ISSN 0254-380 X

No. 233, July - September 2017

Marine Fisheries Information Service

Technical and Extension Series

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

Marine Fisheries Information Service

PUBLISHED BY

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

EDITORIAL BOARD

Dr. U. Ganga (Editor)
Dr. Shoji Joseph
Dr. Miriam Paul Sreeram
Dr. V. Venkatesan
Dr. Shinoj Parappurathu

ASSISTED BY

Mr. Arun Surendran
Mr. C. V. Jayakumar
Mr. P. R. Abhilash
Mr. V. H. Venu

Front Cover : Rack drying of bombay duck

Back Cover : Ring seine catches of small pelagics landed at Cuddalore

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

In this issue of MFIS, the lead article explores the various facets of marine fisheries insurance in India and the interventions required to make it more widely acceptable among fishermen. The increasing frequency and intensity of storms, cyclones and disruptions in weather and climate patterns are an indicator of the Climate Change phenomenon operating on a global scale. Wise interventions will ensure that the fishermen are protected at least to a certain extent from losses due to the vagaries of nature, through insurance schemes. The status of marine fisheries in the various maritime states of India during 2016 has been included to highlight contemporary trends on a regional scale and their contribution to the marine fisheries production of the country. In addition, several interesting notes related to the rich marine biodiversity and fisheries from various parts of the country have also been included.

Marine Fisheries Information Service

No. 233, July-September 2017

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

CONTENTS

Marine Fisheries Insurance in India: Status and prospects

*Shinoj Parappurathu, C. Ramachandran, A. Gopalakrishnan, K. Mohammed Koya, R. Narayanakumar, K. P. Salini and P. V. Sunil

ICAR-Central Marine Fisheries Research Institute, Kochi
**email: pshinoj@gmail.com*

Technological advancements in the realms of vessel propulsion, gear design, navigation-system as well as information-communication have resulted in intensification of investments and thereby deepening of economic risks associated with marine fishery operations. The risks in capture fisheries include a variety of factors such as loss or damage to fishing vessels, equipment and gear in operation, loss of catch and human casualties in the sea. Though such risks and dangers are inherent with marine fishing operations, their economic implications are manifold in recent times, particularly for the small-scale fishers and boat owners. The risks associated with fish culture in marine environment (mariculture) is also equally important in the wake of disease incidences, climate change and consequent weather factors, harmful algal blooms (HAB) and other natural calamities. Despite the above state of affairs, institutional mechanisms to address risk and uncertainties in the marine fisheries/ mariculture sectors have been grossly inadequate in India. Insurance is one of the widely adopted means for risk management and is used the world over as an effective instrument for containing and mitigating a wide variety of risks such as asset risks, production and management risks, market risks, personal and health risks. Insurance in fisheries is by far under-utilized compared with other sub-sectors of agriculture in the country, barring a few local exceptions, and therefore unavailable for the majority of the stakeholders in this sector. This is notwithstanding the growing demand for risk management solutions from the fishing community across the country.

Present status of marine fisheries /mariculture insurance

Insurance in the fisheries sector in India, unlike that of crop and livestock, does not have a long history or an organized structure to boast of. Except for the presence of a few public sector insurance companies and cooperative bodies at the local level with limited scale of activity, the sector has received little attention either at the central or state levels. The private sector operation in this arena is also limited to a few cases scattered over time and space. Among the available options, the 'Group Accident Insurance Scheme for Active Fishermen' is the only major programme presently in operation that covers the life/disability risks of the boat crew. Under this, the insured fishermen (reserved for age group of 18-70 years) get a claim of ₹ 2 lakhs in case of permanent disability/accidental death, and ₹ 1 lakh in case of partially disability. The premium is fully subsidised and borne by the central government and state governments on 50:50 basis. An additional 300 thousand fishermen were targeted to be covered under this scheme during the 12th plan (2012-2017). A similar scheme in operation under the patronage of Matsyafed in Kerala provides a compensation of ₹ 5 lakhs to the dependents of fishermen who die in accidents. It also covers partial disability and hospital expenditure of injured fishermen with payments varying from case to case. Vessel/ gear (fishing net) insurance is another major risk management tool to secure the livelihoods of fishermen against the risks in the seas. The conditions for vessel insurance vary significantly depending on the type of vessels, area of operation

and companies involved. However, the annual premium generally ranges between 3-5 per cent of the value of vessels and even higher at times. Compensation is generally paid only in case of complete damage of vessels. They are mostly extended by the subsidiaries of GIC (New India Assurance Company Ltd., Oriental Insurance Company Ltd. and United India Insurance Company Ltd.) and a majority of the active policies are credit-linked. Vessel insurance is also offered by Matsyafed for member fishermen on vessels purchased under their subsidised loan scheme. A similar subsidised vessel insurance scheme is being offered by the government of Tamil Nadu for vessels operating from various harbors within the state. Apart from these, boat owners' associations based at certain harbours (Neendakara harbour in Kollam district of Kerala, Paradeep harbour in Odisha; Mangrol harbour in Junagadh district of Gujarat) are providing special risk coverage against damage of vessels to member fishermen. Insurance coverage of coastal assets (houses and other immovable property) is another important risk management measure which every fishermen family ought to have. Unfortunately, the 'Disaster Risk Insurance Product for Coastal Communities' introduced in the aftermath of the Tsunami of 2004 in Tamil Nadu is the only major experiment in this regard so far. This scheme piloted by Bajaj Allianz with assistance from CARE India, provided micro-insurance to nearly 75,000 coastal families in Tamil Nadu and proved helpful during the cyclone Nisha that occurred in 2008. Even this scheme is not in operation presently, leaving the large part of Indian coastal households without any effective risk management covers. As of now, no major programmes/schemes exist to deal with risks and uncertainties related to mariculture operations.

Level of adoption

An assessment of the adoption of various types of personal/group accident insurance schemes across selected maritime states based on a primary survey conducted by ICAR-CMFRI in 2016 revealed that about 80-100% of the sampled fishermen were covered under accident insurance scheme in Kerala, a state with the highest level of adoption (Table 1). In Tamil Nadu, the coverage ranged from 16-100% across the landing centres surveyed. On the other

Table 1. Adoption of various types of fishery insurance schemes in selected maritime states of India

State	District	Per cent of sampled fishermen/ vessel crew who adopted insurance of type			
		Personal/group accident insurance	Vessel (hull) insurance	Fishing gear insurance	Coastal asset insurance
Kerala	Kollam	100 (45)	12 (25)	0 (25)	0 (45)
	Alappuzha	100 (20)	50 (10)	10 (10)	0 (20)
	Ernakulam	79 (38)	17 (23)	0 (23)	0 (38)
	Kasargod	87 (15)	0 (5)	0 (5)	0 (15)
Andhra Pradesh	Vizianagaram	0 (22)	0 (17)	0 (17)	0 (22)
	Srikakulam	0 (24)	0 (19)	0 (19)	0 (24)
	Vishakhapatnam	0 (14)	0 (9)	0 (9)	0 (14)
Tamil Nadu	Cuddalore	16 (44)	0 (29)	0 (29)	14 (44)
	Puducherry	100 (10)	10 (10)	0 (10)	0 (10)
	Villupuram	96 (50)	0 (40)	0 (40)	0 (50)
Gujarat	Junagadh	35* (20)	47* (15)	0 (15)	0 (20)
	Gir Somnath	55*# (20)	33* (15)	0 (15)	0 (15)
Odisha	Ganjam	0 (47)	0 (37)	0 (37)	0 (47)
	Jagatsinghpur	50* (20)	100* (10)	0 (10)	0 (20)

Note: Figures in parentheses denote total number of respondents applicable under each category; adoption estimates pertaining to vessel and gear insurance are based on responses of vessel owners only.

*Indicates risk coverage against personal accident and vessel damage provided by boat owners associations for their members;

#The estimate includes personal accident insurance availed by vessel crew under government schemes.

Source: Parappurathu *et al.*, 2017 *Marine Policy*, 86: 144-155.

hand, none of the respondent fishermen were insured in Andhra Pradesh, despite it being a state with high incidence of extreme weather events. The states of Gujarat and Odisha were no better with only large landing centres well served leaving out the majority of smaller ones.

The level of adoption of vessel insurance was also not inspiring as per the study. Except in the case of large landing centres in Paradeep, Odisha; Mangrol and Veraval in Gujarat, where influential boat owners' associations operate their own insurance programs with the help of revolving corpus funds collected from member fishermen, the coverage of vessel insurance is hardly satisfactory across the maritime states. Insurance coverage of fishing nets is even worse with most of the fishermen having opted out of it, irrespective of the region they belong to.

