the sector. The measures taken by Kerala need to be emulated in other marine States as well, so as to get a collective responsibility in conserving our rich resources from further decline.

Figure 1 and the state of the s

Dr. Joice V Thomas, CE NETFISH presenting the KMFRA amendments

With this view, NETFISH in association with the Department of Fisheries, Andhra Pradesh, organised a one-day brainstorming workshop titled 'Refinement of Marine Fisheries Management in Andhra Pradesh' on August 20, 2019 at the State Institute of Fisheries Technology (SIFT), Jagannaikpur, Kakinada. The workshop aimed to bring all the major fishery stakeholder groups, Senior State fishery officials and scientists from Fishery Research Institutes under one platform to discuss the need to amend the existing Andhra Pradesh Marine Fishing Regulation Act (APMFRA) 1994. Senior ranking officials including Additional Director, Joint Director, Deputy Director and Assistant Directors from Department of Andhra Pradesh State Fisheries;

Principle Scientist from CIFT Visakhapatnam; three scientists from CMFRI Visakhapatnam; Assistant Director of MPEDA Sub Regional Division, Bhimavaram; Chief Executive of NETFISH; presidents and secretaries of Mechanized and Motorized Fishing Boat Owners' Associations from all the major fishing harbours and fish landing centres of Visakhapatnam, Kakinada, Machilipatnam and Nizampatnam and boat owners of Vizianagaram and other districts attended the workshop and actively participated in the discussions.

Mr. P. Hanumantha Rao, State Coordinator NETFISH, welcomed the gathering and explained the importance and aim of the workshop. He requested the participants to come out with fruitful recommendations to augment

the efforts to amend the existing APMFR Act for promoting sustainable fisheries.

In his inaugural address, Mr. P. Koteswara Rao, Additional Director of Andhra Pradesh Fisheries, said that Andhra Pradesh is blessed with rich marine fish resources by its virtue of second longest coast line of 974 km along the Bay of Bengal and also expressed his concern on the declining fishery resources. Dr. V. Venkateswara Rao, Joint Director of Andhra Pradesh Fisheries, East Godavari district, said that it is high time to take concrete measures to control the fishing practice.

Dr. Raghu Prakash, Principal Scientist, Central Institute of Fisheries Technology

(CIFT) Visakhapatnam, told the stakeholders that as per the results of the research studies done by CIFT on present fishing practices of Andhra Pradesh, there is a need to amend the existing APMFR Act. Dr. Manas, Scientist, Central Institute of Fisheries Research Institute (CMFRI), Visakhapatnam, explained the present statistics of fish stocks of Andhra Pradesh coast and the measures to be taken to maintain the existing fish stocks.

After the inaugural session, Mr. Venkata Rao made a presentation explaining the existing APMFR Act and the need to amend the trawl net cod end mesh size, fishing boat registration and fishing license fees etc. in the Act. Dr. Joice V. Thomas, Chief Executive

of NETFISH, through his presentation explained the 'Kerala Marine Fishing Regulation (Amendment) Act 2017' and 'Kerala Marine Fishing Regulation Rules 2018' with respect to fleet size, engine horsepower, gear size, mesh size, minimum legal size, setting up of fisheries management council, implementation of vessel monitoring system (VMS) etc. to the participants. He also said that the amendments are made as per the fishing fleet and availability of fish species in Kerala. It shall not be same for Andhra Pradesh and hence urged to put forward the recommendations as per the fisheries profile of the State.

The presentations were followed by discussions on various regulations notified in the MFRAs. All the major stake holders strongly recommended amending the existing APMFR Act in line with KMFR Act. Implementation of Minimum Legal Size (MLS), reasonable increase in boat registration and fishing license charges, regulation of size of fishing fleet, not to register new fishing boats etc. were the major suggestions agreed upon by the stakeholders. The stakeholders also suggested the Department of Andhra Pradesh Fisheries to conduct regional or harbour level meetings along with NETFISH to discuss further on the suggestions, before finalizing the amendments of APMFR Act.

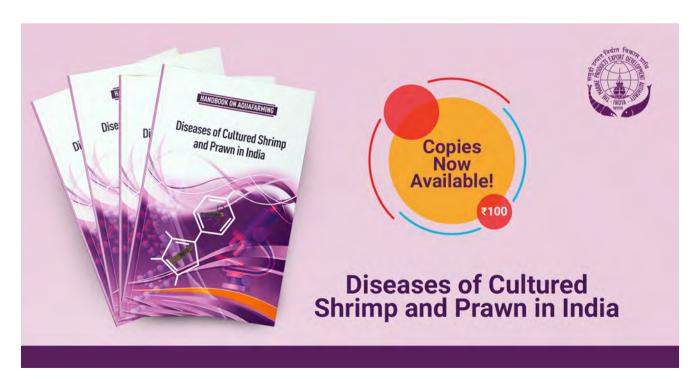
The programme successfully concluded with a formal vote of thanks to all the participants and the dignitaries

present during the workshop. It was NETFISH's success to bring representatives from all the major stakeholder groups for the workshop and also to gain the overwhelming support from the State Fisheries Department for the workshop. Overall, the participants found the workshop well-structured, comprehensive, informative and useful for the betterment of the fisheries sector. The workshop provided an excellent platform to discuss and exchange thoughts and experiences with regard to the sector. The arrangements of the workshop and the hospitality and commitment of NETFISH-MPEDA was highly appreciated by all participants. The feedback and suggestions provided by participants will be taken up while conducting further regional level meetings and also will be presented in the National level workshop planned during this year.



