ISSN 0254-380 X

No. 235, January - March 2018

Marine Fisheries Information Service

Technical and Extension Series

Short neck clam Paphia malabarica *from Ashtamudi Lake - India's first MSC certified fishery*

Indian Council of Agricultural Research
CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
P.B. No. 1603, Ernakulam North P.O., Kochi - 682 018, Kerala, India

PUBLISHED BY

Dr. A. Gopalakrishnan
Director
ICAR-Central Marine Fisheries Research Institute, Kochi

Photo credit : Dr. K. S. Mohamed, Molluscan Fisheries Division, ICAR-CMFRI

Photo credit : Dr. Josileen Jose, Crustacean Fisheries Division, ICAR-CMFRI

The Marine Fisheries Information Service *Technical and Extension Series* envisages dissemination of information on marine fishery resources based on research results to the planners, industry and fish farmers, and transfer of technology from laboratory to field.

From the Editorial Board.....

Warm greetings to all

The lead article in this issue of MFIS dwells on the prospects of ecolabelling marine fisheries in India and the potential benefits expected from moving into such an ecosystem for capture fisheries sector in the country. The ecolabel tag indicates the product is produced in a sustainable, environment friendly and socially beneficial way. Given the enhanced awareness about environmental issues and sustainable development, the number of consumers who opt for such products is increasing globally. According to the Marine Products Export Development Authority, the seafood exports from India during 2017 - 18 period was 13.7 lakh metric tons, worth US$ 7.08 billion. Even if a small portion of this seafood export basket emerges as ecolabelled products, it can become a win-win situation for all the stakeholders. Efforts aimed at this end therefore needs to be considered seriously. Several articles on recent developments in marine fisheries sector are also included for the benefit of the readers.

Marine Fisheries Information Service

No. 235, January-March 2018

Abbreviation - *Mar. Fish. Infor. Serv., T & E Ser.*

CONTENTS

Developments in progressing India's marine fisheries towards Marine Stewardship Council (MSC) certification

*K. Sunil Mohamed[1], Vinod Malayilethu[2] and Ranjit Suseelan[3]
[1]*ICAR-Central Marine Fisheries Research Institute, Kochi.*
[2]*Marine Conservation Programme, WWF-India*
[3]*India Consultant, Marine Stewardship Council*
**e-mail : ksmohamed@gmail.com*

Introduction

Ecolabelling is a market-based tool to promote the sustainable use of natural resources. Ecolabels are seals of approval given to products that are deemed to have fewer impacts on the environment than functionally or competitively similar products. The ecolabel itself is a tag or label placed on a product that certifies that the product was produced in an environmentally friendly way. The label provides information at the point of sale that links the product to the state of the resource and/or its related management regime. Sitting behind the label is a certification process. A range of ecolabelling and certification schemes exists in the fisheries sector, with each scheme having its own criteria, assessment processes, levels of transparency and sponsors. One of the first scientifically developed ecolabelling schemes, the Marine Stewardship Council (MSC) was set up by the World Wildlife Fund (WWF) and Unilever in 1997, but has been independent of them for past many years. The MSC is arguably the most comprehensive fisheries certification scheme in that it covers a range of species and deals with all aspects of the management of a fishery.

What is MSC Certification?

1) The Marine Stewardship Council (MSC) is an international not-for-profit organization established to transform the way the oceans are fished by creating market recognition and incentives for well managed and sustainable fisheries worldwide. The MSC has developed a logo to inform consumers that when they buy seafood products with a MSC logo they are supporting healthier oceans and a healthier environment.

2) Only fisheries certified to be sustainable can use the MSC logo. MSC supports development of sustainable marine fisheries by promoting responsible environmentally sound, socially beneficial and economically viable fisheries practices while maintaining the biodiversity, productivity and ecological process of the marine environment. Both the end customer and the fishing industry gain through this certification.

3) MSC environmental standards for sustainable fishing are based on FAO Code of Conduct for Responsible Fisheries (CCRF). MSC Certification is a set of Principles and Criteria for sustainable fishing which is used as a standard in a third party, independent and voluntary certification programme. These were developed by means of extensive international consultative process through which the views of stakeholders in fisheries were gathered.

4) MSC has a strong and influential market presence (*https://www.msc.org/about-us/10-facts*). There are 9.5 million metric tonnes of seafood caught annually by MSC certified fisheries in 34 countries, which is almost 12% of the annual global harvest of wild capture fisheries. There are 24,768 products with the MSC ecolabel on sale to consumers in over 100 countries. There are about 3,000 MSC Chain of Custody certificate holders, operating in 34,500 sites, which link the certified fisheries to markets. Market use of the MSC label is particularly strong in Western Europe and North America, and is growing quickly in Japan.

The three basic principles of MSC Certification are

Principle (P1) : A fishery must be conducted in a manner that does not lead to overfishing or depletion of the exploited populations and for those populations that are depleted, fishery must be conducted in a manner that demonstrably leads to their recovery.

Principle (P2): Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species on which the fishery depends).

Principle (P3): The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

To determine if each principle is met (for guidance on how certification can be approached see *https://www.msc.org/documents/get-certified/fisheries*), the MSC Fisheries Standard comprises 28 performance indicators (Fig. 1). These are used by independent conformity assessment bodies (CABs) to score the fishery (Fig. 2).

To ensure the MSC program and its associated benefits are accessible to all fisheries including those from the developing world, the MSC developed a set of precautionary risk-based indicators for the assessment of data-deficient fisheries - the Risk-Based Framework (RBF). However, RBF does not cover the assessment of management: Principle 3 of the Fisheries Standard.

Do Indian Fisheries need certification ?

In order to be competitive in global seafood trade (currently India's share of global seafood exports is 4% and it is growing), India needs to be proactive on seafood ecolabelling and, in future, aim for MSC certification of its major globally traded fisheries. In particular India would benefit from MSC certification of fishery products destined for the European and North American markets in two complimentary ways – enhanced economic opportunities and market access for the fishing industry and enhanced international reputation for the quality of Indian fishery management. Besides, these there would be environmental and ecosystem health benefits. Some of these benefits that could be obtained by a commitment and effort toward MSC certification, depending on the nature of that commitment and its public exposure are listed below.

- **Fishing industry:** Recognition of good and heightened management of fisheries, preferred supplier status, newer markets and better pricing.
- **Retailers and wholesalers:** Commitment to sustainability, confidence in sustainability of product, meeting consumer demand.
- **Consumers:** Not contributing towards overfishing and ecosystem degradation and supporting the management effort.

Are Indian Fisheries Certifiable as per MSC standards ?

The MSC is a 'high bar'. Although there are exceptions, many Indian fisheries would likely not meet the requirements of the MSC standards. There are technical assessment methods, such as the Risk Based Framework, that are available for MSC assessment in data limited situations, and these may help relatively quickly to address shortcomings in the ecological principles (i.e. P1 and P2). However deficiencies in meeting the management and governance Principle (i.e. P3) would need to be addressed directly through concerted efforts in revision of rules and regulations through the State and Central governments. Though this would take focused effort it could be addressed through development of time-limited action plans.

The short-neck clam (*Paphia malabarica*) fishery of Ashtamudi Lake which is a low-volume, low-value, small-scale fishery with an export market got MSC certified a few years back. About 20 years ago when the fishery was in a crisis with low biomass and dwindling catches, the advice of ICAR-CMFRI for regulations was voluntarily followed by the fishers.

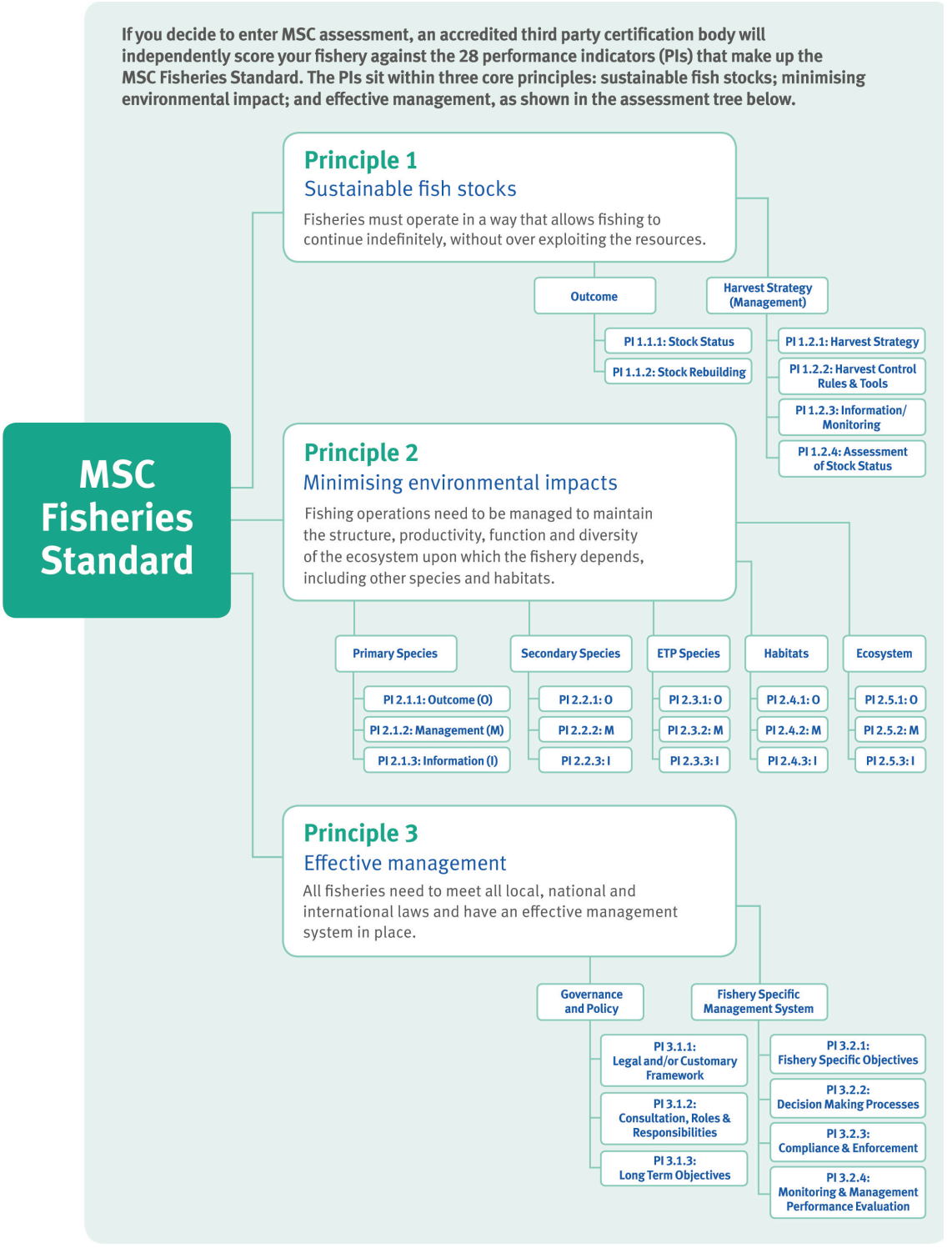

Fig. 1. MSC principles and performance indicators (source : *www.msc.org*)