Main challenges

There are a number of issues that explain the reasons behind low risk financing of the marine fishery sector in India. In most of the places, the fishers / mariculture farmers are either unaware or are less concerned about the need to insure their assets against various types of risks. In certain cases like vessel insurance in Kerala, people are well aware of insurance, but are reluctant due to high premiums involved, lack of provision for claim settlement in case of partial damage, hassles involved in claim settlement process, reservations about timely and assured settlement of claims and so on. As enrollment is lower due to the above reasons, the insurance companies have limited options to develop products that are affordable. The companies are also concerned about malpractices such as intentional dumping of fishing vessels, especially old and less energy-efficient ones, to secure claims. Unlike on land, the mechanisms to detect such malpractices are scanty. At many places, the fishermen/fish farmers point to lack of availability of adequate insurance options as one of the reasons for their non-enrollment. This is particularly relevant for private insurance, wherein the industry has never explored the potential of launching suitable products for a number of risks citing low interest of fishermen, poor demand for insurance, low profitability, high risk involved, high moral hazard, and so on. In short, insurance in India's fisheries sector suffers from problems such as lack of transparency, low affordability, high moral hazards and poor customer acceptance.

Technology and policy perspectives for reforms

There is immense scope to reform the coastal asset and fishery insurance through concerted efforts at the Central and State levels. Strong measures from both government and insurance companies are needed to inculcate risk financing culture in the coastal areas. There is also a need to improve the mutual reciprocities between insurance companies and fisher folk. Developing linkages with fishermen/fish farmer cooperatives, producer associations, etc. would prove beneficial in this respect. Ensuring the participation of grass-root level organizations (fishery cooperatives/NGOs/ boat owner associations) as intermediaries or partners for insurance administration besides deploying of a brigade of rural insurance agents/ service providers would also be helpful to strengthen grass root level support services. Micro-insurance is a promising avenue particularly to administer coastal asset insurance. India can learn from successful initiatives from other Asian and African countries on this front. Bundling micro-credit with asset/disaster insurance programs is also a sensible option to enhance coverage of schemes in areas where self-help groups have active presence. There is a general discontent among fishermen/fish farmers about high insurance premium and unavailability of custom-made insurance products. To address this, it is important to bring-in flexibility in insurance schemes through options such as payment of premium in instalments, partial coverage of fishing units and augmented products with coverage on fishing gear. Willingness on the part of insurance companies to compensate partial damage of fishing vessels would certainly make a visible dent in changing the attitude of fishermen towards insurance. They may also think of launching new products in hitherto un-serviced

areas like cage culture, seaweed farming and mussel culture after proper assessments on profitability. The governments should strive towards developing adequate dispute settlement mechanisms to address grievances, besides taking measures for increasing competition in the sector by incentivising the entry of new players to the sector. They may also consider reallocating some of the existing unhealthy subsidies towards incentivising greater insurance coverage. If required, the governments can introduce some degree of legislative coercion through mandatory insurance coverage, wherever possible. Special incentive packages may be extended to the islands which are the most vulnerable, therefore deserving distinctive treatment.

Together with reforms in governance, technology can play a vital role in improving efficiency, bringing transparency and reducing moral hazards in fishery insurance. Innovative products such as weather-index based insurance schemes are already in force in the agriculture sector, wherein, satellite data and inputs from weather stations are being used to trigger insurance payments in case of occurrence of weather related events. These can be extended to capture fisheries sector as well, to increase efficiency and simplify procedures. The inputs from such platforms could be used for compensating damages to coastal assets of fisher folk, marine cages, and other fishery-related infrastructure. Similarly, advanced vessel Monitoring Systems (VMS), which are presently in the pipeline to be introduced in India, could be made use of to track the fishing vessels and assess incidents such as mid-sea capsizing and collisions. Such data would be valuable for the insurance companies to verify insurance claims by affected beneficiaries. Further, interactive Information and Communication Technology (ICT) tools and mobile applications could be leveraged for speedy processing of insurance claims as well as for real-time assessment of damages incurred to fishing vessels and mariculture units in case of calamities. Promising options such as micro insurance, which has already proved its potential to change the lives of resource poor people in various parts of the world, can also contribute and should be explored further. Over and above these measures suggested, efforts to improve the living standards and socio-economic conditions of the fishing community through development programs can also help to a great extent.

Marine fish landings in Gujarat during 2016 - An overview

*Vinaykumar Vase[1], K.Ramani[2] and J. Jayasankar[2]

[1]Veraval Regional Centre of ICAR-Central Marine Fisheries Research Institute, Veraval
[2]ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail: v.vinaykumarvs@gmail.com*

The Gujarat coast in the northern Arabian sea, is one of the most biologically productive region in the world. The fishery resources are mainly demersal in habit with high trophic level. Annual marine fish landings for Gujarat during 2016 was an all-time high of 7.74 lakh tonnes (t), showing an increase compared to the previous year (7.23 lakh t). The state contributed 21.3% of the total marine fish landings in India. The major fisheries harbours (Veraval, Porbandar, Mangrol) and the three landing centers (Jaffrabad, Nawabandar and Rajapara) contributed 74% of the total landings. Major fishery resources like non-penaeid prawns, ribbonfish, bombayduck, squids, lizardfish and rock cods showed increase in landings compared to that in 2015 (Fig. 1).

With inputs from A. Ladani, J. P. Polara, J. D. Vanvi, R. R. Chudasama, K. P. Chudasama, B.V.Makadia, S. P. Makwana and Rathod Vinodbhai Bhikhabhai, FRAD field staff in Gujarat.

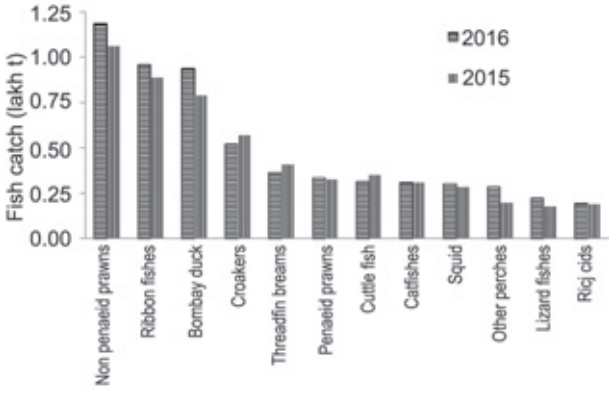

Fig. 1. Major marine fish resources landed in Gujarat during 2016 and 2015

The pelagic finfish resources contributed 38%, followed by demersals 32%, crustaceans 22% and molluscan resources (8%) (Fig. 2). Commercially important fishery resources that contributed to the total marine fish landings of Gujarat in 2016 were non-penaeid prawns (15.29%), ribbonfishes (12.34%), bombayduck (12.08%), croakers (6.71%), threadfin breams (4.69%), penaeid prawns (4.29%), cuttlefish (4.05%), catfishes (3.96%) and squid (3.85%). The non-penaeids which formed a major portion in the crustacean landings, commonly known as "Jawla" were mostly used for fish meal production. Cephalopods contributed maximum in the molluscan landings, which are mostly exported to the South east Asian countries.

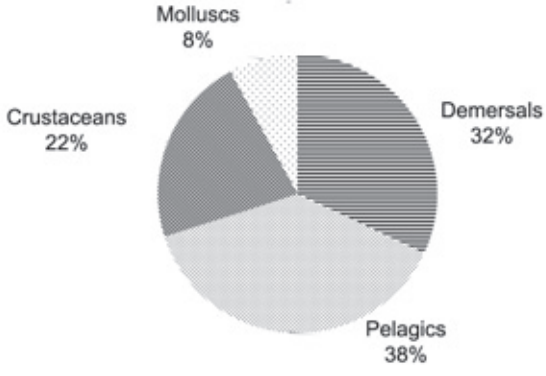

Fig. 2. Components of marine fish landings

The Gujarat fishery is unique in the country due to the domination of mechanised sector (Fig. 3). The estimated landings by mechanised fishing vessels was 7.09 lakh t followed by motorised vessels (0.65 lakh t) and non-motorised vessels contributing a meagre 160 t. The non-motorised landings came mainly during fishing ban season from the districts of Jamnagar, Kutch, Devbhoomi Dwaraka and Morbi.