A Stakeholder representative giving his views during the workshop





'Swachhta Hi Seva Campaign 2019' by NETFISH-MPEDA



Participants of the clean-up programme held at Cuddalore

he 'Swachhta Hi Seva campaign 2019' was observed during 11th Sep. 2019 to 2nd October 2019 on the theme 'Plastic Waste Management', by which 'shramdaan' for plastic waste, mostly at harbours and nearby coastal areas, was carried out as the prominent activity by NETFISH. The campaign included awareness generation events such as mass meetings, rallies, door to door campaign etc. along with plastic waste clean-up drives at selected coastal areas in Tamil Nadu, Kerala, Karnataka, Gujarat, Odisha and West Bengal.

Tamil Nadu North

Cleaning up of the Silver beach Cuddalore and an awareness meet at Periyar Arts and Science College, Cuddalore on September 21, 2019 were the activities conducted in Tamil Nadu North region. About 110 participants, including students from Periyar Arts and Science College, Cuddalore and youth from among fisherfolk, participated in the event. The day's activity started with a clean-up drive at the Silver Beach, Devanampattinam fish landing centre, Cuddalore with the active participation of students of Nehru Youth Club of the Periyar Government Arts College.

Principal of the College, Dr. R. Ulagi, inaugurated

the clean-up programme. T-shirts, hand gloves and gunny bags were distributed to the participants and they actively collected 20 bags of plastic waste, glass pieces, chappals, empty bottles etc, which weighed around 620 kg, within two hours of cleaning activity. Ms. K. M. Sarayu, Sub Collector of Cuddalore, too ioined the event.

A public meeting followed the clean-up, in which Dr. R. Balasubramanian SCO, NETFISH outlined the importance of clean-up and also briefed about the activities of NETFISH across India. To create awareness on the eradication of plastics in our day-to-day usage, special lectures by eminent resource persons were also included in the programme. Mr. Mathimurasu from Mechanized Boat Owners' Association, Cuddalore, offered felicitations.

Certificate of Participation was issued to all the students. Mr. M.A. Sekar, Secretary of SOHES, a member NGO of NETFISH, proposed the vote of thanks. The event succeeded in creating awareness among the village community of Cuddalore on the importance of cleanliness of coastal environment and removing debris and other pollutants along the Silver Beach. The waste materials collected were handed over to municipality people for proper disposal.

Tamil Nadu South

NETFISH in Tamil Nadu South region too celebrated the International Coastal Clean-up Day 2019 coupled with the observance of "Swachhta Hi Seva 2019" at Rameswaram Sangumal Beach on September 21, 2019. The program was a joint initiative with The National Centre for Coastal Research (NCCR), South Asia Cooperative Environment Programme (SACEP) and MSSRE.

Dr. Vinoth Ravindran, NETFISH State Coordinator, gave an introduction on plastic pollution and its harmful effect on marine organisms. He also emphasized the role of Swacchta Hi Seva Mission of the Government of India towards eradicating plastic pollution.

Dr. Velvizhi, Principal Scientist, MSSRF, emphasized the role of general public to protect marine and coastal environment from pollution. Dr. Johnson, Senior Scientist, CMFRI, Commander A.K. Dash, Indian Navy and Mr. Vekatachalapathy, Tourist officer also spoke about importance of clean seas. A total of about 160 volunteers, including representatives from five fishing

villages, college students from Alagappa Evening College, NGOs, youth volunteers, Naval officers, fisheries officials, MSSRF staff and consumer organizations took part in the event. The participants holding placards raised slogans highlighting the importance of coastal cleanliness and avoiding plastic pollution. An oath on "Say No to plastic for a better and green tomorrow" was also administered.

The participants collected debris from entire Sangumal beach for a distance of about one km, which amounted to about 1.3 tons. It comprised of plastic bags, bottles and cups (300 kg), glass bottles (702 kg), clothes (14 kg) ropes (80 kg), boat discards such as thermocol and nets (66 kg), chappals (30 kg) and others (30 kg). Certificates were issued to the participants on completion of the programme.

The programme succeeded in engaging and creating awareness among the fishing communities, schools, colleges and university students, beach visitors and other coastal stakeholders and general public on the importance of pollution-free coast and act as ambassadors of our coastal and marine environment.



View of Swachhta Hi Seva activities held at Rameswaram

West Bengal

NETFISH, Kolkata observed 'Swachhta Hi Seva 2019' on September 24, 2019 by organising a road rally by school students, a class on plastic waste management and collection of wastes and cleaning of Deshapran

Fishing Harbour. The event had an active involvement of 35 participants, including 22 students of Class XII of Vocational Fisheries of Kishorenagar Sachindra Siksha Sadan, Contai, Purba Medinipur, school teachers, officials from Deshapran Coastal Police Station, public volunteers, Special Officer of Deshapran Fishing

Harbour, harbour officials, harbour cleaning staffs, fishermen, net menders, HDCs of Deshapran and Shoula, NGO members etc.

Mr. Pranab Kumar Bera, Officer-in-Charge of Deshapran Coastal Police Station inaugurated the programme and highlighted on the importance of sanitation and the role of students for formation of better society. Mr. Atanu Ray, State Coordinator NETFISH, spoke about the importance of observing "Swachhata Hi Seva 2019" and led an awareness class on Plastic Waste Management system to the students.