This resulted in steady yields from late 1990s and these informal self-regulations were formalized through the creation of the Ashtamudi Clam Fisheries Governance Council under the District Administration on the basis of a fishery management plan (Mohamed *et al.*, 2013, *CMFRI Spl. Publ.* 114). This paved way for the successful ecolabelling of the fishery as India's first MSC certified fisheries

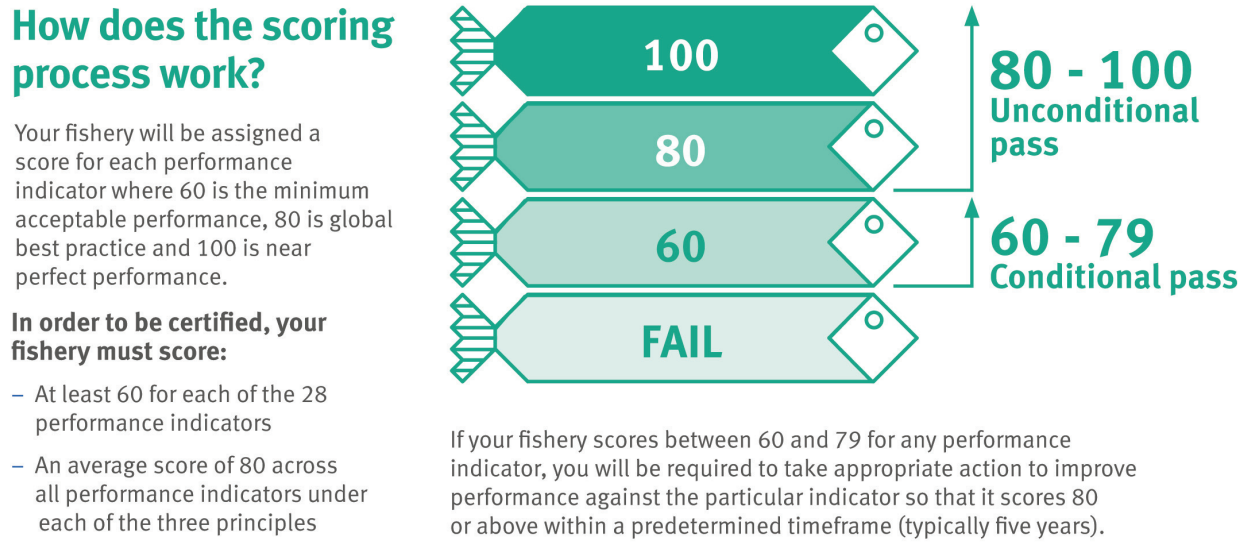

Fig. 2. MSC fishery scoring guideposts (source : *www.msc.org*)

(Mohamed and Malayilethu, 2015; *http://eprints.cmfri.org.in/10522/*).

What is the way forward ?

Accepting that maintaining fisheries in a sustainable manner is a necessity for steady and ongoing yields and employment from wild-caught fisheries in India, and accepting that the MSC ecolabel is a global leader in sustainable fisheries certification with obvious market and trade benefits, the government may develop programs aimed at achieving ecolabelling of identified fisheries. The WWF-India has been a prime mover for supporting certifiable fisheries in India and developing plans for its improvement so that it can be MSC certified. Fishery Improvement Projects (FIPs) are commonly used in many parts of the world to help fisheries meet the requirements of MSC certification (*https://www.msc.org/about-us/credibility/all-fisheries/tools-for-fisheries-improving-towards-msc-certification/tools-for-improving-fisheries-towards-msc*). An infographic on the characteristics of a credible FIP is given in Fig. 3.

The first step is to identify fisheries which have the potential for MSC certification. There are several small-scale fisheries using relatively low-impact fishing gear, some of which are exported or have a potential export market, and hence, can be considered immediately. The larger fisheries that support seafood products for export are shrimp, squid and cuttlefish. These are trawl-caught and thus would need considerable more work to demonstrate achievement of the MSC standard. These fisheries can be taken to be a long-term target for MSC certification. The challenges in these fisheries can be gradually overcome through longer-term FIPs for the concerned fishery, which would include involvement of the government and stakeholders relevant to management and operation of the fishery. All these fisheries would need to develop FIPs, and funding support for this is vital.

WWF has recently used independent international auditors (M/s Poseidon, Australia. Intertek Moody, UK and Jo Gascoigne, UK) to evaluate the shortcomings, with respect to MSC certification, of shrimp and cephalopod trawl fisheries on southwest coast of India and the main constraints are given in Table 1.

Proposed plan to enable MSC certification of key Indian Fisheries

The lesson learnt from the Ashtamudi Clam certification process is that concerted effort is

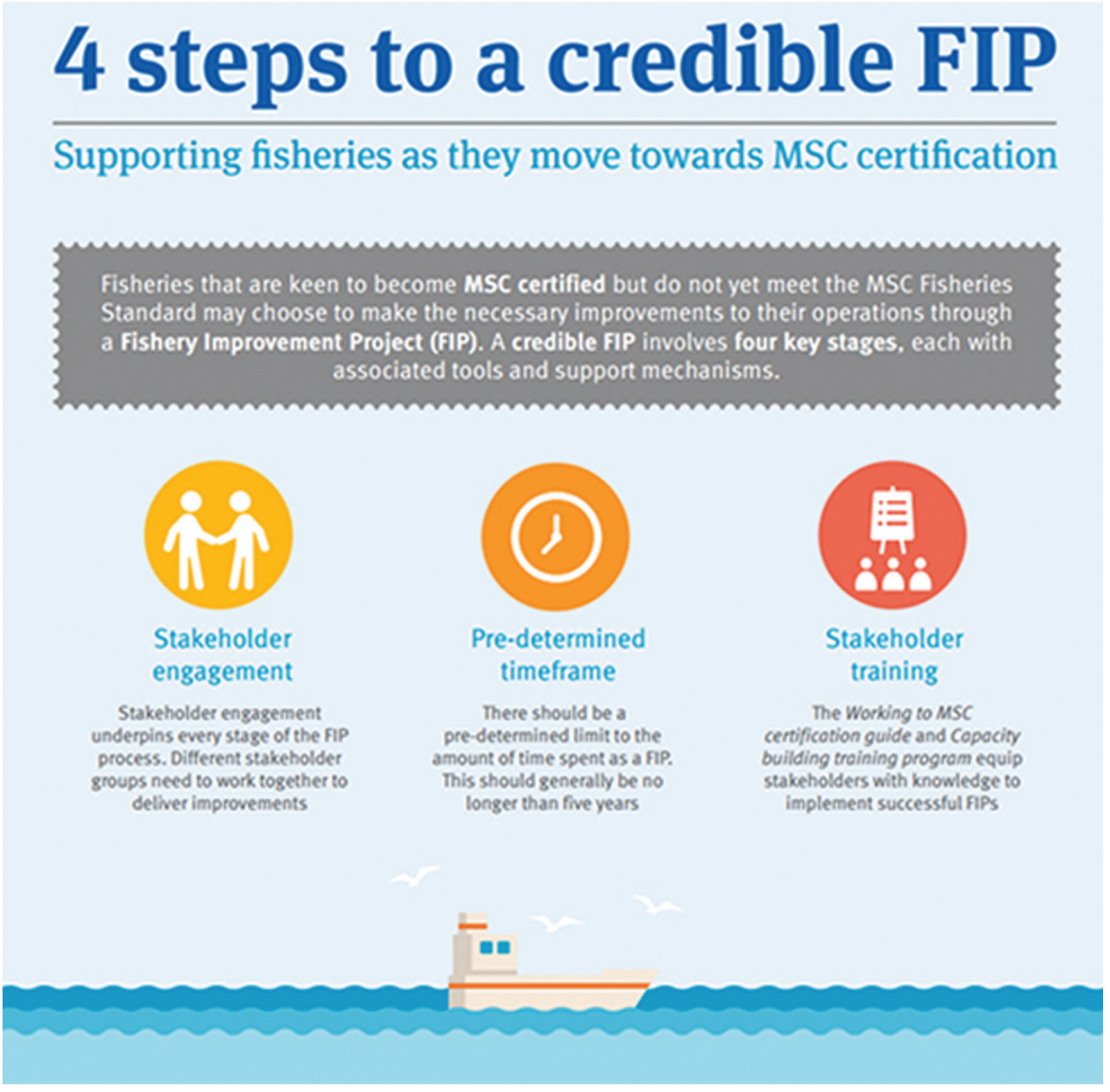

Fig. 3. MSC infographic on fishery improvement project (source : *www.msc.org*)

required from various agencies concern. It is proposed that the agencies develop and agree on a plan that enables some key Indian fisheries to achieve MSC certification. Table 2 describes the objectives for the different agencies to address each of the MSC Principles. While a more detailed workplan to achieve each of these objectives would be developed by the agencies, some possibilities are outlined.

The workplan along with the information and documentation it generates, would allow India to focus its and other agencies attention toward MSC certification of major Indian marine fisheries. In a world in which the demand for fishery products are increasing in leaps and bounds, and the pressure on the natural resources are rising, ecolabelling appears to be a possible way to bring about a greater degree of control and sanity in the system.