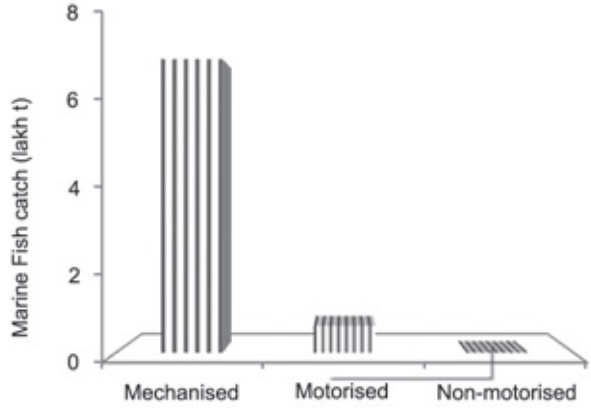

Fig. 3. Sectorwise marine fish landings of Gujarat

Mechanised sector (trawl, *dol*net and gillnet) together contributed nearly 90% of total marine fish landings in the state. The multi-day trawlers (MDTN) contributed 53% of the total annual marine fish landings followed by mechanised *dol*net (MDOL) (32%), outboard gillnet (OBGN) (8%), mechanised gillnet (MGN) (3%), mechanised trawlers (MTN) (3%) and others (1%) (Fig. 4). Motorised sector accounted for 8.43 % of the total catch of which, the main contributon was by gillnets.

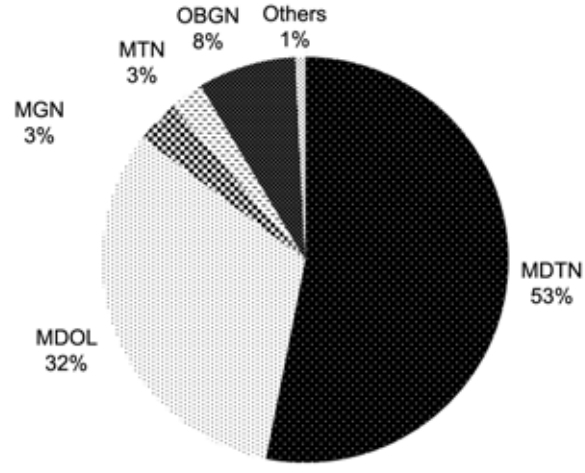

Fig. 4. Gearwise contribution to marine fish landings

A distinct seasonal difference was noticed in the fish landings of Gujarat. The fourth quarter (October - December) contributed maximum fish catch (3.65 lakh t), followed by first (1.94 lakh t), second (1.22 lakh t) and third (0.93 lakh t) quarters. The

maximum fish landings occured during the post fishing ban period and winter season. Fish catch was very meagre during the seasonal fishing ban (June to August) in the region (Fig. 5).

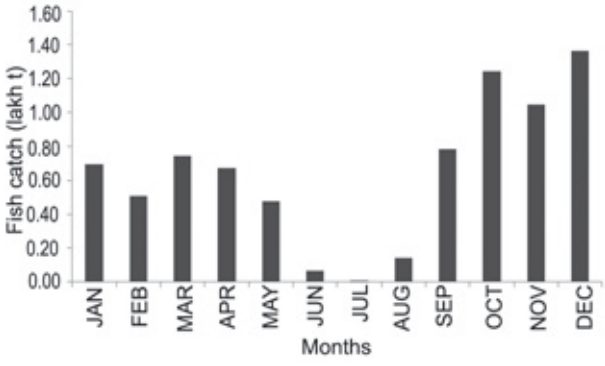

Fig. 5. Monthwise contribution to marine fish landings

The district-wise fish production of Gujarat for the year 2016 showed that the Gir-Somnath ranked first (3.42 lakh t), followed by Porbandar (1.13 lakh t), Amreli (0.91 lakh t), Dev Bhoomi Dwaraka (0.85 lakh t), Junagadh (0.72 lakh t), Kutch (0.35 lakh t), Valsad (0.25 lakh t), Navsari (0.08 lakh t), Jamnagar (0.03 lakh t), Morbi (261 t) and Baruch (181 t). The Gir-Somnath district with major fish landings centers like Veraval, Sutrapada, Nawabander, Muldwaaka and Dhamlej contributes significantly to the total marine fish landings in the state. Jaffrabad a major *dol*net fish landing center in Amreli district, contributes important fishery resources like non-penaeid and penaeid prawns, bombayduck, ribbonfish and catfish.

An appraisal of marine fish landings in Maharashtra - 2016

J. Jayasankar and K. Ramani
ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail: jjayasankar@gmail.com*

The estimated total landings of marine fishery resources of Maharashtra in the year 2016 was 292354 tonnes (t) which was 10.4 % higher than the landings in the previous year for the state. The domination of mechanised sector has been bolstered by an additional landing to the tune of 11% compared to 2015. The outboard sector's contribution increased by 45% while the inboard sector contributed only one-third of what it did in 2015. The non mechanised sector too witnessed a drop to the tune of 32% as compared to 2015.

The major gears and the estimated number of units in deployment during the year were mechanised gillnet (203643 units), mechanised *dol*net (176431), mechanised multiday trawl (76559), mechanised trawl (55305), mechanised purse seine (19551), motorised outboard gillnet (10437) and non mechanised gillnet (28346).The mechanised gears had total sway over the landing of resources followed by non mechanised gill nets.

The growth as compared to 2015 figures are given in Table 1. The hefty increase in the share of mechanised *dol*net and the palpable dip in the quantity of resources landed by mechanised trawlers and motorised gill netters is highlighted.

Table 1. Gearwise landings and growth rate

Gear	Landings (tonnes)	Growth %
Multiday trawl	154648	21
Mechanised *dol*net	57971	48
Mechanised purse seine	46916	13
Mechanised gillnet	19555	-27
Mechanised trawl	10146	-53
Nonmechanised gillnet	358	-44
Outboard (Motorised) gillnet	355	-47

With inputs from P. S. Salvi, M.P. Jadhav, D.D. Sawant, K.R. Mainkar, S.P. Hotekar, Albert Idu K.A., D.G. Jadhav, J.S. Hotagi, B.S. Ramachandra, B.A.A. Shiledar and S.K. Kamble, FRAD field staff in Maharashtra.

The major finfish and shell fish resources landed during 2016 off Maharashtra coast are given below (Table 2). It indicated significant dip in oil sardine and catfish landings compared to 2015. Squid landings showed a phenomenal jump to the tune of 130% and became one of top ten resources (in volume) landed. Non-penaeid prawns, bombayduck and ribbon fishes too showed increase.

Table 2. Major fishing resources landed

Group	2015	2016	Growth %
Penaeid prawns	33763	32262	-4.45
Non-penaeid prawns	20098	31160	55.04
Croakers	28897	28334	-1.95
Squids	9418	21684	130.24
Indian mackerel	14550	19123	31.43
Ribbon fishes	12214	18190	48.93
Bombayduck	13416	17658	31.62
Threadfin breams	12435	14567	17.15
Oil sardine	16841	12466	-25.98
Catfishes	13378	7598	-43.21

Seven high intensity landing centres/ fishing harbours in eight contiguous zones were present (Table 3). The zonal landing pattern showed varying degrees of fluctuation in total landings as compared to the previous year.

In 2016, the peak landings were experienced in New Ferry Wharf (NFW) and Sassoon Docks New (SDN) amongst harbours and in the MH1 zone in the second level, landing centre agglomeration. October and November months witnessed intense landings in most of the zones. A comparison with the profile for the year 2015 revealed the sustained preeminence of NFW in influencing the total landings throughout the year. In majority of zonal months the landings were around 200- 5000 tonnes range. The landings profile juxtaposed with effort profile (effort in estimated units and actual fishing hours) for 2016 indicated that maximum zonal month efforts were in the range of 5000 units or 50-100 thousand hours. But interestingly these profiles also indicated more peaks than the landings profile, especially in zones like MH1, MH2, MH5 and MH6 indicating less catch rates over all.

Table 3. Districtwise landing centres

District	Zone	Landing centres
Sindhudurg	MH1	19
Sindhudurg	MH2	15
Ratnagiri	MH3	13
Ratnagiri	MH4	22
Raigad	MH5	38
Greater Mumbai	MH6	21
Thane	MH7	14
Thane	MH8	16

The species composition of the samples used for estimation of landings indicated maximum alpha diversity amongst the catch spectrum was in the NFW, a major trawl centre, reaching a peak of 167 in the month of October (Table 4). The nominal average catch rate per boat and the variability were computed for the year 2016 (Fig. 1).