During the clean-up event, hand gloves, caps, waste collection bags etc. were provided to the participants and they actively collected plastic bags, PET bottles, plastic cups, thermocol pieces, broken nets and ropes etc. from the premises of Deshapran harbour. Sanitization of drainages and wharfs areas was done using bleaching powder.

The net menders and fishers were urged not to litter the region with plastic, nets, thermocol, bottles etc. and to dispose the wastes only at the designated area to make the harbour neat and clean.



Awareness class and clean-up held at Deshapran, West Bengal

Karnataka

In Karnataka, an awareness class on 'Plastic waste menace and its management measures' was held on September 24, 2019, followed by a 'plastic waste clean-up programme' at Amdalli fishing harbour. More than 100 participants, including students of Janata Vidyalaya; fishers and public of Amdalli Fishing Harbour attended the programme.

Mr. Narayana K. A., State Coordinator NETFISH, explained the objectives of the plastic waste clean-up programme under 'Swachhta Hi Seva Programme'. Inaugurating the programme, Mr. Vasanth Kumar, Professor, Karwar, spoke about plastic menace to the human as well as to the environment. Mr. Thoku Harikantra, Director, Fishermen Co-Operative Society, Mudga, also spoke on the occasion. The Head Master of Janata Vidyalaya, Amdalli administered the oath "not to use of plastic straws for drinking cold drinks". After the formal function, a rally with the participation of students and public was organized, raising slogans against the use of plastics.

A demonstration on proper cleaning of the harbour premises and auction hall was also done with the help of fishers. Later on, all the participants cleaned the auction hall and wharf areas and collected plastic wastes dumped inside the harbour.



Awareness class held at Amdalli, Karnataka

Odisha

The event organised on October 1, 2019 at Paradeep Fishing Harbour under the banner "Swachhta Hi Seva 2019" started with spreading awareness messages to the boat crew.

Mr. Ratnakar Nayak and Mrs. Rebaca Jose, Assistant Directors, MPEDA; Mr. Madhumaya Samal, Manager of Harbour Management Society; Mr. Gopal Krishna Mohanty, Assistant Manager of Management Society and Mr. Subaskumar Rout, Secretary, Trawler Owners Association Paradeep led the campaign.

The participants were made aware about the impacts caused by single time use plastics on the environment, especially the marine eco-system. The campaign also urged them not to throw plastic materials like-damaged nets, plastic water bottles, polyethylene bags, broken plastic basket, engine oil plastic bottles, etc. to the open sea. They were told to collect and unload them in to the waste bins kept at fishing harbour on their return from fishing. The awareness class was followed by a mass clean-up drive by around 40 people including the trawler crew members and officials, during which large quantity of plastic wastes was collected.



Participants of the harbour clean-up conducted at Paradeep, Odisha

Kerala North

NETFISH conducted a harbour clean-up drive at Chettuva fishing harbour in Thrissur district on October 1, 2019 as part of "Swachhta Hi Seva" campaign, in association with the Harbour Labour Union Coordination Committee of Chettuva fishing harbour.

The cleaning programme was inaugurated by Mr. Amal C. J., Assistant Coordinator Thrissur district, Suchitwa Mission, in a function presided over by Dr. Joice V. Thomas, Chief Executive, NETFISH. Mr. Santhosh N.K, NETFISH State Coordinator, welcomed the gathering and Mr. Narayanan C.S., leader of Chettuva Fishing Harbour United Trade Union, proposed the vote of thanks.

It was decided at the meeting to reduce and eradicate the use of single use plastic items from the harbour. The Tharakans Association of the harbour offered stainless steel cups for drinking tea in future programmes and meetings in the harbour.

After the inaugural function, harbour workers and other members from different stakeholder groups actively

participated in the cleaning activity. They cleared the overgrown grass and collected all solid litter from the harbour premises. NETFISH provided hand gloves, face



Dr. Joice V. Thomas, CEO NETFISH speaks at Chettuva

masks, refreshments and lunch for the entire group comprising about 60 harbour workers from different unions and other stake holders, who participated in the cleaning activity.

Kerala South

NETFISH-MPEDA, in association with the National

Service Scheme of Kerala University of Fisheries and Ocean Studies (KUFOS), conducted a clean-up at Thoppumpady Fisheries Harbour and an awareness generation drive including rally and door-to-door programme in the nearby fishing hamlets on October 2, 2019. The NSS unit volunteers with the active participation of workers at Thoppumpady Fisheries Harbour made the entire harbour area free of plastic wastes. An awareness speech was also arranged at the harbour against plastic pollution.

The programme was presided over by Dr. Joice V Thomas, CEO, NETFISH and he emphasized the impact of plastic pollution on the environment and human health. Mr. A. M. Noushad, Chairman of Harbour Coordination Committee, inaugurated the programme. Mrs. Sangeetha N. R., State Co-ordinator NETFISH, welcomed

the gathering and Dr. Binu Varghese, Assistant Professor, KUFOS, offered felicitation. The clean-up event ended with a vote of thanks by Dr. Rejish Kumar V.J., Programme Officer, NSS and Assistant Professor, KUFOS.

After the clean-up programme a rally was organized with active participation of volunteers, fishers, workers and trade unions of the harbour. The volunteers handed over awareness notices to the workers and shops in the area. Later on, the participants visited Manassery fishing village where an interaction was organised with traditional fishermen. After the interaction, the volunteers visited the fishermen houses and explained how to properly manage plastics and handed over notices against plastic pollution. About hundred households near the beach area were covered by the door-to-door programme.