Table 1. Major constraints identified for MSC certification of the shrimp and cephalopod trawl fishery in India

MSC Principle	*Shortcomings*	*Possible Solutions*
P1 Sustainable fish stock	No Limit Reference Points have been identified for the stock.	To meet the MSC standard, some Limit Reference Points would be needed.
	The management regime does not include any measures to prevent the fishery from impairing the reproductive capacity of the stock.	To meet the MSC standard, some Target Reference Points would be needed.
	No Target Reference Points have been set. There does not appear to be a harvest strategy in place for this fishery that meets this definition at present.	In order to meet the MSC standard, a Harvest Strategy would be needed for the fishery.
P2 Minimizing environmental impacts	There is no management strategy in place to govern the retention of non-target species in this fishery.	An appropriate strategy for managing the retention of non-target species would be needed.
	There is no management strategy in place to govern the discarding of non-target species in this fishery.	An appropriate strategy for managing the discarding of non-target species needed.
P3 Effective management	No appropriate long-term objectives can be found in policy documents, such as a harvest strategy or harvest control rules. In this respect the management system is not complete.	The fishery management system needs to be updated to include a harvest strategy and harvest control rules that are linked to fishery specific objectives.
	As noted above, the decision making process in place does not appear to link fishery specific objectives to management measures for either serious issues or to deliver precautionary management.	The decision making processes needs to be updated to link management measures to management objectives.
	No mechanisms exist to enable the management system to be subject to internal and external review. There is no formal schedule for such review, nor a commitment to respond to the results of such review.	A formal system for management performance evaluation required.

Development of a separate sustainability standard for the country rather than use of internationally accepted standards is an option which is often debated. There are several drawbacks in this consideration as the reputation and reliability of the label is the primary criteria considered by buyers of sustainable seafood. Developing a standard adhering to FAO and GSSI (Global Sustainable Seafood Initiative) guidelines and consistent with ISEAL (International Social and Environmental Accreditation and Labelling Alliance) code of good practice is an expensive and time consuming task. Furthermore, a diluted standard will not find any market acceptance.

Recent Developments

a) Improving the certification basket of India

During the 25th Technical Advisory Board meeting of the MSC at Kochi in 2015, the Seafood Exporters Association of India (SEAI) requested for focussed attention of the MSC on India's seafood industry. This was primarily because importers of Indian seafood from Europe and North America were demanding certified sustainable products or at least products from fisheries which have shown an inclination towards sustainability as in a FIP. In 2017, the MSC opened its presence in India through the appointment of a consultant based in India. The

Table 2. Workplan and suggested roles and responsibilities of various organisations in the effort to move towards MSC certification in India

MSC Principle/ Other	Objective	By whom?	Workplan
P1 Sustainable fish stock	Stock status Harvest strategy & controls Fishery information & monitoring	ICAR-CMFRI	Create fishery specific groups to collate biological and technical information. Identify gaps with respect to the standards requirement and make plans to address them.
P2 Minimizing environmental impacts	Primary & secondary species ETP species Habitats & ecosystem	ICAR-CMFRI	Collate information on primary and secondary species, ETP species and habitats.
P3 Effective management	Governance & policy Fishery specific management systems Legal framework	State & Central Fisheries Departments	Create time-limited action plans to address gaps in policy and management as identified by the consultant.
Stakeholder management & coordination	Awareness, scoping studies, FIPs, stakeholder meetings, consultant management	WWF-India MSC-India	Identify consultants, conduct scoping studies and make FIPs. Coordinate stakeholder meetings and create awareness.
Overall Coordination & funding	Coordination with government departments and seafood exporters and arranging funding	MPEDA	Generate corpus fund for certification; get all players together; coordinate meetings and actions.

MSC-India and WWF-India, with the help of ICAR-CMFRI, have shortlisted and prioritized several species/fisheries which can be moved to the process of MSC certification. The species selected were prioritized using criteria such as market value of the resource, the small-scale nature of the fishery and limited complexity. Some of the fisheries selected are simple single species, others are complex multi-species and multi-gear fisheries.

The concerted efforts of MSC-India, WWF-India and ICAR-CMFRI have resulted in moving more than a dozen species/ fisheries towards MSC certification (Table 3). The technical backstopping for all of these fisheries are provided by ICAR-CMFRI; and several species specific fishery management plans are on the anvil. More importantly, several clients and stakeholders have come forward by investing time and money to ensure fisheries sustainability and also better market accessibility.

b) Financial schemes to support certification

MSC certification requires sufficient funds to pay for professional audits. Recognizing the need for encouraging Indian fisheries to move towards sustainability and traceability certificates, the Marine Products Export Development Authority (MPEDA) has launched financial schemes to support fishers moving towards certification. Under clause C.1.1 of the MPEDA scheme launched on 21.09.2018, financial grant to the tune of ₹ 5 lakhs (50% of cost subject to maximum of ₹ 5 lakhs) is provided as assistance for certification of fishery and chain of custody. This is a welcome initiative and should provide the impetus to move many Indian fisheries towards certification.

c) Training for Indian auditors

Third party auditing is an integral part of the MSC certification process. Currently auditors evaluating an Indian fishery have to come from Europe or North America. This greatly increases the cost of the assessment process. In order to reduce costs, the MSC with the help of WWF-India has been organizing training programmes in India in order to build local capability. For example, MSC Level 2 & 3 training were conducted during 2018. A recent Level 3 capacity building/training organised for three candidates took place alongside a Conformity Assessment Body (CAB) conducting MSC pre-assessment for five fisheries in Kerala. The CAB

Table 3. Details of fisheries which have moved towards MSC certification in India.

Fishery	Species	FAO Area	Client	Conformity Assessment Body (CAB) for audit	Funding	Status
1. Gillnet caught blue swimming crab	*Portunus pelagicus*	Palk Bay Area 57	Crab Meat Processors Association (CMPA)	SCS Global USA	National Fisheries Institute Crab Council, USA	• Fisheries Management Plan (FMP) prepared by ICAR-CMFRI • Pre-assessment in process • Stakeholder meetings held
2. Gillnet caught Indian oil sardine	*Sardinella longiceps*	Kollam Area 51	Fishermen Welfare Society, Kollam	Moody Marine UK	WWF-India	• Fishery mapping by ICAR-CMFRI • Pre-assessment and FIP complete • Stakeholder meetings held
3. Trawl caught karikadi shrimp	*Parapenaeopsis stylifera*	Kerala/ SW coast Area 51	Seafood Exporters Association of India (SEAI)	Control Union Pesca UK	SEAI Consortium	• Fishery mapping by ICAR-CMFRI • Draft Pre assessment • Stakeholder meetings held
4. Trawl caught Indian nylon shrimp	*Heterocarpus woodmasonii, H. chani*	Kerala/ SW coast Area 51	Seafood Exporters Association of India (SEAI)	Control Union Pesca UK	A consortium of processors led by Choice Canning Company	• Fishery mapping by ICAR-CMFRI • Pre-assessment due • Stakeholder meetings held
5. Trawl caught poovalan shrimp	*Metapenaeus dobsoni*	Kerala/ SW coast Area 51	Seafood Exporters Association of India (SEAI)	Control Union Pesca UK	SEAI Consortium	• Fishery mapping by ICAR-CMFRI • Draft Pre assessment • Stakeholder meetings held
6. Trawl caught Indian squid	*Uroteuthis photololigo duvaucelii*	Kerala/ SW coast Area 51	Seafood Exporters Association of India (SEAI)	Control Union Pesca UK	SEAI Consortium	• Fishery mapping by ICAR-CMFRI • Draft Pre assessment

						• Stakeholder meetings held
7. Trawl caught pharaoh cuttlefish	*Sepia pharaonis*	Kerala/ SW coast Area 51	Seafood Exporters Association of India (SEAI)	Control Union Pesca UK	SEAI Consortium	• Fishery mapping by ICAR-CMFRI • Draft Pre-assessment • Stakeholder meetings held
8. Trawl caught webfoot octopus	*Amphioctopus neglectus*	Kerala/ SW coast Area 51	Seafood Exporters Association of India (SEAI)	Control Union Pesca UK	SEAI Consortium	• Fishery mapping by ICAR-CMFRI • Draft Pre assessment • Stakeholder meetings held
9. Trawl caught whelk	*Babylonia spirata*	Kollam Area 51	SEAI, All Kerala Boat Owners Association	Control Union Pesca UK	SEAI Consortium All Kerala Boat Owners Association, MPEDA	• Fishery mapping by ICAR-CMFRI • Client negotiations in progress
10. Trawl caught flower shrimp	*Penaeus semisulcatus*	Palk Bay/ Gulf of Mannar Area 57	ALDI SÜD /SHORE Germany	Independent consultant	ALDI SÜD /SHORE Germany	• Fishery mapping by ICAR-CMFRI • Draft pre assessment report • One stakeholder meeting held
11. Trap caught lobster	*Panulirus homarus*	Nagercoil/ Kanyakumari Area 51	FISHMARC	Under negotiation	Under negotiation	• Fishery mapping by ICAR-CMFRI • Stakeholder meetings held
12. Pole and line caught skipjack tuna	*Katsuwonus pelamis*	Lakshadweep Area 51	Department of Fisheries Kavaratti	Control Union Pesca UK	WWF-India, International Pole and Line Foundation	• Bait fisheries management plan completed by ICAR-CMFRI, Pre assessment & FIP development competed • Stakeholder meetings held
13. Trawl caught threadfin bream	*Nemipterus randalli*	Southwest coast Area 51	Ghadre Exports, Ratnagiri	Sustainability Incubator, USA	Ghadre Exports, Ratnagiri	• Pre-assessment competed • Stakeholder meeting pending

trained and mentored selected participants through the pre-assessments via CAB-led workshops and remote support. The idea is that with this additional training and exposure to CABs, the selected candidates would be in a good position to become fishery assessors in India.

Level 2 capacity building / training programmes are held as part of MSC's ongoing efforts to build capacity to support small-scale fisheries and fisheries in the global south that are interested in working towards meeting the MSC Standards. Additionally, the MSC-India is also helping fisheries colleges and universities improve and develop their post-graduate curriculum with respect to ecolabelling and MSC standards.

d) Launch of the Sustainable Seafood Network of India (SSNI)

On 5th April, 2018, a workshop was jointly hosted by ICAR-CMFRI, WWF-India and MSC-India titled "Indian fisheries towards sustainability - Marine Stewardship Council Certification" at ICAR-CMFRI, Kochi, Kerala, chaired by its Director. During this workshop which was attended by fisheries scientists, development agencies, seafood exporters and stakeholders, a networking group called as "Sustainable Seafood Network of India" (SSNI) was formed as unanimously agreed at the workshop.