Table 4. Species diversity in zone-month matrix

Zone/ Month	1	2	3	4	5	6	7	8	9	10	11	12
ARN - ARNALA	33	16	34	33	42	24	22	19	25	61	53	44
BAS - BASSEIN KOLLIWADA	25	32	11	33	24	16	11	23	32	32	40	38
MH1	40	29	37	45	60	19	9	10	10	51	39	35
MH2	45	16	49	63	27	17	8	39	11	39	39	19
MH3	31	11	24	28	23	4	NS	20	18	21	22	16
MH4	23	18	17	23	38	4	NS	7	NS	25	28	28
MH5	26	13	28	22	15	12	18	46	39	50	55	34
MH6	28	32	26	35	31	NS	4	11	15	38	36	29
MH7	28	19	23	31	39	24	16	37	23	27	46	31
MH8	11	7	15	31	28	21	15	NS	8	8	27	14
NFW - NEW FERRY WHARF	125	71	152	123	143	22	28	121	156	167	153	144
SAT - SATPATI	29	19	21	47	39	19	23	NS	59	37	61	53
SDN - SASOON DOCK NEW	29	29	37	39	33	NS	9	51	43	62	58	71
SDO - SASOON DOCK OLD	126	123	173	151	149	34	49	135	164	153	174	161
VER - VERSOVA	84	62	88	89	101	37	8	50	90	132	106	102

NS - No sampling

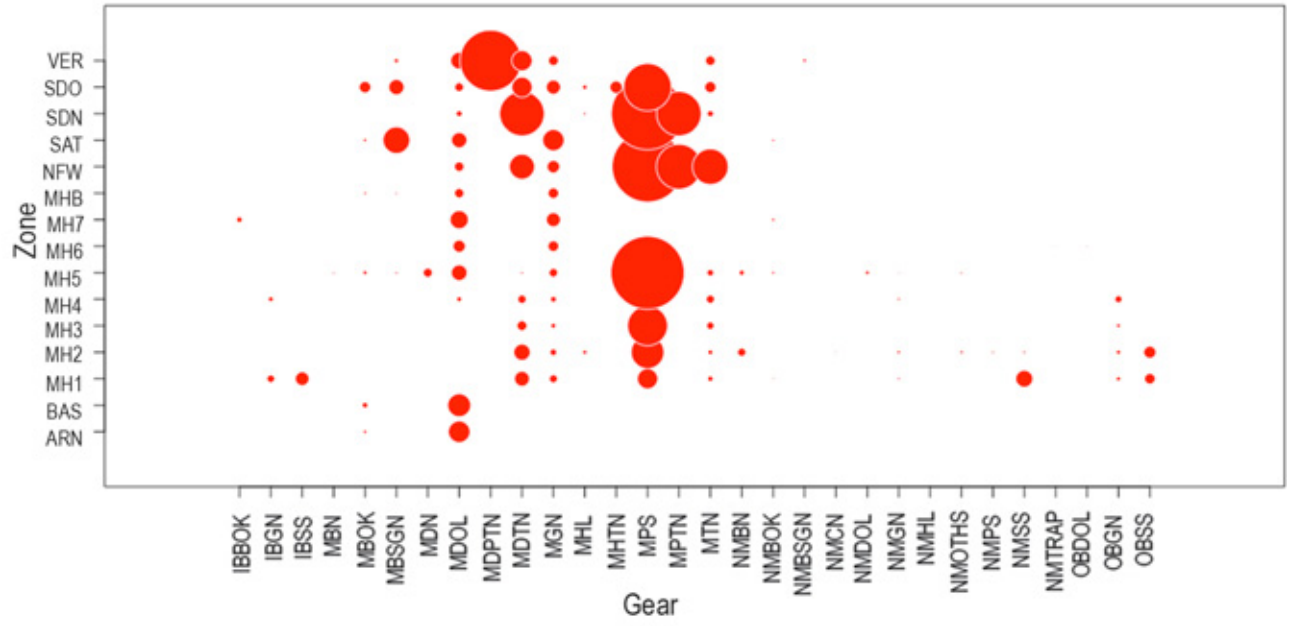

Fig. 1. Variability in catch rate of zone- gear combinations in 2016

IBBOK - inboard bokshi net, IBGN - inboard gill net,IBSS - inboard shore seine, MBN - mechanised bag net, MBOK - mechanised bokshi net, MBBSGN - mechanised bottom set gill net, MDN - mechanised drift net, MDOL - mechanised *dol*net, MDPTN - multiday pair trawl net, MDTN - multiday trawl net, MGN - mechanised gill net, MHL - mechanised hooks & line, MHTN - mechanised hand trawl net, MPS - mechanised purse seine, MPTN - mechanised pair trawl net, MTN - mechanised trawl net, NMBN - non mechanised bag net, NMBOK - non mechanised bokshi net, NMBSGN - non mechanised bottomset gillnet, NMCN - non mechanised cast net, NMDOL - non mechanised *dol*net, NMGN - non mechanised gillnet, NMHL - non mechanised hooks & line, NMOTHS - non mechanised others, NMPS - non mechanised purse seine, NMSS - non mechanised shore seine, NMTRAP - non mechanised trap, OBDOL - outboard dol net, OBGN - outboard gill net, OBSS - outboard shore seine

The landings sampled from mechanised purse seine crafts were showing high standard error in the MH5, NFW and Sassoon Docks (New) zones. The trawl landings too showed considerable deviation amongst sampled crafts, especially in Versova, Sassoon Docks (New) and NFW. Amongst zones MH5 showed significant variation in catch rates of MPS. Towards getting a more incisive view of the landing pattern across the zones, standardized average per boat mean total catch across various gear, month, day and season combinations were computed and the result is given below (Fig. 2). The plot revealed that the most productive harbor, NFW, comes second in the standardised per boat average catch, while Sassoon Docks (New) takes the top position. The influence of the mechanised boats landing centres can be well seen by the fact that just three centres with maximum trawl landings between them offset the below average rates of 11 other zones.

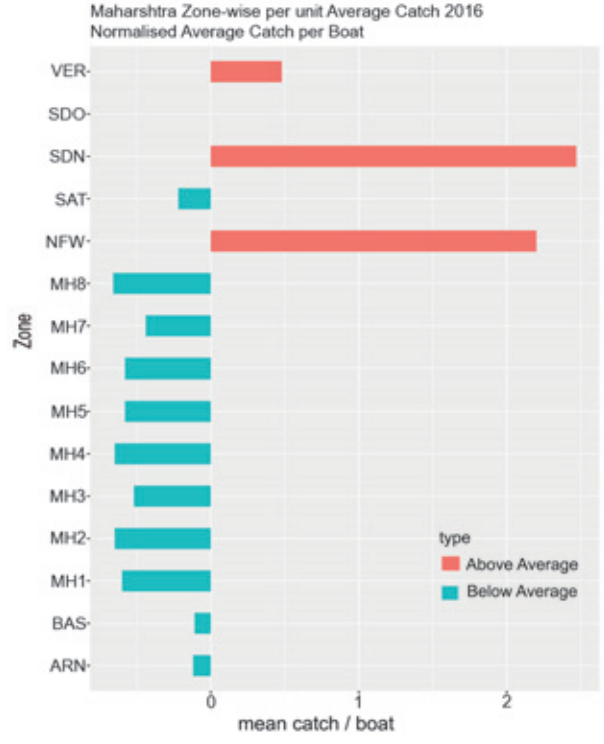

Fig. 2. Ranking of fishing harbour based on landing patterns across zones

Marine fish landings in Karnataka during 2016 - An overview

*Somy Kuriakose and Sijo Paul
ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail: somycmfri@gmail.com*

Karnataka, with a 300 km coastline supports livelihood of 1.7 lakh fisherfolk population residing in 144 marine fishing villages. The marine fish production in the state reached a record 5.29 lakh tonnes (t) in 2016. The increase is attributed to the hike in the landings of *Priacanthus* spp., lesser sardines and oil sardine in 2016 as compared to 2015. Among the three coastal districts of Karnataka, Dakshina Kannada and Udupi districts contributed 38% each, followed by the Uttara Kannada (24%). The Mangalore and Malpe Fisheries Harbours are the main contributors in the Dakshnina Kannada and Udupi districts respectively. Huge landings of *Priacanthus* spp. was observed in multiday trawlers landed at Mangalore fisheries harbour to the tune of 15 to 25 t per boat during the months of November and December, 2016.