Various activities conducted at Thoppumpady, Kerala

Gujarat

The "Swachhta Hi Seva" campaign organised on October 03, 2019 at Mangrol Fishing Harbour, Gujarat, included



Harbour clean-up at Mangrol

a class room session and a clean-up activity at the harbour. Mr. Veljibhai Masani, Chairman GFCCA, was the special guest in the programme. Mr. Ram Adhar Gupta, Deputy Director, MPEDA Regional Division, Veraval; Mr. Ranchodbhai Gosiya, President of Mahavir Cooperative

Society, Mangrol; Mr. Ukabhai Vala, Principal and Mr. Prakasbhai Khorava, Vice Principal of Parmesh School; Mr. Imtayaz Belim, Assistant Superintendent of Fisheries, Mangrol, were also present for the programme.

Mr. Jignesh Visavadia, State Coordinator, NETFISH gave a presentation on "Plastic Waste Management" to students of 11tStandards 11 and 12 of the Parmesh School, Mangrol. Mr. Veljibhai Masani and Mr. Ranchhodbhai Gosiya explained the merits and demerits of use of plastics and administered the oath to stop "Single Use Plastic". Mr. Ram Adhar Gupta highlighted on the need to avoid use of plastic for domestic purpose.

After the awareness session, the outdoor clean-up activity was conducted at Mangrol fishing harbour with the participation of 70 people, including officials, students and fishers.

Around 200-250 kg of plastic wastes was collected from surroundings of the harbour and disposed. Cloth bags were distributed in the programme to create awareness on to avoid use of plastic bags for domestic purpose.

Workshop for the Refinement of Marine Fishing Regulation Act

s part of the ongoing effort to sensitize the stakeholders as well as the Government machinery to take necessary action for amending the Odisha Marine Fishing Regulation Act 1982 by encompassing effective control measures to facilitate sustainable fishing practices, the NETFISH-MPEDA organised a State-level workshop on September 23, 2019 at Raptani Bhawan, Bhubaneswar. The workshop was organised in association with the State Fisheries Department of Odisha. The National Fisheries Development Board (NFDB), Hyderabad rendered support by providing cent per cent financial assistance for conducting the event.



Inaugural address by Mr. R. Raghu Prasad IFS, Commissioner– cum-Secretary, Fisheries and Animal Resources Development, Government of Odisha

The workshop was inaugurated by Mr. R. Raghu Prasad IFS, Commissioner and Secretary for Fisheries, Animal Resources Development Department, Govt. of Odisha. Dr. N. Thirumala Naik IAS, Director of Fisheries, Government of Odisha; Mr. S.K. Jena, Director, Export Promotion and Marketing, Government of Odisha; Mr. Pradap Ranjan Rout, Joint Director of Fisheries (Coastal), Government of Odisha; Mr. Surva Kumar Mohanthy, former Joint Director, Fisheries and Consultant, Chilka Development Authority; Dr. Manoj Kumar Sinha, Officerin-Charge, National Fisheries Development Board, Bhubaneswar; Dr. Subal Roul, Scientist-in-Charge CMFRI, Puri; Mr. U.C. Mohapatra, Deputy Director MPEDA Bhubaneswar, representatives and leaders from the Mechanised and Non-Mechanized Boat Owner Associations of Paradeep, Balaramgadi and Dhamara, and officials from Department of Fisheries, SEAI, MPEDA, NETFISH and member NGOs attended

the workshop. Around 100 people, including officials and stakeholders, turned up for the workshop. Dr. Joice V Thomas, Chief Executive, NETFISH, welcomed the participants.

In his inaugural address, Mr. Raghu Prasad IFS said that the sector needs to be strengthened by implementing Vessel Monitoring programmes for preventing Illegal, Unregulated and Unreported (IUU) fishing. He stressed on the need of certain amendments in the Odisha Marine Fishing Regulation Act 1982 in line with the amendments in the Kerala Marine Fishing Regulation Act 1980, in order to better conservation of the marine resources and the bio-diversity. The Secretary said that Department would conduct several consultative stakeholder meetings across the State to discuss the National Marine Fisheries (Regulation and Management) Bill 2019 and OMFRA. He appreciated the efforts made by NETFISH-MPEDA for conducting this workshop.

Dr. N. Thirumala Naik, IAS, Director of Fisheries, Odisha addressed the gathering and expressed his concern on the declining trend of marine catch for the last several years. He urged to take immediate action by all stakeholders to preserve the natural resources for sustainable fishing and livelihood for the future generation. While thanking the organizers for timely step to hold such seminar, he requested the participants to cooperate, share their suggestions for the amendments and make full use of the technical sessions. Director Export Promotion and Marketing; President SEAI, Odisha; Trawler Associations' presidents from Paradeep and Balaramgadi; president of Traditional Boat Owners



Welcome address by Dr. Joice V. Thomas, Chief Executive, NETFISH

Association and the president of Association of Fish Producers Federation Odisha, offered felicitations.