SSNI is mandated to bring together people and organizations to pursue common goals that cannot be undertaken in individual capacities. This network will be sharing information related to sustainable seafood, coordinate related activities and assist to join forces for such activities that require joint efforts. The SSNI aims to work in the following areas:

a) Provide oversight and monitoring of fisheries working towards MSC

b) Provide advice on species/fisheries for potential FIPs and certification

c) Provide input to the development and implementation of projects supporting fisheries working to MSC

d) Provide awareness of sustainability and MSC certification

e) Creating a development consensus on sustainability issues

f) Work in collaboration with different stakeholders, NGOs and funding agencies

g) Drives policy, project design, funding availability and project executions

h) Creating economies of scale (assist in trade of sustainable fisheries from India)

i) Provide a forum for capability building in India for sustainability and certification

j) Identifying opportunities for collaboration in support of sustainability and certification among different stakeholders

k) Documenting knowledge based on members' interventions

The SSNI has an Apex Body at National Level which is called as the Apex Advisory Board. It comprises of a Chair, 9 members drawn from different stakeholder groups and a convener. The SSNI also has a Terms of Reference (TOR) and scope to expand on regional scales.

To summarise, ecolabelling and certification of Indian seafood appears poised for further growth because of the tremendous interest and support of all stakeholders that it is currently receiving. However there is a long road ahead before Indian marine fisheries can fully meet all the standards of the MSC. On the other hand, the certification initiatives are driving the research institutions and the government to urgently tackle sustainability issues in fisheries.

Acknowledgements

The authors are thankful to the Director, ICAR-CMFRI for supporting the fisheries certification and sustainability initiatives. A large number of stakeholders such as fishers, associates from seafood industry and fisheries officials have contributed to the progress made. Thanks are also due to Dr Keith Sainsbury and Dr V Kripa for critical comments.

Multiday ring seine fishing for tunas - A new initiative at Cuddalore, Tamil Nadu

*M. Sivadas, A. Margaret Muthu Rathinam, S. Pradeep, S. Mohan, R. Vasu, N. Rudramurthy, K. S. Shiak Mohamed Yousuf, V. Joseph Xavier and P. Laxmilatha

Madras Research Centre of ICAR-Central Marine Fisheries Research Institute, Chennai
**e-mail: sivadasmadhav@yahoo.com*

The introduction of ring seine in Tamil Nadu was to target shoaling fishes like oil sardine. The volume of oil sardine landings in Tamil Nadu showed tremendous improvement after the use of this gear. Though Tamil Nadu government banned the operation of this gear in 2000, it is still active in certain parts of Tamil Nadu like Cuddalore which is the most important ring seine fishery centre. In Cuddalore, the mechanized ring seine fishery started in 2009. The units were bought from Kerala and hence the size of the boat and engine power, size of net and operation of the gear were similar to those used in Kerala. The normal operation of ring seine is within 30 to 50 m area and very close to the shore, The catch is brought to the landing centre in carrier boats on the same day. The oil sardine fishery in 2017 was a failure because of which the operation of ring seines was almost suspended. The failure of oil sardine fishery continued in January and February 2018. In order to tide over this difficult period, the fishermen having bigger ring seiners (> 70 ft OAL with engines of >500hp) ventured into deep sea fishing targeting oceanic tunas in February 2018.Normally 50 persons are engaged in each boat. The net has an overall length of 2000 to 2100 m with the height varying from 100 to 120 m with a mesh size of 110 mm. Though the net is made of cotton, the lower part with a height of 9 to 10 m is made of nylon net to which the usual lead weight and rings are attached. According to the fishermen, the nylon net which is their innovation, breaks easily and thus helps in the easy retrieval of the net whenever it gets entangled as it passes over rocky surfaces.

The tuna fishing grounds are approximately 50 to 80 nautical miles (nmi) away, where the depth is more than 1000 m and takes 8 hours to reach. The total fishing days in each voyage vary from 3 to 4. The net is operated during day time only and depending on the shoal strength, two to four hauls are made in a day. Carrier boats are not employed and the catch is directly unloaded from the boat in the Cuddalore Fisheries Harbour. Hence there is no ambiguity regarding estimating the actual catch of a mother boat usually associated with the ring net fishery for small pelagics such as sardines. Initially, the yellow fin tunas caught were of sizes above 30 kg. Occassionally as on the observation days on 26 and 27th February, yellowfin catch was dominated by smaller size groups, weighing less than 5 kg (Table 1, Fig. 1). Other fishes caught were mainly little tunny, frigate tuna and dolphinfish.

Table 1. Catch details of multiday ring netters on observation days

Date	Unit landed	Catch (t) Yellowfin tuna	Skipjack tuna	Other fishes	Total (t)
12.2.18	1	24	12	0	36
	2	16	10	0	26
13.2.18	1	10	3	0	13
	2	7	2	0	9
	3	5	2	0	7
21.2.18	1	18	0.9	0	18.9
	2	15	0.9	0	15.9
	3	8	0.3	0	8.3
22.2.18	1	12	0.3	0.5	12.8
	2	15	0.4	0.6	16
	3	8	0.5	0.9	9.4
26.2.18	1	10	0.5	0.5	11
27.2.18	1	3	10	2	15
	2	3	9.8	2.3	15.1


Fig. 1. Yellow fin tuna caught

The catches were disposed through open auction. The rate for yellow fin tuna ranged from ₹ 80 to ₹ 95 per kilogram and that of skipjack tuna around ₹ 60/-. The entire tuna catch was transported to Kerala for further disposal.Economics of each trip was estimated. Each fishing unit is normally owned by a group of 10 to 15 persons. It requires 3000 l of diesel besides 250-300 ice bars each weighing 50 kg for preservation of the tunas and other fishes caught. They take 100 cans of fresh water for drinking besides food items. The operational cost for one trip is around ₹ 2 lakhs. The total proceeds are shared on 40: 60 among workers and owners respectively. The operational expense is met from owners share. Present operations are perceived to be profitable for the owners and the workers also get a decent share.

This is yet another example of using their own wisdom to tide over their crisis and has certain positive points besides the economic aspects. The fishing is conducted in areas far away from the conventional fishing grounds and traditional fishermen. Targeting a resource (oceanic tunas) which the government is emphasizing as part of diversification of fishing and augmentation of fish catch is also achieved.

Generally, the deep sea multiday drift gill netters used to catch the bigger yellowfin tuna occurring during this time of the year but in a few numbers only. However, this year, the gillnetters based at Chennai and Thoothukudi got very good catches of bigger yellowfin tuna during this period. These were fully mature suggesting spawning shoals. A gradual decrease in the quantity of bigger yellowfin tuna landed along with dominance of smaller size ones in the catches during the end of February was recorded. Hence, it is not clear how long this fishery trend will continue and requires further monitoring.

Observations on the fishing of polychaete worm in the intertidal region of Tuticorin Bay

*P. S. Asha and K. Diwakar

Tuticorin Research Centre of ICAR-Central Marine Fisheries Research Institute, Thoothukudi
**e-mail: ashasanil@gmail.com*

As an alternative livelihood sources fishers from Thoothukudi, Puducherry and Chidambaram are regularly harvesting the polychaete worms found Tuticorin Bay. The polychaete worms collected were identified as *Marphysa* spp (Fig. 1). While the fishers from Puducherry are collecting the worms for the live bait industry, the groups from Chidambaram are collecting it for shrimp hatcheries to be used as a live feed for shrimp brooders. Groups of fishermen are harvesting the worms during the low tide time from the intertidal region especially in the early morning hours. The process includes the spotting of the worm burrows followed by excavating the soil with a spade. While one person digs the other searches for the polychaete worms by breaking the lumps. The digging of the earth is done even up to two meter depths for getting sufficient numbers. The collected worms have to be kept in live

Fig. 1. Harvested *Marphysa* sp.

condition in clean vessels with seawater until they are handed over to agents of shrimp farmers. When used as prawn maturation feed in hatcheries. Each group is reported to collect around one kilogram of live worms per day which earns them ₹ 300 per kg on the spot itself. Earlier there was not much demand for this worm, due to its reported role as a passive vector for the white spot syndrome virus in cultured shrimps. However, now the polychate worms are back in demand. Its role as a maturation diet for the brooders of *Penaeus vannamei* in the prawn hatcheries and local shrimp farms is driving this trend. There is scope for culture of this polychaete in India to meet the growing market demand and also to prevent overexploitation in wild populations.

Frequent landing of bull sharks at Vizhinjam

*Ambarish P. Gop, S. Surya, N. K. Midhunranj, K. K. Suresh, T. G. Kishore and M. K. Anil

Vizhinjam Research Centre of ICAR-Central Marine Fisheries Research Institute, Vizhinjam
**e-mail : gopidas.ambarish@gmail.com*

Unique and continuous landing of bull shark, *Carcharhinus leucas* was observed at Vizhinjam landing centre during the February – March, 2018 period (Fig. 1). 16 numbers of bull sharks measuring 110-359 cm (total length) and weighing 90 - 330 kg each were landed. Of these, only 3 sharks were immature. The landings of *C. leucas* along the Vizhinjam coast is usually occurs only once or twice in a month, but such steady landings as recorded was a rare occurrence. Plywood boats of around 7-8 m OAL fitted with fitted with 25 hp out board motor or two 9.9 hp combined motors conduct the single day fishing using hook and line. Bull sharks as by-catch in the bottom set gillnets (targeting rays) were also observed on a few days. The fishers venture upto 25 nautical mile from the shore and are operating the gears up to the depth of 135 meters for catching bull sharks. The fishers recorded from the shore during the early morning hours and returned in the afternoon. The landings of bull shark at the Vizhinjam landing centre fetched good returns which were a relief to the fishermen who were

Fig. 1. Bull sharks landed at Vizhinjam landing centre on different days

resuming fishing after the cyclone *Ockhi* which had recently occurred. Most of the days, the sharks were auctioned off at the rate of ₹ 40,000 – 90,000 per piece. The bull sharks landed were transported to Thoothoor for further processing and marketing. These processing plants process the shark as dried and salt cured based on the demand from neighboring states. Kerala is one preferred state with Calicut, Changanassery, Kottayam and Ettumaanoor being prominent areas of dried shark consumption and market demand.