The main characteristic of marine fisheries in Karanataka is the predominance of pelagic resources. In the year 2016, the estimated pelagic landing of 2.84 lakh t accounted for 54% of the total marine fish landings. An increase of 17% was noticed in the pelagic landings compared to 2015, mainly due to rise in the catch of Indian mackerel, oil sardine and lesser sardines. Demersal fish resources contributed 36% of the total landings. The spurt in the demersal fish landing was mainly due to heavy landings of *Priacanthus* spp. by trawlers. The crustacean and molluscan resources contributed almost equally (5%) to the total landings for the year 2016 (Fig. 1).

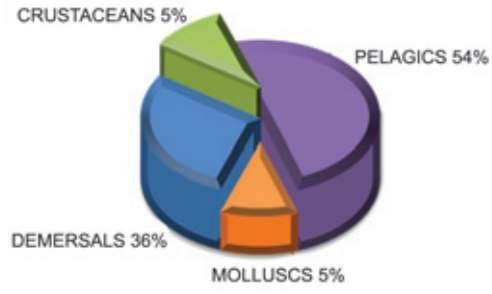

Fig. 1. Components of marine fish landings

Table 1. Major resources landed

Resources	Landings (t)	
	2016	2015
Indian mackerel	88,219	65,699
Priacanthus spp.	68,554	21,347
Oil sardine	62,609	43,489
Threadfin breams	52,858	40,699
Lizard fishes	33,972	28,399
Cephalopods	26,604	26,344
Scads	25,275	42,890
Lesser sardines	18,990	6,445
Tunas	16,801	6,460
Ribbon fishes	16,808	17,866
Penaeid prawns	15,292	16,218

The major resources that dominated during the year was the Indian mackerel, *Priacanthus* spp., oil sardine, threadfin breams, lizard fishes and cephalopods. These resources together contributed more than 60% of the estimated landings of marine fish along the Karnataka coast in 2016 (Table 1 & Fig. 2). The landings of Indian mackerel showed an

With inputs from M. Chaniappa, V. Lingappa, U. Jeyaram, C. G. Ulvekar, Ganesh Bhatkal, U. V. Arghekar, Sathyanarayan V. Pai, K. C. Pandurangachar, Suraj Surendra Kalgutkar and Ravichandra Angadi, FRAD field staff in Karnataka.

increase of about 22,000 t with major share from purse seiners and multi-day trawlers. An increase of about 47,000 t was noticed in the landings of *Priacanthus* spp., which was harvested mainly by trawlers in multi-day operations. Estimated catches of oil sardine was 62,609 t showing an increase of about 19,000 t over the previous year with major share (80%) coming from purse seiners. The landings of lesser sardines increased nearly threefold amounting to 18,990 t as a result of increased landings from trawlers and purse seiners. In 2016, landings of threadfin breams amounted to 52,858 t, 97% of which was caught in trawl nets that indicated an increase of 3%. There was a drastic drop of 40% in landings of scads. Marginal decline in the landings of ribbonfishes, penaeid prawns and cephalopods was recorded.

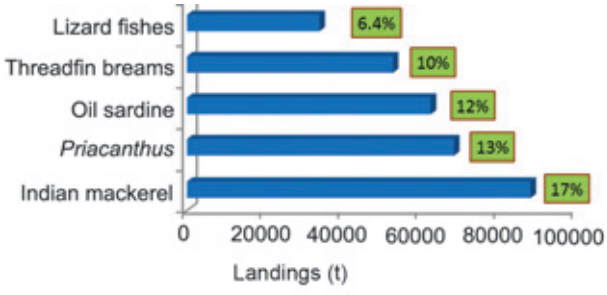

Fig. 2. Major marine fishery resources landed in Karnataka

Mechanised and motorised sectors contributed 91% and 8% respectively of the estimated marine fish landings in Karnataka (Fig. 3). Non-motorised sector contributed relatively little (1%) to the total marine fish landings in the state. Among the mechanised boats, 70% of the fish harvest was by trawlers and 29% by purse seiners. Compared to the previous year there was an increase of 5.2% in the total trawl landings. There was an increase in the multiday trawl landings with a reverse trend for single day trawl landings. Combined gear operations of hooks and line with trawl net also happened during this period. The purse seine landings increased by 68,440 t mainly due to 'light fishing' operations in the Dakshina Kannada and Udupi districts. In this fishing technique, when the moonlight is less or absent, lights are attached to a structure above water or suspended underwater to attract fish that were caught using nets. These landings are characterised by a wide species diversity and could be well differentiated from a regular demersal trawl catch. A self-imposed ban on light fishing by the fishermen in the Karwar area was noted.

Major gears which contributed from the motorised sector were ring seine (OBRS) and gillnet (OBGN). Among the different types of gears operated, trawl net (MTN) and seine nets (MPS, OBRS) contributed 94% of the landings (Fig. 4). Trawlers contributed 3.37 lakh t of marine fish in 2016. The catch per hour of the multi-day trawlers (MTN) increased to 110 kg/hr from 75 kg/hr. The resources mostly harvested by trawlers were threadfin breams, *Priacanthus* spp., scads, Indian mackerel, cephalopods, lizard fishes and ribbon fishes.

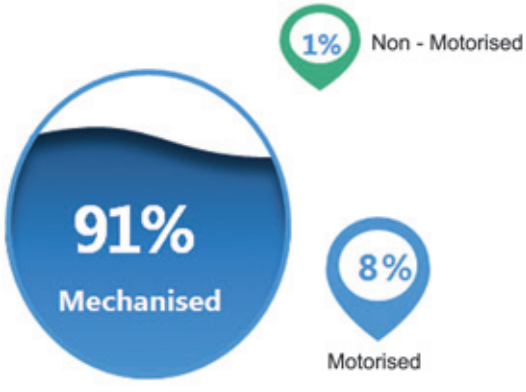

Fig. 3. Sectorwise marine fish landings

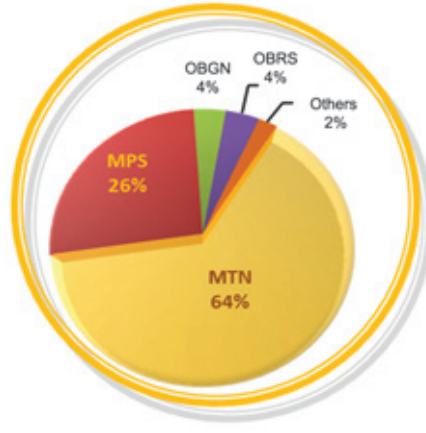

Fig. 4. Gearwise contribution to marine fish landings

The catch from mechanised purse seine (MPS) showed an increase of about 96% during 2016. The unit operations also increased from 33,919 in 2015 to 42,432 during 2016 and increase was noticed in the catch per unit effort also. The catches from ring seiners increased to 21,130 t with a catch per unit of 2,126 kg. Slight reduction in the number of ringseine unit operations and an increased trend in case of gillnetters was recorded. The catch from gillnetters was not as high as in 2015, but the estimated catch per boat (164kg) was higher than the previous year.

Seasonal contribution of landings indicated that the most productive period was from October-March (Fig. 5) and least volume (17%) during the April-June period.

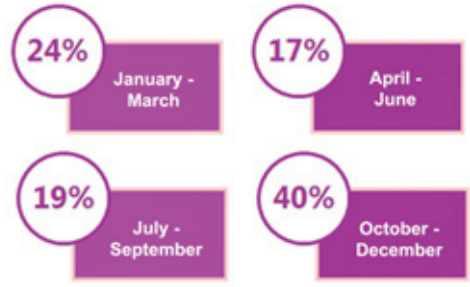

Fig. 5. Seasonal landing trends

Marine fish landings in Kerala during 2016 - An overview

*Somy Kuriakose , Sindhu K. Augustine and T.V.Sathianandan
ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail: somycmfri@gmail.com*

Kerala has 188 marine fish landing centres along the coastline of 590 km length and 1.2 lakh marine fishermen families. The estimated marine fish landings in Kerala during 2016 was 5,22,550 tonnes (t) contributing about 14% of the marine fish production in the country (Fig. 1).