FOCUS AREA

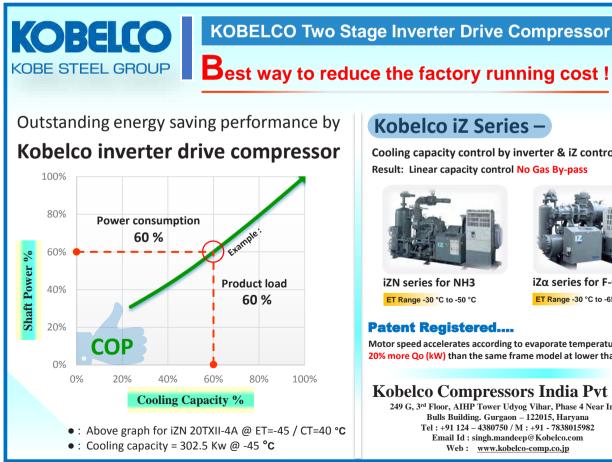
Three presentations were made during the workshop. They were "Orissa Marine Fishing Regulation Acts & Rules" by Mr. Pratap Ranjan Rout, Joint Director Fisheries (Coastal): "The National Marine Fisheries (Regulation and Management) Bill, 2019: State's Comments and Framework for Revised OMFR Act" by Mr. Surya Kumar Mohanty, Fisheries Consultant CDA and "Amendments of Marine Fishing Regulation Act-Kerala model" by Dr. Joice V. Thomas, Chief Executive, NETFISH, Kochi. The presentations were followed by discussions on various regulations in OMFRA.

The discussion session was chaired by Dr. Joice V. Thomas, Mr. Pratap Ranjan Rout, Mr. Surya Kumar Mohanty and Mr. U.C. Mohapatra. During discussions, the stakeholders thanked NETFISH-MPEDA for organising this important workshop at Bhubaneswar. All the stakeholders sought more time for discussing the National Fishery Law as well as OMFRA act themselves.

The workshop led to formulating recommendations like bringing in the possible amendments in OMFRA

in line with the amendment made in the KMFRA act, considering the State's fishery profiles, holding further discussions with all stakeholders regarding the amendments to be made in Orissa Marine Fishing Regulation Act 19, circulating copies of the National Marine Fisheries (Regulation and Management) Bill 2019 among all major Mechanized and Non-mechanised Boat Operators Associations for further discussions, and urging the Department of Fisheries to organise stakeholders meetings at Balasore, Paradeep, Dhamara, Ganjam and Puri in coming months for effective follow up on discussions about the National Marine Fisheries bill-2019 and OMFRA.

It was also decided to discuss the suggestions formulated at the workshop and subsequent meetings in the final meeting to be held at the office of the Director of Fisheries. Cuttack ahead of formulating the comments and forwarding them to the Government by Fisheries Department. The workshop concluded with Mr. S. K. Mohapatra, State Coordinator NETFISH, proposing vote of thanks.



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State-level Brainstorming workshop on "The Refinement of Marine Fisheries Management in Goa"

TETFISH, in association with the Department of Fisheries, Goa, organised a one-day brainstorming workshop titled 'Refinement of Marine Fisheries Management in Goa state' on October 30, 2019 at Directorate of Art and Culture, Patto, Goa. The workshop aimed to bring all the major fishery stakeholder groups, senior State Fishery officials and scientists from Fishery Research Institutes under one platform to discuss on the need of amend the existing Goa Marine Fishing Regulation Act (GMFRA) 1980 in tune with the 'Kerala Marine Fisheries Regulation Act 1980', which was amended last year.

Ms. Siddhi Upadi, welcomed the dignitaries of the programme, and participants of the workshop. Mr. Anil Gawde, NGO, NETFISH-MPEDA, gave an introductory speech about the workshop in Konkani language. The workshop was inaugurated by Mrs. Smitha Mazumdar, Deputy Director, Department of Fisheries, Goa. In the inaugural address, she said that fishermen need to be strengthened with fishing vessel tracking devices or Vessel Monitoring programmes in order to prevent Illegal, Unregulated and Unreported (IUU) fishing. She stressed on conservation of species and marine bio diversity while emphasising on the need of certain amendments in the Goa Marine Fishing Regulation Act 1980 in line with the amendments in the Kerala marine Fishing Regulation Act 1980 and congratulated NETFISH-MEPDA for conducting this.

Dr. Joice V. Thomas, Chief Executive, NETFISH, addressed the gathering and expressed his concern on the declining trend of marine catch for the last several years. He urged the fishers to take immediate action by all stake holders to preserve the natural resources for sustainable fishing and livelihood for the future generation. He requested the participants to cooperate, share their suggestions for the full use of the technical sessions.

Inaugural function was presided over by Mr. Asok Kumar, Deputy Director, MPEDA, Panaji, Goa. In his presidential address, he said that fishers should focus on hygienic handling of the fishes on board and in fishing harbours too, along with the conservation. He advised the fishers to take benefits from MPEDA schemes for getting satellite phone and square mesh cod ends. Ms. Rohita Naik, Department of Fisheries, Goa and Narayana K A, SCO, NETFISH-MPEDA were also present.

Senior officials, including Deputy Director and Assistant Directors from Department of Goa State Fisheries, scientists from NIO, FSI and Central Coastal ICAR, Goa, Deputy Director of MPEDA, Sub Regional Division, Panaji, Chief Executive of NETFISH, fishers of mechanised and motorised fishing vessel owners' associations from all the major fish landing centres and boat owners of Chapora, Malim, Vasco, Cutbon and other places attended the workshop and actively participated in the discussions.

After the inaugural session, Ms. Rohita Naik, Deputy Director of Department of Fisheries, Goa, made a presentation explaining the existing GMFR Act and the need to amend the trawl net cod end mesh size, fishing boat registration and fishing license fees etc. in the Act.