Emergence of blood clam fisheries off Mumbai coast

*Santosh N. Bhendekar[1], Vaibhav D. Mhatre[1], Geetha Sasikumar[2], Veerendra Veer Singh[1] and K. Sunil Mohamed[3]

[1]*Mumbai Research Centre of ICAR-Central Marine Fisheries Research Institute, Mumbai*
[2]*Mangalore Research Centre of ICAR-Central Marine Fisheries Research Institute, Mangaluru.*
[3]*ICAR-Central Marine Fisheries Research Institute, Kochi*
**e-mail: santucofs@gmail.com*

Blood clam (*Tegillarca granosa)* lives in intertidal and shallow subtidal waters preferring muddy bottoms, mainly in protected bays and estuaries, or in mangroves with silty bottoms and low salinity. In India, it forms commercial fishery in Kakinada Bay in Andhra Pradesh (Narasimham, K.A. 1969, *J. Mar. Biol. Ass. India*, 20: 407-417).Thane Creek is an inlet in the shoreline of the Arabian sea off Mumbai where large-scale exploitation of blood clam has emerged during the recent past.The blood clam fishery near Mahul, Trombay and Darukhana which commenced in December 2017 lasted upto March 2018. They were harvested by hand picking in shallow areas and hand dredges operated from wooden canoes 10-15 feet overall length. Nearly 8-15 Fishers from Darukhana go for handpicking the class. In Mahul and Trombay the fishermen use a canoe, rowed by one while the others conduct dredging. Each hand pickers was getting about 30 kg catch. The catch from each canoe was 100-300 kg per day. The length range of blood clam caught was between 34.5 to 52.6 mm. Hand pickers sell the clams in local markets while canoes bring catch to New Ferry Wharf where agents procure it for supplying to Goa and on demand basis to hotels in Mumbai. The price varies from ₹ 30-60 per kilogram. As per fisher's opinion the fishery is not regular but once every three years they are getting good catches of blood clam.

Abnormalities in Indian oil sardine

T. B. Retheesh, D. Prakasan, A. R. Akhil, U. Ganga and E. M. Abdussamad

ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail: tbretheesh@gmail.com*

Routine sampling of Indian oil Sardine, *Sardinella longiceps*, for biological studies was done . On 31st December, 2017, out of 61 specimens collected, one sardine with blunted snout (Fig. 1) and one with deformed caudal fin (Fig. 2) was observed.

Fig. 1. Indian oil sardine with deformed head region

Fig. 2. Indian oil sardine with deformed candal fin

Pre orbital region in one sardine specimen was deformed and formed a distorted upper jaw. Lower jaw also appeared more blunt than a normal specimen. The specimen was immature with total

length (TL) of 14.4 cm and total weight (TW) of 23.3g with empty gut. The other was a maturing female specimen with 15 cm TL and 34.7 g TW with empty gut. The lower lobe of caudal fin was curved upward.

Unusual feeding behaviour of Indian oil sardine

*V. Mahesh and K. P. Said Koya

Calicut Research centre of ICAR-Central Marine Fisheries Research Institute, Kozhikode
**e-mail: santucofs@gmail.com*

The Indian oil sardine, *Sardinella longiceps* is a filter feeder, feeding mainly on plankton, particularly diatoms. They usefully feed on surface planktons and occasionally resort to bottom feeding (Bensam, 1964, *Indian J. Fish,* 11A (1): 377-390). In recent years, the presence of fish scales has become more common. Recently, during a biological sampling of 108 trawl caught oil sardines, collected on 4.1.2018 from the Puthiyappa Fisheries Harbour, a male specimen (stage II maturity stage, measuring 180 mm in TL and weighing 51 gm) with full gut condition had one *Bregmaceros* sp (45 mm) inside its gut (Fig. 1). Earlier also, observation on 11.6.2015 in which 30.4% of the ring net caught oil sardines, measuring 147 to 200 mm in TL, had 1 to 3 numbers of *Stolephorus* sp. in their guts (Fig. 2). The frequent occurrence of fish scales and the presence of fishes. in the guts of oil sardines in recent years requires more detailed studies.

Fig. 1. Trawl net caught sardine with *Bregmaceros* sp.

Fig. 2. Ring net caught sardine with *Stolephorus* sp.

A note on the shoal of *Priacanthus hamrur* caught during experimental trawling

P. T. Jinesh, G. Maheswarudu, S. Lakshmi Pillai, L. Sreesanth, N. Ragesh, Jose Josileen and Rekha Devi Chakraborty

ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail: jinovia777@gmail.com*

During the experimental fishing conducted by F V *Silver pompano* on 10th November 2016, a shoal of bullseye *Priacanthus hamrur,* weighing 1.5 t, was caught at 65-70 m depth off Alappuzha coast (9^0 25' 51'' N, 75^0 58' 49'' E). The shrimp trawl net with cod end mesh size of 20 mm was operated for an

Fig. 1. Bulk catch of *Priacanthus hamrur*

hour and the total catch comprised of *P. hamrur* (99%) and *Uroteuthis (Photololigo) duvaucelii* (1%). *P. hamrur* caught ranged from 189-231 mm in total length weighing between 92- 156 g each. Sex ratio (Male: Female) was 1:2. Females of size range 189-231 mm and males of 196-221 mm were recorded. Among females, the specimens in size range of 201-220 mm were mature (stage IV). The length weight relationship estimated indicated the 'b' for males and females as 2.73 and 2.93 respectively with no significant variation *(p*>0.05) among the sexes. Most of the specimens (72.8%) had empty stomach. It was observed that the diet was represented by *Acetes* spp. which was the single largest diet component. Hydrographic parameters observed from the location include Surface and bottom water salinity (34 and 32 ‰), Surface and bottom water temperature (27.5 and 25 °C) respectively. Phytoplankton analysis indicated, tintinnids and chaetognatha were present in the fishing ground.

A report on the deep sea swarming crab

*Vivekanand Bharti, R. Jeyabaskaran, J. Jayasankar, P. Vysakhan and Seban John

ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail : vivekanandbharti15@gmail.com*

Deep sea swarming crab *Charybdis* (*Goniohellenus*) *smithii* MacLeay, is found in the depth range between 60 to 356 m in the Arabian Sea and Bay of Bengal and believed to play a significant role in the marine food web. Observations from a trawl survey aboard *F V Silver Pompano* at 40 m depth that was made on 17th October, 2017 is reported. The trawl was operated in the afternoon for one hour, from 09° 57'55" to 10° 00' 03" North and 75° 55' 37" to 75° 53' 50" East coordinates at a speed of 3.5 knots/hour. The codend mesh size was 25 mm. A total area of 110194 m^2 was swept during trawling. The total catch recorded was 123 kg, including crabs (95 kg), squid (24 kg) and 4 kg of other fishes (Indian mackerel, lizard fish, anchovy, etc). The total biomass of crab and squid estimated in the surveyed ground was 862.12 and 217.80 kg per square km, respectively. Dense abundance of *C. smithii* has been observed between Mangalore and Quilon at depths of 201-

Fig. 1. *Charybdis (Goniohellenus) smithii* catch

300 m during July to January (Balasubramanian and Suseelan, 2001, *Bulletin of Marine Science*, 68(3): 435–449). The size spectrum and reproductive aspects of *C. smithii* caught was recorded . Catch was dominated by the males. The range of carapace width (CW) varied from 38 to 52 mm in males and 35 to 45 mm in female crabs. The CW was significantly different ($p < 0.01$) among the sexes

(Table 1). About 16.13 % of the crabs caught were ovigerous females. The peak maturation in *C. smithii* is reported to be during the winter monsoon. The temperature and salinity of the sea surface and bottom water in the fishing ground were 28.46° C and 24.62° C, and 35.24 to 35.07 PSU, respectively. Though *C. smithii* is well known as a deep sea crab, its temporal migration towards more shallow and coastal waters needs to be understood to estimate its potential biomass, migration pattern and possible levels of sustainable exploitation.

Table 1. Details of catch of *C. smithii*

Sex	Number (%)	Weight (%)	Sex ratio	Carapacewidth (mm) Mean	Range	S D
Male	71	79.90	2.44	43	38 - 52	3.60
Female	29	20.10	1	39	35 - 45	2.62

Gapers- An important component of the diet matrix of predatory demersal fishes

*Shikha Rahangdale, G. K. Jayshree, B. A. Sangita, K. Rajan, V. Vinay Kumar, D. Divu, K. Tarachand, S. Kapil and P. Abdul Azeez

Veraval Regional Centre, ICAR-Central Marine Fisheries Research Institute, Veraval
**e-mail : shikharahangdalecife@gmail.com*

Serranids, nemipterids, priacanthids, sciaenids and synodontids forms the major share of demersal fish landings along the northwest coast of India and especially in Gujarat. Fishes forms the major component of diets of these demersal fishes, followed by crustaceans. The juveniles of commercially important fishes as well as several less known taxa form an important component of the diet. Small sized mesopelagic and bottom dwelling groups like myctophids, apogonids, acropomatids and bregmacerotids were the key groups reported (Thangavelu *et al*. 2012). Our recent investigation (September-December, 2017) in guts of eight commonly occurring demersal fish species along Veraval coast (*Nemipterus japonicus, N. mesoprion, Saurida tumbil, S. undosquamis, Epinephelus diacanthus, Johnius glaucus, Otolithus cuvieri and Priacanthus hamrur*) revealed the significant presence of the above mentioned prey groups (Fig. 1a-1d). In addition, the presence of gapers (fig. 1e)

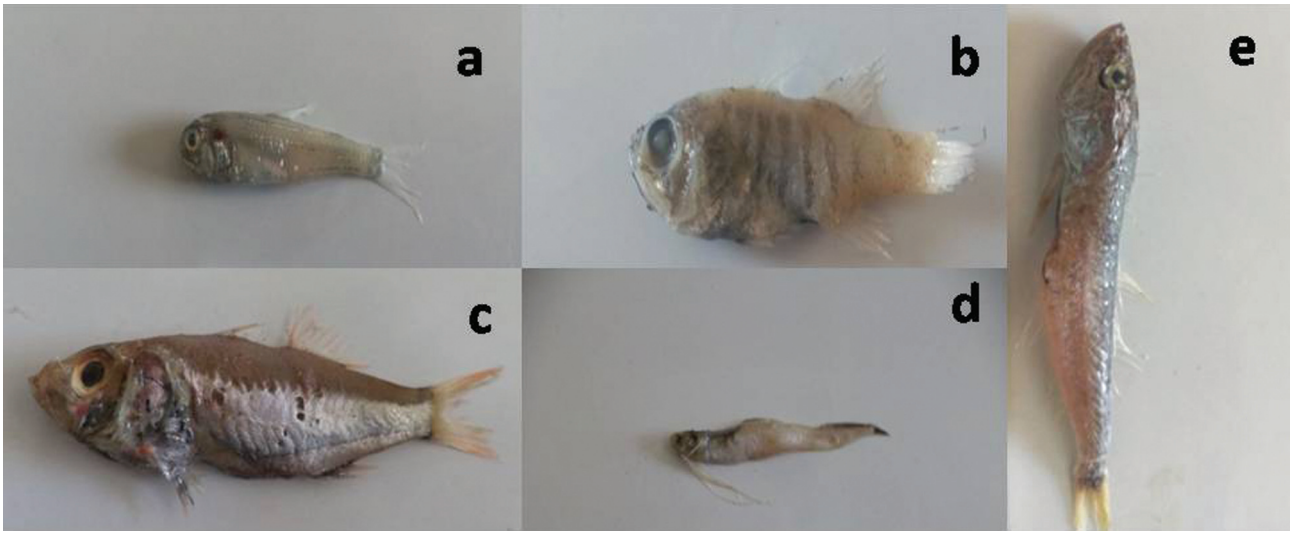

Fig. 1. Selected prey items (a-Myctophid; b-Apogonid; c-Acropomatid; d-Bregmacerotid; e-Champsodontid) from diets of commercially important groups of demersal fishes.