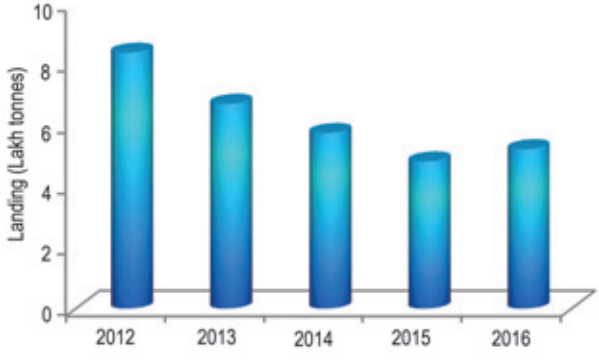

Fig. 1. Trend of marine fish landings in Kerala during 2012-2016

Pelagic finfish contributed 60% of the total marine fish landings in 2016 with scads, mackerel and oil sardine top in the list. Demersal resources estimated at 1.32 lakh t, contributed around 25% of the landings along this coast.

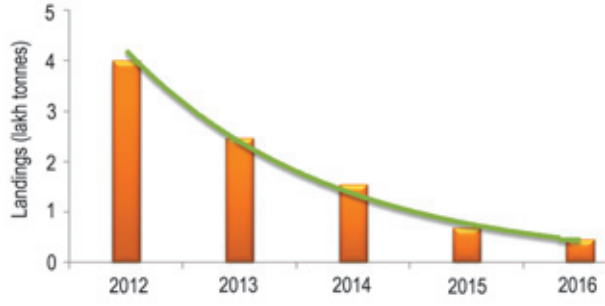

Fig. 2. Oil sardine landing trends

The major resources contributing to the landings of demersal resources were bullseye, threadfin breams, flatfishes, lizardfishes, rock cods and croakers. The landings of crustaceans and molluscs

With inputs from Sijo Paul, K. K. Suresh, A. Y. Jacob, K. G. Baby, K. C. Hezhekiel, Thomas Kuruvila, K. N. Pushkaran, P. K. Baby, T. Retheesh, Poulose Jacob Peter, N. K. Midhunraj, T. G. Kishor, Ansar Pokkarakath, T. Rajesh Babu and P. Shiju, FRAD field staff in Kerala.

showed a declining trend during 2016 forming 8% and 7% portions of the total landings respectively. Nearly one-third of the crustacean landings were penaeid prawns while cephalopods formed the bulk of the molluscan landings.

Table 1. Major resources landed in Kerala

	2015	2016
Scads	28151	53990
Indian mackerel	70079	47253
Oil sardine	68431	45958
Threadfin breams	42253	37245
Cephalopods	38509	35672
Penaeid prawns	38006	31494
Bulls eye	4691	29869

The estimated landings of major resources for 2015 and 2016 are given in the table. Scads belonging to the genus *Decapterus* were the most abundant resource (0.54 lakh t) in the state during 2016. Oil sardine, the major resource in Kerala, continued its declining trend with an estimate of 45,958 t in 2016 (Fig. 2). Compared to 2015, decrease in the landings of Indian mackerel, threadfin breams, anchovies *(Stolephorous)*, cephalopods and peneaid prawns was recorded. The landings of bulls eye (*Priacanthus* spp.) and scads during 2016 increased considerably. For *Priacanthus* spp., from a mere 4,691 t in 2015 a high of 29869 t was recorded in 2016. Trawlers contributed 97% of bullseye landings.The resource has become a major portion of the trawl landings (12%), along with other resources such as threadfin breams, penaeid prawns and scads.

Table 2. Gear-wise landing trend

Gear	2015	2016
Multiday trawl net (MDTN)	189347	219656
Outboard ring seine (OBRS)	98073	113534
Mechanised ring seine (MRS)	66770	58617
Outboard gillnet (OBGN)	35505	36051
Mechanised others (MOTHS)	27560	24890
Outboard boatseine (OBBS)	11780	22011
Mechanised trawlnet (MTN)	19777	13638
Outboard hook and line (OBHL)	12831	9779
Mechanised gillnet (MGN)	764	7321
Non mechanised (NM)	7921	5933

The contribution by mechanised, motorised and artisanal sectors were 63%, 36% and 1% respectively (Fig 3). Multiday trawlers accounted for about 42% of the landings in Kerala. Ring seine catches accounted for 33% of the landings. Important gears which contributed to the mechanised sector were trawlnets, ringseines and gillnets (Table 2). The multiday trawlers contributed maximum (2,19,656 t) with an increase of 30,000 t from the previous year's catch. The average catch per trawler also increased from 2 t to 2.8 t. The ringseiners popularly known as *thanguvallam* that targets the oil sardine and mackerel resources contributed a catch of 58,617 t. Compared to the previous year catch volumes showed a decline of 8,152 t and catch per boat also dropped from 2.3 to 2 t mostly because of the declining oil sardine catch.

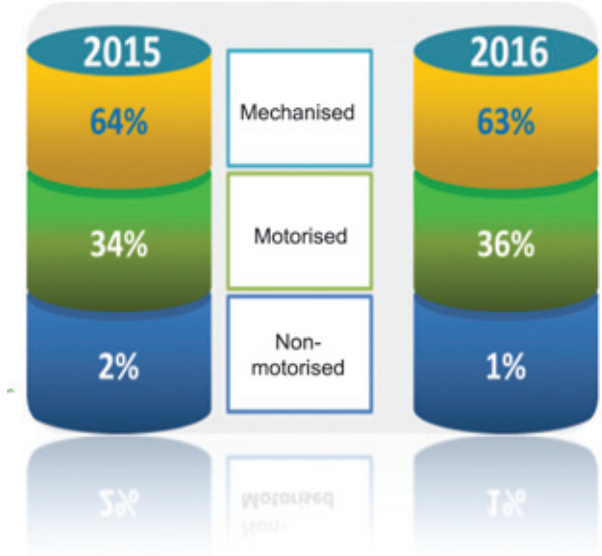

Fig. 3. Sectorwise contribution to marine fish landings in Kerala

Almost 61% of the total landings of motorised sector were from the outboard ringseiners. Their catch volume increased from 98,073 t in 2015 to 1,13,534 t in 2016. The catch per boat also increased from 855 to 890 kg as they got good catches of anchovies and scads. Non-motorised sector contributed 5,933 t of landings which is 2,000 t less than that of last year. Small thermocol boats widely used for nearshore fishing by the fishermen in Alappuzha district contributed a major share (59%) of the total landings in this sector.

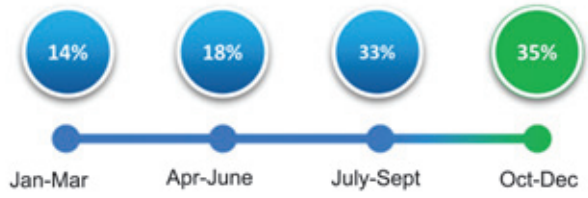

Fig. 4. Seasonal catch contribution in 2016

Seasonal fluctuations in landings indicated peak in October-December period (35% of the landings) followed by July-September (Fig. 5). Among districts, Ernakulam topped with 1.4 lakh t (26%). The three fishing harbours here (Munambam, Cochin and Vypin) recorded increase in landings. Kozhikode had second largest catch with 1.0 lakh t (20%) where three major harbours, namely Beypore, Puthiyappa and Chombala contributed major share. Kollam district stood in the third place with 90,584 t which is less by 2000 t than that of the previous year. The

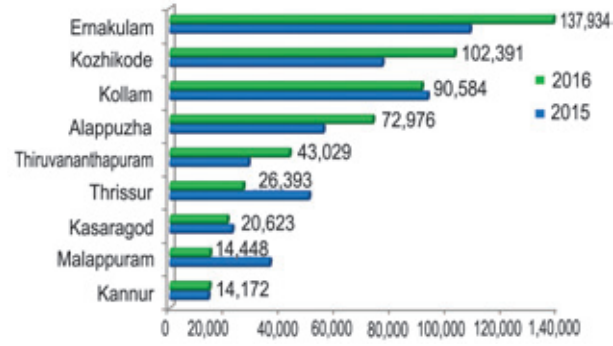

Fig. 5. Districtwise estimated marine fish catch

two major harbours, Neendakara and Sakthikulangara showed a declining trend in landings as well as the fishing effort in unit operations. In Alappuzha district, landings increased by around 20,000 t with an estimated 72,976 t. Motorised ringseine fishery dominated with scads replacing the eminence of oil sardine in the catch volumes in 2016.