Dr. Joice V Thomas made a presentation to explain the 'Kerala Marine Fishing Regulation (Amendment) Act 2017' and 'Kerala Marine Fishing Regulation Rules 2018' with respect to fleet size, engine horsepower, gear size, mesh size, minimum legal size, setting up of fisheries management council, implementation of vessel monitoring system (VMS) etc. He also talked about the amendments are made as per the fishing fleet and availability of fish species in the state of Kerala. He added it shall not be same for Goa State and hence urged to put forward the recommendations as per the fisheries profile of the Goa state. Mrs. Smitha Mazumdar translated the presentation in Konkani and clarified the doubts.

The presentations were followed by discussions on various regulations notified in the MFRAs. All the major stake holders recommended amending the existing GMFR Act in line with KMFR Act. Implementation of

FOCUS AREA

Minimum Legal Size (MLS), reasonable increase in boat registration and fishing license charges, regulation of size of fishing fleet, not to register new fishing boats etc. were the major suggestions agreed upon by the stakeholders. The stakeholders also suggested the Department of Goa Fisheries to conduct regional and harbour level meetings to discuss further on the suggestions, before finalising the amendments of GMER Act

The programme was successfully concluded with a formal vote of thanks to all the participants and the dignitaries present during the workshop. The workshop provided an excellent platform to discuss and exchange

thoughts and experiences with regard to the sector.

The arrangements of the workshop and the hospitality and commitment of NETFISH-MPEDA was highly appreciated by the participants. The feedback and suggestions provided by participants will be taken up while conducting further regional level meetings and also will be presented in the National level workshop planned later during this year.

Entire workshop was coordinated and organised by the team comprising senior MPEDA staff Mr. Dina Naik, Mr. Saish and Mr. Rohan, Ms. Suparna, Mr. Shrraj and Mrs. Santeshwari, HDCs of NETFISH, Panaji, Goa.





Training programme on "Eco-friendly and Sustainable Aquaculture through Species Diversification"



A view of the training session

PEDA Regional Division Kochi organised a training programme on "Eco-friendly and Sustainable Aquaculture through Species Diversification" at Thrikkunnappuzha village in Alappuzha district from September 24 to 26, 2019, as a part of its extension programmes. The training programme was mainly aimed to benefit new farmers to promote sustainable and diversified aquaculture production by adopting BMPs. Eighteen farmers from Alappuzha district attended this training session.

The trainees were taught about the different aquaculture practices suitable for the particular site. Culture aspects like stock assessment, feed and water quality management, health-disease management, PHT sampling, harvesting methods, postharvest management, marketing aspects related to species like Scampi, Shrimp, Seabass, Crab, Tilapia etc were also covered in the training programme. Presentations on certification and farm enrolment schemes of MPEDA and issues related to the misuse of antibiotics in aquaculture were also included in the programme. The technical sessions were handled by officials of MPEDA Regional Division, Kochi including Mrs. Elsamma Ithack, Assistant Director; Mr. P. Bijimon, Field Supervisor;

Mrs. Manjusha K., Field Supervisor and Mrs. Fathima, Assistant Divisional Officer, Department of Fisheries, Alappuzha. The trainees were also taken to government fish farm and training centre at Ayiramthengu, Kollam as part of the field visit.

After the technical sessions, an interactive session was held, where Mrs. Elsamma Ithack, Assistant Director, MPEDA Regional Division, Kochi answered to the queries raised by participants. This was followed with certificate and stipend distribution to the participants.



Certificate distribution to the participants

Training Programmes on Diversified Aquaculture



Mr. K. Reji Mathew, Assistant Director, MPEDA, Regional Division, Nagapattinam, addressing the participants at Mettupalayam

raining programmes on diversified aquaculture were held for general farmers in Mettupalayam in Coimbatore and Thirumurthy dam in Tirupur in September.

Mr. K. Reji Mathew, Assistant Director, MPEDA, Regional Division, Nagapattinam, inaugurated the training session at Thirumurthy dam of Tirupur district on September 17, 2019.

In his inaugural address, he spoke about MPEDA's role in promoting export-oriented aquaculture and importance of site selection and farm construction techniques for aquaculture. His talk was followed by Dr. A. Ramasamy, former Assistant Director, MPEDA, leading a class on aquaculture diversification, selection of species for diversification, pond preparation techniques and farm management techniques.

On September 18, 2019, the farmers were taken for field visit to the fish farm owned by Mr. Kamardeen, GIFT fish farmer, Palani, where the farm management practices were explained to the trainees.

On the final day, Dr. A. Kannan, LA, MPEDA, Regional

Division, Nagapattinam led the class on importance of GIFT Tilapia, Seabass and freshwater prawn farming to boost the export. Mr. K. Reji Mathew, Assistant Director took classes on fish and prawn harvest techniques and their economics analysis. Various doubts on diversified aquaculture raised by the 22 participants, who participated in the session, were answered. Mr. K. Reji Mathew distributed the certificates to trainees marking the conclusion of the programme and Dr. A. Kannan proposed the vote of thanks.

The training programme at Mettupalayam of Coimbatore was held from September 24 to 26, 2019. Mr. K. Reji Mathew welcomed the participants and delivered the inaugural address. He spoke about MPEDA's role in promoting export-oriented aquaculture. Farmers were taken for field visit next day to the fish farm of Mr. Murthi, an integrated fish farmer in Sathyamangalam. The farm management practices were explained to the trainees on the field.

Dr. A. Ramasamy, former Assistant Director, MPEDA; Dr. A. Kannan, LA, MPEDA, Regional Division, Nagapattinam and Mr. K. Reji Mathew led the classes here too. This session was attended by 20 farmers.