in varying quantity, from the guts of seven out of eight species studied was recorded (Table 1). The gapers are mesopelagic fishes belonging to the family Champsodontidae and three species namely *Champsodon vorax, C. nudivittis and C. snyderi* were reported from north-eastern Arabian Sea (Ganga *et al.*, 2014; *Indian J. Fish.* 61(4):128-130.). Despite its presence in North-eastern Arabian Sea, the group was rarely recorded in diets of the predatory demersal fishes (Mali *et al.* (2017 *Int. J. Life. Sci. Scienti. Res. 3*(3): 1039-1046) where *Champsodon* sp. was noted in the diet matrix of lizard fishes. Our present observations of the guts of common demersal fishes suggested the presence of the group in similar intensity as other small mesopelagic groups (Table 1). The earlier report might have included gapers in semi-digested and digested fish category and difficulty in identification of the species. Since several new reports on occurrence of the species of gapers from Indian coast are now available, it will be easier to understand its ecology and role in marine food chains.

Table 1. Presence-Absence matrix of selected prey items in the diet of commercially important demersal fishes

Species/ Groups	Nemipterids		Serranid	Synodontids		Sciaenids	Priacanthid	
	N. japonicus	*N. mesoprion*	*E. diacanthus*	*S. tumbil*	*S. undosquamus*	*J. glaucus*	*O. cuvieri*	*P. hamrur*
Myctophids	+	+	+	++	+	+	+	+
Apogonids	+++	++	+	++	+	-	+	++
Bregmacerotids	++	++	+	+++	+++	++	++	+
Acropomatids	+	+	-	++	+	-	+	-
Champsodontids	+	+	+	++	++	-	+	+

10-25% (+++); 5-10% (++); upto 5 % (+) and Absent (-) † calculated after excluding empty guts]

Frequent occurrence of nematode parasites in moontail bullseye

*Livi Wilson, P. K. Seetha, P. U. Zacharia, T. M. Najmudeen, Rekha J. Nair, K. T. S. Sunil, M. Radhakrishnan, T. G. Sumithra, C. Archana and N. K. Sanil
ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail: liviwilson@gmail.com*

Nematodes infect various organs of fish such as stomach, intestine, liver, gonads, swim bladder, fins, orbits of the eye and brain. This parasitic infestation is known to cause growth retardation and impaired gonadal development in fishes. Bullseye belonging to the family Priacanthidae is a major demersal fishery resource in India and mainly caught by multiday trawlers operated at 20-150 m depths. Nematode parasites were found in moontail bullseye *Priacanthus hamrur* landed at Cochin Fisheries Harbour during May-September, 2017 period. Both testis and ovary of the fishes were found infected. However the infestation was more common in female fishes. Among 112 fishes examined (81 female, 31 male), 17 were infected, of which 14 were females. Within the same gonad, the size of

Fig. 1. Parasitic infestation seen in the testis of moontail bullseye

the parasite ranged from 20 to 70 mm and the number of parasite infesting each gonads varied from one to ten. In some cases, due to heavy

infestation, the whole ovary was occupied by the parasites rendering the ovary black and occurrence of ova atrophy. Even though the parasites were present in all gonadal stages immature, maturing, mature and spent/recovering the infestation was more predominant in the mature and spent/ recovering stages. Among the males infected with the parasite, all gonads were in the spent/ recovering stages. The highest prevalence of the nematode parasite during the period of study was recorded in September (32%) and lowest (8.8%) in August. Although the fish looks healthy, the occurrence of the parasite in the gonad can cause great harm to the stock by destroying the eggs. There have been earlier reports of nematode infection in flatfishes (Biju kumar, 1996, *J. Mar. Biol Ass. India.*, 38: 34 – 39). The identification of parasite using CO1 gene was complete and the nucleotide sequence was subjected to homology search. The nematode parasite was found belonging to the genera *Philometroides*. Further studies are in progress.

Observations on a mud bank fishery

K. G.Baby and Sijo Paul

ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail: babykg62@gmail.com*

The mud bank fishery of four different places in Thrissur district of Kerala was observed in July 2017. The phenomenon was first observed in North west of Chettuva Fisheries Harbour at a distance of 5 to 7 kilometres and depth of 4 to 10 metres. At Chettuva Fisheries harbour inboard ring seiners crafts operated *Thangu vala* (large mesh ring seine) and outboard ring seiners operated *Chooda vala* (small mesh ring seine). The catch in *Thangu vala* had predominance of *Sardinella longiceps* (ranging from 1800 kg to 4000 kg per boat) and *Rastrelliger kanagurta* (ranging from 1650 kg to 3200 kg per boat) followed by *Metapenaeus dobsoni, Stolephorus* spp., *Alepes djeddaba, Penaeus indicus, Opisthopterus tardoore* and *Thryssa* spp. In *Chooda vala,* the anchovy *Stolephorus* spp. was dominant (ranging from 800 kg to 850 kg per boat) followed by *O. tardoore, Ambassis* spp. and *Thryssa* spp. At Perinjanan Bhajanamadam landing centre fishing units had temporarily migrated from Kaipamangalam companykadavu, Nattika, Karimpuram, Edamutttam and Vanchipura landing centres. The out board crafts with small trawl net (locally called Double net/*Pothan vala*) were operating very near to shore targeting the prawns. *Metapenaeus dobsoni* (ranging from 200-350 kg per boat) *Penaeus indicus* (ranging from 10-20 kg per boat) followed by *Leiognathus* spp., *Thryssa* spp., *O. tardoore, Stolephorus* spp.,*Tripauchen vagina, Portunus pelagicus, P. sanguinolentus, Otolithus* spp., *Jhonius* spp. and young ones of *Trichiurus lepturus* of 25-30 cm were landed. In addition to this, the three layered trammel net locally called as '*Disco vala*' were also operated by outboard and non-mechanised crafts. Catch comprised *M. dobsoni* (ranging from 2-5 kg per boat) followed by *P. indicus, Leiognathus* spp., *Thryssa* spp., *O. tardoore, Portunus pelagicus, Otolithus* spp. and *Jhonius* spp. during the entire month.

At Kalllampadi and Edakazhiyoor, crafts based at Blangad, Thalikkulam and Vadanapilly landing centres operated. Outboard crafts operating trawl net landed *M. dobsoni* (ranging from 120–260 kg per boat) followed by *P. indicus, P. monodon, Alepes kleinii, Leiognathus* spp.,*Thryssa* spp., *O. tardoore, Stolephorus* spp., *Tripauchen vagina, Otolithus* spp. and *Johnius* spp. Gillnets operated from outboard and non-mechanised crafts had *P. indicus, O. tardoore, Thryssa* spp*, Alepes kleinii, Rastrelliger kanagurta* and *Sardinella longiceps*. At Edakazhiyoor crafts from Mannilamkunnu, Panchavadi, and Puthenkkadappuram operating trawl net landed *M. dobsoni* (ranging from 80–160 kg per boat) followed

Table 1. Fishery trends in the different landing centres

Landing centre	Fishing crafts & units operated	Gear specifications	Dominant species and Approximate value /Kg
Chettuva	Inboard ring seiners(both wooden & steel built), 50 units	*Thanguvala* of 18-20 mm, mesh size	*Sardinella longiceps* (₹ 60) and *Rastrelliger kanagurta* (₹ 80)
	Outboard ring seiner (wooden built), 25 units	*Choodavala* of 8- 10 mm mesh size	*Stolephorus* spp. ₹ 100
Perinjanam Bajanamadam	Murivallam(Outboard wooden craft using trawl net), 25 units	Trawl net (smaller version locally non as *Pothan vala* /Double net)	*Metapenaeus dobsoni* ₹ 120 - 140
	Out board and Non-mechanised-wooden *valloms*, 20 and 10 units respectively	Trammel net (Bottom set gill net)	*Metapenaeus dobsoni* ₹ 120 - 140
Kallampadi	Out board wooden craft *(Murivallam)* using trawl net), 30 units	Trawl net (smaller version locally *Pothan vala*/ Double net)	*Metapenaeus dobsoni* ₹ 120 - 140
	Out board and Non-mechanised wooden craft, 25 and 20 units respectively	Gill net	*Penaeus indicus* ₹ 350 - 380
Edakazhiyoor	Out board wooden craft *(Murivallam)* using trawl net), 30 units	Trawl net (*Pothan vala*/ Double net)	*Metapenaeus dobsoni* ₹ 130 - 140
	Out board and Non-mechanised wooden craft, 15 and 5 units respectively	Gill net	*Rastrelliger kanagurta* ₹ 80 - 100
	Out board wooden ring seiner, 10 units	*Choodavala*	*Metapenaeus dobsoni* ₹ 130 - 140

by *P. indicus, Alepes kleinii., Thryssa* spp., *O. tardoore, Stolephorus* spp. *and Sillago sihama*. In gillnets operated by outboard and non mechanized crafts *R. kanagurta, Otolithes* spp. and *Lactarius lactarius* were mainly caught. *M. dobsoni* (ranging from 150-240 kg per boat), *Ambassis* spp., *Stolephorus* spp. and young ones (measuring 7.5 to 10 cm) of oil sardine, *S. longiceps* were the major catch in outboard ring seiners.