Marine fish landings in West Bengal during 2016 - An overview

*K. G. Mini, Sindhu K. Augustine and T. V. Sathianandan
ICAR-Central Marine Fisheries Research Institute, Kochi
**e-mail: minikg02@gmail.com*

A remarkable increase in marine fish landings in West Bengal was recorded in 2016. The estimated total marine fish landings with a 129% upsurge reached 2.72 lakh t from the 1.19 lakh t recorded in 2015. Almost all the main finfish resources showed an increase but the exceptional dominance was of Hilsa shad. Its estimated landings touched a record high of 89,109 t from the 16,273 t recorded in 2015. The increase was found to sustain throughout the year except during the fishing ban (April-May) period and in November and December. The trend in the total marine fish landings of West Bengal and Hilsa shad since 2007 is given (Fig. 1).

Fig. 1. Trend in the total marine fish and Hilsa shad landings (lakh t)

Pelagic resources such as hilsa shad, bombayduck and anchovies contributed 68% of the total landings of the state and were mainly caught by gillnetters. Demersal finfish constituted 22% in which catfish, croakers and pomfrets were landed by gillnetters as

With inputs from Bijoy Krishna Burman and Indranil Mukherjee, FRAD field staff in West Bengal

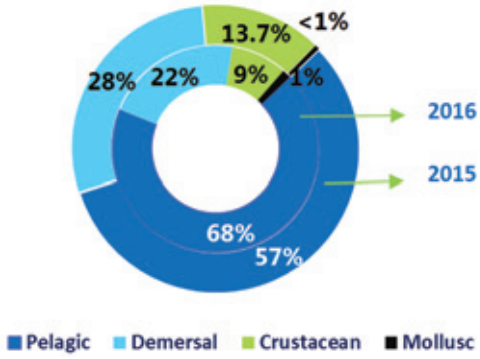

Fig. 2. Assemblage-wise contribution to total marine fish landings in West Bengal in 2015 and 2016

well as trawlers. The crustacean landings assessed at 9% of the total landings and molluscan resources at 1% were mainly caught in trawls and bagnets (Fig. 2).

Resource wise Hilsa shad, (*Tenualosa ilisha)*, locally known as *Ilish* contributed 33% of the total landings of the state and most of it (96%) was harvested by the gillnetters. The other major resources landed were bombayduck, catfish, anchovies, penaeid prawns and croakers. In comparison to 2015, the landings of Bombayduck doubled with 31,333 t and 58% of this was contributed by bagnet. Catfish, another important resource in the state showed a three fold hike from previous year, with 17,414 t landed which is the highest catch of this resource in the last five years. The catfish catch chiefly comprised of the *Arius* spp. and were caught by gillnetters. The anchovies (*Coilia*, *Setipinna* and *Stolephorus*) at an estimated 15,898 t was double that of previous year and mostly harvested by trawlers and bagnetters. Penaeid prawn landings estimated at 14,895 t showed significant increase from the previous year's catch of 5,897 t.

Sector-wise landings indicated mechanised fishing crafts contributed 90% of the total catch, motorised sector 9.9% and traditional non-motorised fishing craft only 0.1%. Gillnetters have a major share (59%) of the catch in the mechanised sector at 1,44,482 t followed by trawlers (31%) and rest by bagnets and hooks & line.

In motorised sector bagnets with 16,399 t contributed 61% of the total landings. Gillnet, shoreseines and hooks & lines were used by motorised fishing crafts. A comparison of catch per unit effort (in kg/unit) of major gears in both mechanised and motorised sector was made (Figs. 3 & 4). The catch per hour increased slightly in the case of mechanised trawlnet, gillnet and hook & lines whereas plummeted to less than half of what it was in 2015 in bagnet. In the motorised sector, catch per unit effort of shoreseine showed more than 50% jump from previous year.

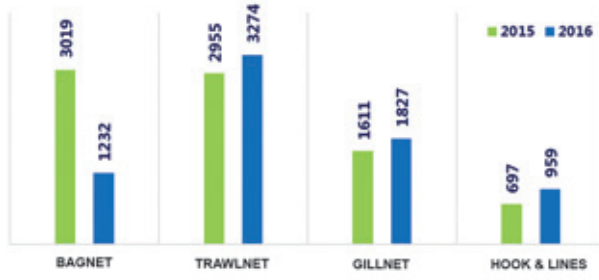

Fig. 3. Comparison of catch per unit effort in mechanised sector in 2015 and 2016

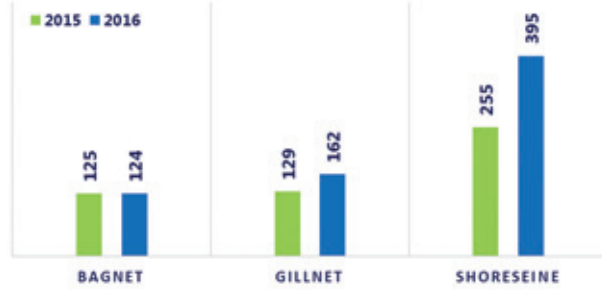

Fig. 4. Comparison of catch per unit effort in motorised sector in 2015 and 2016

District-wise contribution indicated South 24 Paraganas adjacent to the *Sunderbans* was the chief contributor with 2.39 lakh t (88%) of the total marine fish landings. The major fishing harbours of the district which are in Kakdwip, Namkhana, Fraserganj, Raidighi and Sultanpur have good facilities for berthing, marketing and other maintenance services. Nearly thirty marine fish landing centres are present in Purba Midnapur district and in a majority of them only seasonal fishing using traditional fishing crafts is observed. The district contributed 0.32 lakh t (12%) of the total marine fish landings. Major fishing harbours here were Digha Mohana, Sankarpur, Patuaghat and Rasulpur.

Generally, the fourth quarter of the year (October-December) contributes most to the marine fish landings in the state. In a contradiction, the third quarter (July-September) of 2016 had the maximum catch (1.24 lakh t) which formed 45% of the total marine fish landings. The first quarter contributed 73,304 t (27%). The landings of the fourth quarter was estimated at 58,000 t (22%) which was comparably very less to that in 2015. The second quarter (April-June) contributed the rest (6%).

It can be concluded that the marine fishery sector of West Bengal has recovered in the year 2016 from the declining fishery trends in the previous years. The reckless fishing for juvenile fishes using mosquito net type fishing gears has been curbed. Employing good practices of fishing in the coming years can benefit not only the 81,000 fishermen families in the coastal districts but also the entire population of the state where fish is a highly relished food.

Marine fish landings in Odisha during 2016 - An overview

*K. G. Mini, Vivekanand Bharti, V. K. Manu, Sindhu K. Augustine and T. V. Sathianandan
ICAR-Central Marine Fisheries Research Institute, Kochi
** e-mail: minikg02@gmail.com*

The state of Odisha has a long coast line of 480 km with numerous fisheries harbours and fish landing centres like Paradeep, Bahabalapur, Dhamra, Atharabanki, Nuagarh, Bada Arjipally etc. According to Marine Fisheries Census 2010, there are 1.14 lakh fishermen families with 3.95 lakh fisherfolk engaged in actual fishing activities. In 2016, the marine fish production in Odisha was 1.17 lakh tonnes (t) showing a decrease of 17% over the previous year. The state contributed only 3.2% to India's marine fish production in 2016. Among the six coastal districts namely Balasore, Bhadrak, Kendrapara, Jagatsinghpur, Puri and Ganjam, most of the marine fish landings came from Jagatsinghpur district (62%).

The marine fish landings of Odisha comprises of pelagic, demersal, crustacean and molluscan resources with 197 species recorded from all the groups. Even though pelagic resources are the largest contributor (53%) in the state, the catch of these resources was 13% lower than that in the previous year. 70% of the total pelagic landings was represented by five resources, namely, ribbonfish, Indian mackerel, other clupeids, lesser sardines and horse mackerel. The contribution of demersal and crustacean resources was 31% and 14% respectively (Fig. 1). The main demersal resource was croakers which contributed 48% of the total volume of demersal fish landings. Among the crustaceans, the most important resource was penaeid prawns, accounting for 82% of the total crustacean landings. Molluscan resources contributed 2% and showed a slight increase compared to 2015.