Mr. K. Reji Mathew, Assistant Director, MPEDA, Regional Division, Nagapattinam, addressing the session at Thirumurthy Dam, in the presence of Dr. A. Ramasamy, former Assistant Director, MPEDA, Mr. Subramaniam, Fisheries Officer, Dharapuram and Dr. A. Kannan, LA, MPEDA, Regional Division, Nagapattinam



A view of participants during the training session at Mettupalayam



A view of training at Thirumurthy dam of Tirupur District



Participants during the field visit to the integrated fish farm of Mr. Murthi, Sathyamangalam



Participants during the field visit at GIFT fish farm of Mr. Kamardeen, Palani





Training Programme on eco-friendly shrimp and prawn farming



A field visit to Vannamei farm

five-day training programme on 'Eco-friendly / sustainable shrimp/ prawn farming' and 'Aquaculture of Diversified Species' for SC/ST candidates was organized by MPEDA Sub-Regional Division, Ratnagiri at Golwan village in Sindhudurg district from October 2 to 06, 2019.

Golwan village in Sindhudurg district is gifted with sufficient cultivable fresh water and brackish water area, which is suitable for shrimp farming and fish culture. There is a very high scope for new entrepreneurs to take up shrimp or prawn farming as well as crab or fish farming in the area. The region has the potential to generate export produce. It can also provide an alternative livelihood and employment opportunities to both educated as well as unemployed youths. The area also is home for many SC/ST families that lack information about aquaculture as an alternative livelihood opportunity. Taking into consideration all these factors, Ratnagiri Sub Regional Division of MPEDA organised a 5-day training programme exclusively for SC/ST candidates at Golwan village, with the goal of imparting awareness on sustainable farming and diversification of aquaculture. The programme was attended by 24 members from SC/ST communities. The training programme was inaugurated by Mrs. Prajna Chawan, Sarpanch of Golwan Gram Panchayat on October 02, 2019. In her inaugural speech, she appreciated MPEDA initiative to conduct such training

programmes in the village. She advised the participants to make use of the training and start their business in shrimp or fish farming. Mr. Suresh Tambe, a progressive farmer, were among other locals who spoke during the occasion.

During these five days, various topics related to the subject were discussed by MPEDA officials and resource persons arranged from various regions. Dr. T.R. Gibinkumar, Deputy Director and Dr. Vishnudas R. Gunaga, Junior Technical Officer, gave detailed lectures on aquaculture – right from the site selection, selection of species, pond preparation, water quality management, feed management, disease management and harvesting. Apart from the details of shrimp farming, the trainees were given an overall information about the culture of crab, seabass, tilapia and scampi. Mr. Mayur Sarang, technician from M/s. Oswal Udyog and Mrs. Shradha Anagolkar, a dealer of M/s. GrowBest Feeds, delivered lectures as resource persons on second day of the training programme.

On the morning session of the third day of the training programme, Dr. B.R. Chawan, Professor from College of Fisheries, Ratnagiri, led a class on 'Freshwater Cage Culture'. In the afternoon session, a demonstration of 'Value-added Fishery Products' was organised in association with NETFISH. Mr. Anil Gawade from Nagarik Bahushiksha Pratistan (NGO) demonstrated

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the various methods of preparing value-added fishery products such as shrimp pickles, fish cutlets, fish fingers and fish snack from low value fishes. Trainees actively involved in the preparation of value-added products, which provided hands on training to start an alternative livelihood enterprise.

On the fourth day of the training programme, a field trip was arranged for the trainees. The trainees were taken to the Vannamei shrimp farm owned by Mr. Rajesh Popkar at Kochara village in Vengurla Taluk. Mr. Mondal, the caretaker at the farm, explained the various culture techniques involved in Vannamei farming to the trainees. Trainees also visited the crab farm owned by Mr. Bhaskar Raout at Vengurla, where the trainees got the opportunity to see the pond rearing and box rearing of crabs. Mr. Bhakar Raout explained the various techniques involved in crab farming and soft shell crab production. He also expressed his willingness to help

the trainees to start crab farming business.

On fifth day of training programme, Mr. Jafar Wadkar, a progressive crab farmer and Mr. Arun Alase, a progressive freshwater farmer from Kollapur, were the resource persons from their respective fields. Mr. Arun Alase, who is also the Chairman of Kurundwad Urban Co-operative Bank, assured the possibility of providing term loans to the farmers to start aquaculture business in addition to the farm level consultancy services.

The five-day training programme concluded with the valedictory session on October 6, 2019. Mrs. Prajna Chawan, Sarpanch of Golwan Gram Panchayat, chaired the session. She once again thanked MPEDA for conducting such useful training programmes for the benefit of the socially backward communities and distributed the certificates to the trainees.



Certificates being distributed at the valedictory function



Trainees familiarising with water analysis equipments



Hands-on training on 'Value-added Products'

CMFRI develops 'designer clownfish'



The variety commands a good demand in the market and fetches high price for fisherfolk. The Mandapam Regional Centre of the Central Marine Fisheries Research Institute (CMFRI) has developed 'designer clownfish'. The development of the new ornamental fish with traits of four sub types of clownfish would give a major boost to ornamental fish farming and keeping, officials said.

The CMFRI, which had been helping local fisherwomen set up ornamental fish units, an alternative livelihood programme to fisherfolk, has developed the attractive and colourful 'designer clownfish', which commanded a good demand in the market and fetched high price for the fisherfolk.