Differentiating two closely resembling ariid species of *Nemapteryx* genus

Rajan Kumar, R. Shikha, V. Vinay Kumar, D. Divu, K. Tarachand, P. Abdul Azeez and S. Kapil
Veraval Regional Centre of ICAR-CMFRI, Veraval
**e-mail : rajanfrmcife@gmail.com*

Genus *Nemapteryx* is globally represented by six species of which three are distributied in Indo-Pacific waters viz. *Nemapteryx nenga* (Hamilton, 1822), *Nemapteryx caelata* (Valenciennes, 1840) and *Nemapteryx macronotacantha* (Bleeker, 1846). *N. caelata* is a relatively bigger sized species with a maximum recorded size of 45 cm total length (TL) whereas the maximum size of other two species is limited to 30 cm TL (Froese and Pauly, 2018, World Wide Web electronic Publication,

Fig. 1. *Nemapteryx caealata* (26.2 cm TL)

Fig. 2. *Nemapteryx macronotacantha* (14.6 cm TL)

www.fishbase.org). The validity of *N. caelata* as species was questioned and believed to be a variant of *N. nenga*. The species presently enjoys the status of a valid species, but it needs a thorough assessment to completely rule out the possibility of it being a junior synonym of *N. nenga*. *N. caelata* forms a good fishery especially along the North west coast of India. The species is characterized by highly engraved bony shield on the head, a pair of palatine teeth and very strong dorsal and pectoral spines. *N. macronotacantha* closely resembles small or medium sized *N. caelata* and is mostly misidentified in the field. A close examination especially shape of teeth patch can clearly separates the two species. *N. caelata* has strongly triangular palatine teeth patch whereas the shape is oblong in case *N. macronotacantha*. Difference in morphometric characters such as longer pre-2nd dorsal, inter-orbital and inter-nostril lengths in *N. caelata* whereas larger eye diameter and longer barbels in *N. macronotacantha*, is reported (Kailola ,1999 *FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific.* , Rome, FAO,1827-1879 pp.). The incidence of *N. macronotacantha* along northwest coast of India is higher than reported which is due to misidentification of the species as juvenile or sub-adult of *N. caelata*. A closer examination in the field is required to explore the spatio-temporal abundance of the various catfish species from the region.

A report on the occurrence of gear parts in the gut of three spot swimming crab

*V. A. Leslie, K. N. Saleela,S. Jasmine,B. Santhosh and F. Muhammed Anzeer

Vizhinjam Research Centre of ICAR-Central Marine Fisheries Research Institute, Vizhinjam
**e-mail : lesliecmfri@gmail.com*

Portunus sanguinolentus commonly known as 'three spot swimming crab', or 'Mupottan njandu' in the vernacular in Kerala forms a major portion of commercially important marine crabs landed along Vizhinjam coast. On 13th November 2017, crab samples were obtained from bottom set gill nets operated in 10 m depth, 5 km away from the sea shore off Vizhinjam. While analyzing gut contents of crabs, 3 specimens of *P.sanguinolentus* were found with multifilament synthetic gill net parts in their entire fore gut. The gut contents were transferred into a petridish and observed under microscope. The green colored multifilaments were clearly visible even without using a microscope.

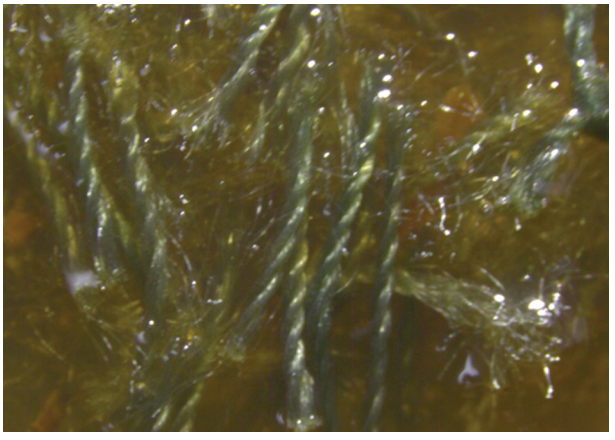

Fig. 1. Microscopic view of multifilament synthetic gear part found in the crab gut

This species is reported as a carnivore, mainly feeding on crustaceans, molluscs and finfishes (Sukumaran and Neelakantan,1997 *Indian Journal of Marine Sciences*, 26 (1): 35-38). Biological details of crab specimens with ingested synthetic material is given in Table 1.

Table 1. Biological details of the crabs

Carapace width (mm)	Weight (g)	Sex	Synthetic gear part (g)
92	44	female	0.168
95	48	male	0.180
120	110.8	male	0.234

This study indicates the harmful effects of marine pollution in coastal waters off Vizhinjam. It has been noticed that huge quantities of discarded synthetic fishing gears are washed ashore near Vizhinjam Harbour. Status and composition of marine litter along the Indian beaches were given (Kaladharan *et al.*, 2017 *J. Mar. Biol. Ass. India*,59 (1):19-24; Sulochanan, B., 2011 *Mar. Fish. Infor. Serv., T&E Ser.,* 208: 18-19) has been reported. The effect of ghost nets in the oceanic and coastal ecosystems with suggestions for reducing marine debris (Kripa *et al.,* 2016 *Mar. Fish. Infor. Serv., T & E Ser.*, 228:3-10) is to be given due attention to preserve the quality of the fishing ecosystem.

Plastic debris entangled silky shark landed

*Subal Kumar Roul, T. B. Retheesh, M. Radhakrishnan, D. Prakasan, A. R. Akhil, K. T. S. Sunil , N. A. Augustine Sipson, P. K. Seetha and P. U. Zacharia

ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail: subalroul@gmail.com*

Several species of marine fishes have been documented as entangled in manmade debris in oceans, but comparatively few reports are available globally on sharks. Here we report the observation of a silky shark *Carcharhinus falciformis* affected by plastic debris caught in the Arabian Sea.

A juvenile male *C. falciformis* (148 cm total length, 122 cm fork length, 110 cm standard length) entangled by a synthetic fishing gear material was observed in the landings at Cochin Fisheries Harbour, Kerala on 15th February 2017. It was caught in a hook and line operation by a multi-day fishing unit near Ratnagiri, off Maharashtra coast and landed along with other shark species. The shark appeared normal but closer observation revealed a few wounds, with small holes at fifth gill slit of each side, base of left pectoral fin and top of the head. Small piece of plastic line of light green colour probably from each knot of the gear material protruded outside from each hole (Fig. 1). It appears that the specimen during its early life stages may have got entangled in the fishing gear and escaped with part of the net or accidentally entangled in discarded or lost fishing gear. Initially the material may have entangled around the gill region and as the animal grew in size, it remained embedded in the skin. The tissue was probably by regeneration process and was leaving a clear scar around the gill region (Fig. 1A-D). During swimming movements, the embedded material might have obstructed the normal feeding behaviour of the animal. From the

length-weight Relationships parameters of *C. falciformis* available in Fishbase (Froese and Pauly, 2017, *www.fishbase.org*), the expected weight of the specimen was calculated as 19.87 kg whereas it weighed only 16.60 kg. This reduced body weight might be due to reduced food intake caused by the stress the animal faced.

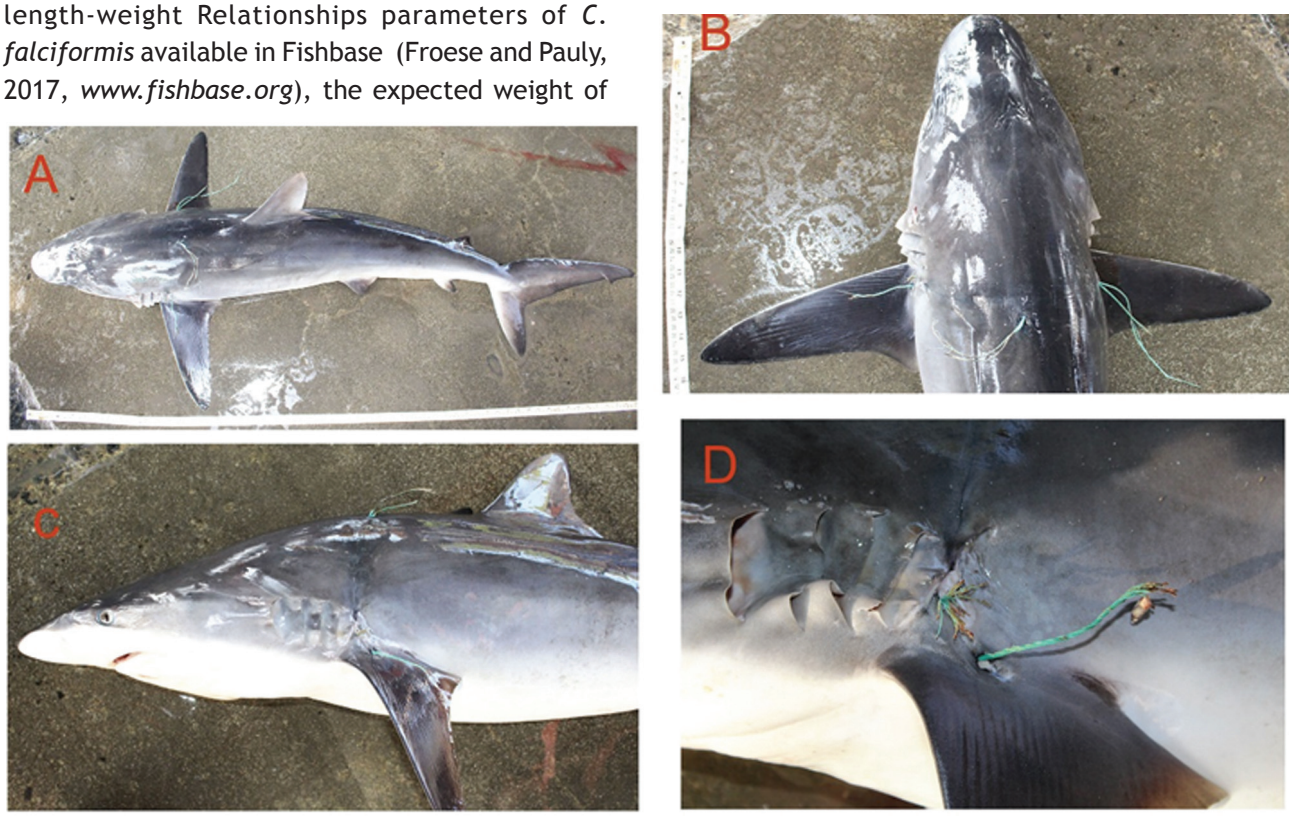

Fig. 1. Silky shark entangled with plastic debris. (A) General view of the specimen. (B) Dorsal view, (C) and (D) Lateral view of the head showing damage on the gill region, base of pectoral fin, top of head and scare mark around the head.