"The biggest attraction of this fish is that it has the traits of all the four sub types of clownfish – Picasso, Platinum, Tear drop and Snow flake. We have developed and standardised seed production protocol", said Mr. R. Jayakumar, Scientist (in-charge), CMFRI.

After standardising the production protocol, the CMFRI had started supplying juveniles, measuring one to one and a half inch to fisherwomen running ornamental fish units, marine ornamental fish farmers and those who maintained marine aquariums, he said.

The CMFRI sold designer clownfish at a premium rate of Rs. 150 per fish, while the farmers, after growing

the fish for 45 days, sold them at Rs. 400 each. In the open market, a single multi-colour fish was sold at Rs. 800, he said.

Mr. Jayakumar said the Marine Biotechnical Unit at the CMFRI headquarters in Kochi had developed *varna*, a special feed for ornamental fish. The feed in the form of small granules gave better growth and colour intensity to different varieties of ornamental fish, he said.

As ornamental fish farming was emerging as a profitable business and aquarium fish keeping was growing as one of the popular hobbies, local fisherwomen were encouraged to set up ornamental fish units as alternative livelihood means. With the funding support of the CMFRI, 20 such units had been established in Thangachimadam, Pamban and Mandapam, he said. The Institute proposed to set up five more units at Pudukudi in Thondi for the benefit of Scheduled Caste people under the Scheduled Caste Sub-Plan (SCSP) at a total cost of Rs. 32 lakh. Local self-help groups were being involved in setting up the units with 100 per cent subsidy. Each unit would have six glass tanks and life support system, he said.

Seaweed species can curb acidification of oceans, shows study

Scientists led by the Indian Council of Agricultural was curbed in when seaweed was introduced. Research-Central Marine Fisheries Institute (ICAR-CMFRI) have identified a species of green algae that can reduce the acidification of seawater induced by climate change. According to the study, published in the latest edition of the Journal of Marine Biological Association of India, green seaweed Chaetomorpha antenning was able to prevent the corrosive effects of acidic seawater on molluscs and sea urchins.

Acidification of seawater occurs when atmospheric carbon dioxide (CO2) released via anthropogenic (manmade) activities, leads to a gradual decrease in pH levels in seawater. On a scale of 0 to 14, a pH level below seven turns water acidic, while more than seven makes water alkaline.

The ICAR-CMFRI study showed that like terrestrial vegetation, Chaetomorpha antennina uses CO2 for photosynthesis, removing dissolved CO2. To identify the effect of dissolved carbon dioxide - which leads seawater to turn into carbonic acid – the three-member team studied the dissolution rate of the outer shells of dead molluscs and spines of sea urchin when treated with seawater. For this, they used seawater with different dissolved CO2 levels (0, 100, 200, 250 and 300ppm), both, in the presence and absence of the seaweed. Results showed that the weight of shells reduced as the concentration of dissolved CO2 increased, indicating that carbonate materials dissolved from the skeletal structures. However, the weight loss of the samples

"This biological efficiency of green seaweed Chaetomorpha antennina can be attributed to sequestration of CO2 during photosynthesis and subsequent release of dissolved organic carbon," stated the study.

"The role played by the seaweed in the net reduction in the weight of shells and spines was higher in lower CO2 levels, which suggests the need to optimise the quantity of live seaweed biomass to fight higher levels of dissolved CO2," P Kaladharan, principal investigator, ICAR-CMFRI. "This trend warrants the need for more seaweed beds along the coast or extensive seaweed farms to combat ocean acidification."

Increasing acidity in the oceans is one of the consequences of climate change. According to the International Union for Conservation of Nature (IUCN), rise in ocean temperatures and oxygen loss act concurrently with seawater acidification. Together, they have the potential to alter marine ecosystems and impact coastal protection and the fishing industry. Data released by the Smithsonian Ocean in May estimated that oceans at present absorb 22 million tons of CO2 daily. While the average pH on the ocean surface prior to the beginning of the industrial era (late 18th century) was around 8.2, today it is about 8.1. A 2008 study showed that a pH drop of 0.1 translates roughly to a 30 per cent increase in acidity.

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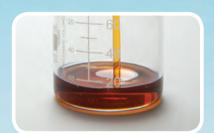
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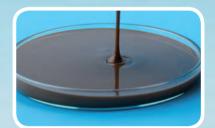
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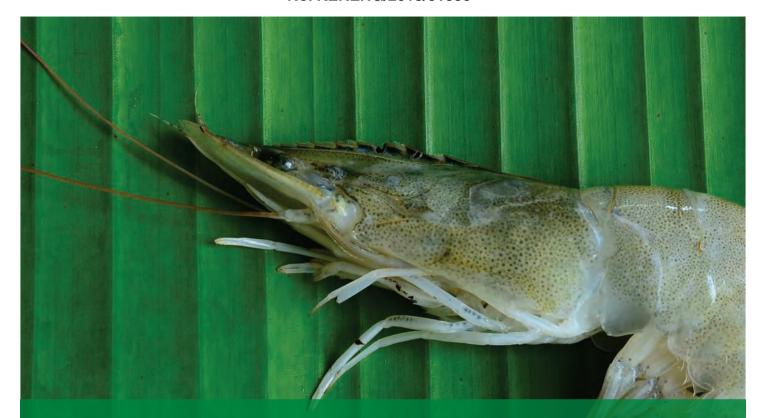




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