Sharks are top predators and considered as keystone species in the marine ecosystem. Carcharhinid sharks are more vulnerable to plastic debris than other shark because they usually breed in shallow waters and are the most abundant shark groups in coastal areas (Compagno, 1984, *FAO species catalogue. Sharks of the world. An Annotated and Illustrated Catalogue of Shark Species Known to Date Part 1. Hexanchiformes to Lamniformes vol. 4. FAO, Rome)*.The typical nature of sharks in hunting food could be a probable reason for entanglement especially when a food source is associated with this debris. Hence, it is necessary to reduce marine debris through proper legislation to control pollution of the sea, promoting public awareness and encouragement of caring for the environment culture in order to reduce such incidences.

Brief note on the infestation of pedunculate barnacles in crabs

*Kurva Raghu Ramudu[1], N. K. Sanil[2], P. Vijayagopal[2], Saloni Shivam[1] and Vikas G. Barsagade[3]

[1]*Karwar Research Centre of Central Marine Fisheries Research Institute, Karwar*
[2]*ICAR-Central Marine Fisheries Research Institute, Kochi*
[3]*Department of Zoology, Nabira Mahavidyalaya Katol, RTM Nagpur University, Nagpur*
**e-mail : raghu.kurva@icar.gov.in*

An investigation was made to isolate and identify parasites from *Charybdis lucifera* landed at Cochin Fisheries Harbour in January, 2018. The carapace, branchial chambers and gills of each crab was

observed for the presence of octolasmids. *Octolasmis* spp. are generally known as stalked barnacles or pedunculate barnacles. They are common in shallow waters and often found attached to the exoskeleton of the decapod crustacea, including crabs. This can affect the marketing of such infected commercially important crabs.

Octolasmis sp. were identified on the basis of morphological features such as overall shape, capitular shape and capitular plate morphology. Length and width of the peduncle and capitulum were taken a stereomicroscope.

The following terminology was used to describe the parasitic infestations.

$$\text{Prevalence (\%)} = \frac{\text{Total number of infected fishes}}{\text{Total number of fish hosts examined}} \times 100$$

Relative density or Abundance(%)

$$= \frac{\text{Total Number of individuals of particular parasite species in a smaple of host}}{\text{Total number of fish hosts examined (infested + uninfected)}}$$

$$\text{Mean intensity(\%)} = \frac{\text{Total Number of individuals of parasite species in a sample of host}}{\text{Total no of infected fishes}}$$

A few crabs were highly infected with *Octolasmis* sp. which were found attached on the carapace and swimming legs (Fig. 1). Prevalence, relative density, mean intensity and severity of infestation of *Octolasmis* sp. was recorded (Table 1). Severity of infestation was assessed based on a score, 0 = Absent; 0.5 = Present, low grade; 1 = Present, mild; 2 = Present, moderately; 3 = Present, infective; 4 = Present excessively and severely infected.

This study showed that 12% of the crabs examined were heavily infested. The impact of heavy infestation on the marketing of the crab is to be assessed.

Fig. 1. Crab infected with *Octolasmis* sp. (Dorsal & Ventral view)

Table 1. Assessment of *Octolasmis* sp. infestation in *Charybdis lucifera*

Crab Species	Site of infestation	Numbers Examined (n)	Numbers infected	Number of parasites recovered	Parasitic Frequency Index, PFI (%)	Relative density	Mean intensity	Severity of infestation
Charybdis lucifera	carapace and swimming legs	25	3	48	12	1.92	16	4

A note on heart urchins and sand dollars washed ashore

S. Gomathy, S. Selvanidhi and P. Laxmilatha
Madras Research Centre of ICAR-Central Marine Fisheries Research Institute, Chennai
**e-mail : gomathycmfri@gmail.com*

Large quantities of fragile skeletons (Tests) of heart urchins and sand dollars were found washed ashore in Mudaliar kuppam, village and Pudukuppam village of Villupuram district during September 2017. Out of hundreds of broken skeletons as well as a few intact pieces washed ashore, *Maretia planulata* (Tiny maretia heart urchin) and *Echinodiscus bisperforatus* (Keyhole sand dollar) were identified. Sand dollars are collected for making souvenirs, curios and aquarium trade. Collection of live specimens is illegal.

Maretia planulata (dorsal view)

Echinodiscus bisperforatus

Heavy landing of juveniles of threadfin breams

Livi Wilson, T.M. Najmudeen, P.U. Zacharia and P.K. Seetha
ICAR-Central Marine Fisheries Research Institute,
**e-mail: liviwilson@gmail.com*

Threadfin breams are a commercially important group of marine fishes in India. *Nemipterus randalli* locally known as '*kilimeen*' or '*Puthiyaplakora*' is the most abundant species contributing 53.5 % of threadfin bream landings in Kerala. A fisheries resources assessment survey was conducted at seven landing centers viz., Cochin fisheries harbour, Munambam fisheries harbour, Munambam mini harbour, Kalamukku, Chellanam, Murikkumpadam and Fort Kochi landing centers for three months during December 2016 - February 2017. Sizeable landings of juvenile fishes were noticed at all the landing centres with a high occurrence at the Munambam mini harbour. Juvenile landings at this centre were confined mainly to *Nemipterus randalli* caught by multiday trawlers, operating at depth range of 60-150 m. The duration of the fishing of multiday trawlers operating from these centers varies from 5 to 15 days. The overall length of the crafts were 13-18 meters with engine of 110 HP to

411 HP. An average of 3 hauls per day that may take around 2 to 2.5 h of trawling operation was reported by the fishers.

The fish is sold locally in fresh condition for ₹ 70-80 per kg at the landing centres. It also has high export value as it is used for the preparation of value-added products like surimi, kamaboko, sausages etc. Usually the landing of this fish peaks during the month of August when the trawlers venture into the sea after the monsoon ban. The juveniles of this species are locally called as '*pottankili*', with size varying from 4 – 8 cm. It may be mentioned here that the Minimum Legal Size (MLS) of capture implemented by Government of Kerala for *Nemipterus randalli* is 10 cm TL (total length). The huge demand for the juvenile fishes as a major input to the fertilizer and fish meal plants is the main reason for harvesting large quantities of juveniles of this species.

The estimated economic loss calculated due to the juvenile landing of *Nemipterus randalli* during December 2016 to February 2017 at the Munambam mini harbour using a bio-economic model is presented in Table 1. Most of the juvenile fishes were transported to Mangalure in Karnataka and sold to fertilizer and fish meal plants for ₹ 30-35 per kg. The juveniles exploited are the new recruits in the fishery and hence their indiscriminate exploitation will be disastrous to the fishery in the long run.

Table 1. Estimated economic loss due to juvenile fishing of *Nemipterus randalli* at Munambam mini harbor

Months	December 2016	January 2017	February 2017
Juvenile landing (in tonnes)	295.86	912.83	381.41
Estimated economic loss (₹ in lakhs)	80.91	249.65	104.31

Rare occurrence of hairtail blenny

Swapnil Tandel, Vaibhav D. Mhatre, K. V. Akhilesh* and Veerendra Veer Singh

Mumbai Research Centre of ICAR-Central Marine Fisheries Research Institute
**email: akhilkv@gmail.com*

During an experimental fishery and oceanography survey conducted at 40 m depth off Ratnagiri, a single specimen of hairtail blenny, *Xiphasia setifer* Swainson, 1839 (345 mm TL, 15 g) was collected on 18th November 2016. This demersal, with an eel like body is marine gobiid fish (family blennidae), found in burrows along soft-mud bottom habitats in coastal waters. The species is very rarely encountered in fishery and hence meristic and morphometric counts were taken (Table 1, Fig. 1).

Fig. 1. Hairtail blenny, *Xiphasia setifer* (345 mm TL)

Table 1. The morphometrics of *Xiphasia setifer*

Meristic counts	Numbers
Dorsal fin spine	12
Dorsal fin rays	112
Pectoral fin ray	13
Anal fin spine	2
Anal fin ray	104
Upper jaw teeth count	25
Lower jaw teeth count	28
Morphometric	**Length (mm)**
Total Length	345
Head length	24
Pectoral fin length	14
Pre-orbital length	6
Eye diameter	6
Post orbital length	12

Marine Fisheries Information Service
Technical & Extension Series

Guidelines for authors

The *Marine Fisheries Information Service Technical & Extension Series* (MFIS) is an avenue for rapid communication of research findings pertaining to the marine fisheries sector. It welcomes articles reporting significant new information, knowledge and understanding of marine fisheries, marine ecosystems, marine biodiversity and mariculture. Articles should be written in English, in a popular style with minimal technical jargon. It should be brief not exceeding 5 A4 size paper sheets. Articles will be selected for publication considering its current relevance, innovative ideas and scope for application of new knowledge for the development of the marine fisheries sector.

Preparation of Articles for MFIS

Title page should include authors' full name, institute's mailing addresses and the email address of the corresponding author. The title of the paper must be relevant and brief.

General text must be typed in 12-point, Times New Roman font with 1.5 spacing. Headings within each section must be short and follow a logical sequence. Acronyms, abbreviations and technical terms should be written out in full the first time they are mentioned. Tables should be kept to minimum and if any are included should conform to the size and lay-out of the MFIS. Table Headings should be short.

Figures & graphs should be limited and in Black & White only. Figure and graph legends should be complete and clear in all respects. Colour photographs can be submitted separately as high-resolution TIFF or JPEG files.

References should be minimal (not more than 5 references per article), brief but accurate and complete. The citation format with Author (s) name(s), year, Journal name, Volume, page number(s) should be followed to provide the reader enough information to trace the reference easily. Format given below may be followed.

Taylor *et al.*, 1998, *Aquaculture*, 162: 219-230. (Reference with more than two authors)

Friedman and Bell. 1996, *J. shellfish Res.*, 15: 535-541. (Reference with two authors)

Pauly, 1980, *FAO Fish. Tech. Pap.*, (234).

Submission of article

Authors are requested to submit soft copies of the articles addressed to Editor, MFIS to the E-mail address **pmemfis2017@gmail.com**. The text with clearly legible tables/ Figures appropriately placed should be submitted as a MS-Word file. Figures and photographs can be sent separately as MS-Excel or Tiff /JPEG files respectively after article is accepted for publication, which will be communicated to the author.

Gillnet caught blue swimming crab Portunus pelagicus *from Palk Bay - Moving into a FIP*

MFIS