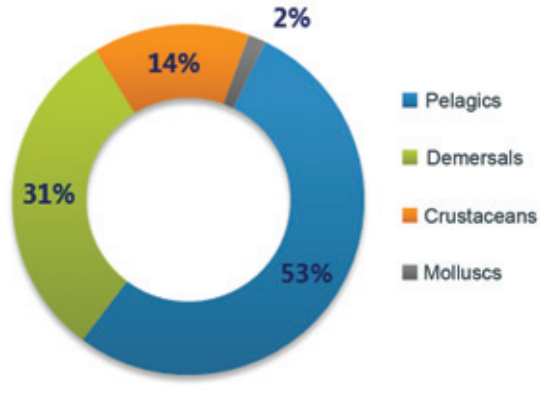

Fig. 1. Components of marine fish landings

With inputs from Swapan Kumar Kar, Sukhdev Bar and Kala Malik, M. FRAD field staff in Odisha

The top five dominating resources were croakers, penaeid prawns, ribbon fishes, Indian mackerel and lesser sardines, which accounted for 52.8% of total marine fish landings of the state (Fig.2). In 2016 Indian mackerel, ribbon fish and croakers showed 2.5%, 2.2% and 0.2% increase respectively while lesser sardines and penaeid prawns decreased by 7.9% and 1.2% respectively as compared to previous year.

Fig. 2. Contribution of top 5 resources

In 2016, 66.8% of marine fish landings of the state was contributed by mechanised sector, while motorised and non-mechanised fishing sectors accounted for 26.9% and 6.3% respectively (Fig. 3). The landings from all three sectors decreased during 2016 compared to that of 2015. Trawlnets and gillnets, the two major gears operating in the state contributed more than three fourth of the marine fish landings. Multi-day trawlers (MDTN) contributed

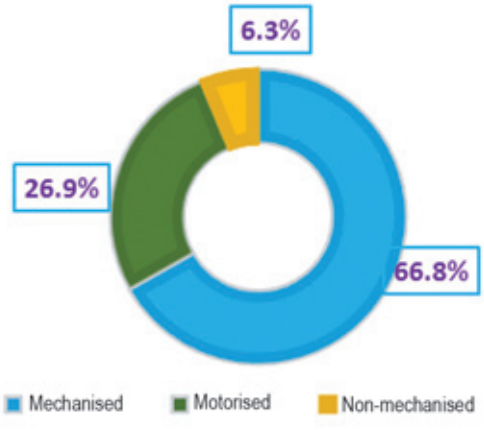

Fig. 3. Sectorwise catch contribution

(64%) of the state's marine fish landings with croakers, penaeid prawns, ribbon fishes and Indian mackerel as the major resources.

The maximum catch per unit effort of 3230 kg/unit was observed in MDTN, followed by single day trawl net (MTN) and mechanised gillnet (MGN) at 1468 and 1380 kg/unit respectively. The catch per unit hour for MDTN was 57 kg. The minimum catch per unit effort was recorded in traditional non-mechanised (NM) fishing gear, which was only 62 kg/unit (Fig. 4).

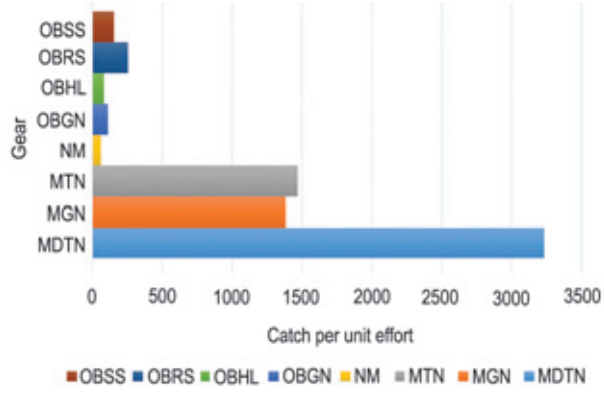

Fig. 4. Catch per unit effort of various gears

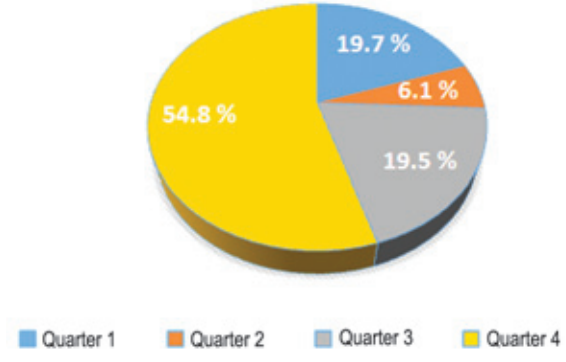

Fig. 5. Percent contribution of various quarters

Seasonal landing trend revealed that the best fishing in the entire year was realised in the fourth quarter (October - December) with 0.6 lakh t. There was almost equal volumes (0.2 lakh t) from first and third quarters. The least fishing activity was in the second quarter (April - June) which coincides with the seasonal fishing ban resulting in the lowest contribution (6%) by this quarter (Fig. 5).

Marine fish landings in Andhra Pradesh during 2016 - An overview

*Vivekanand Bharti[1], K. G. Mini[1], T. V .Sathianandan[1], D. Pugazhendi[2], R. Manjeesh[1] and Sindhu K. Augustine[1]

[1]*ICAR-Central Marine Fisheries Research Institute, Kochi*
[2]*Madras Research Centre of ICAR-Central Marine Fisheries Research Institute, Chennai*
**e-mail: vivekanandbharti15@gmail.com*

Andhra Pradesh with a coastline of 974 km, and nine coastal districts has 1.63 lakh marine fishermen families residing in the 555 marine fishing villages (Marine Fisheries Census 2010) who depend on fishing either directly or through allied activities for their livelihood. The state is cyclone prone and during the past decade, cyclones have severely affected the state's fisheries sector. The marine fish landings was 1.92 lakh tonnes (t) in the year 2016, which was 35% less than that of the previous year. The drastic reduction in the landings of the state may be attributed to reduction in fishing operations during the months of September, October and November due to cyclone warnings. Among the coastal districts, East Godavari contributed the highest (33%) to total marine fish landings of the state, followed by Visakhapatnam (22%) and Srikakulam (11%). In spite of decline in the catch contributions from a few landing centres like Bhairavpalem, Kakinada and Nizampatnam the landings increased compared to previous year.

The marine fishery resources were categorized into pelagics, demersals, crustaceans and molluscs (Fig. 1). In 2016, pelagic finfish resources remained the largest contributor (1.2 lakh t, 63%) despite experiencing a decline in the landings compared to 2015. The landings consisted of demersals (0.4 lakh t, 21%), crustaceans (0.3 lakh t, 14%) and molluscs (0.03 lakh t, 2%).

During 2016, the top five marine fishery resources of the state were lesser sardines, Indian mackerel, penaeid prawns, ribbon fishes and oil sardine. These collectively accounted for about 50%

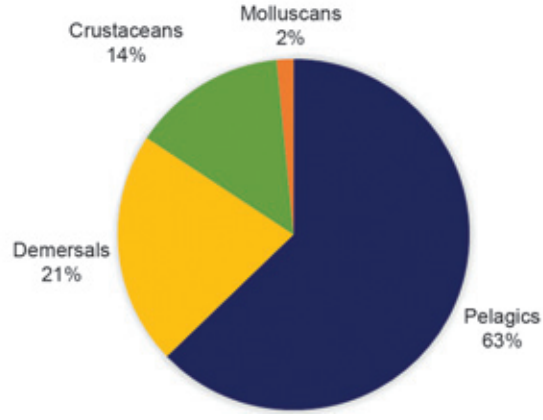

Fig. 1. Components of marine fish landings

of total marine fish landings in the state (Fig. 2). Principal species among lesser sardines were *Sardinella gibbosa* and *Sardinella fimbriata*.

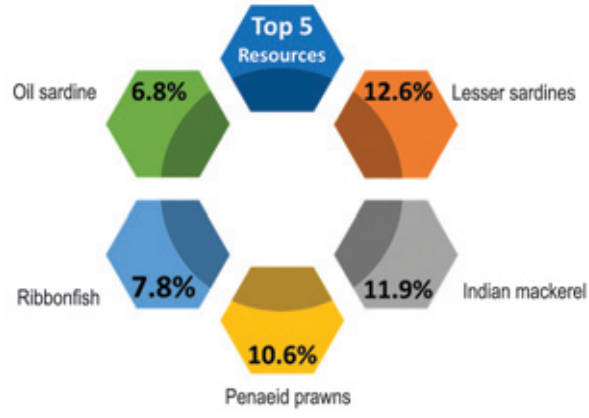

Fig. 2. Contribution of top five resources

Among all maritime states, contribution from motorised sector is dominant only in Andhra Pradesh. The contribution of motorised sector

With inputs from R.V.D. Prabhakar, P. Venkataramana R. Sivaraju, P. Nagaraju, S. Tatabhai, G. Sudhakar, S.V. Subba Rao, S. Chandrasekharan, J. Balaji, Moshe Ch. and Y.V.S. Suryanarayana, FRAD field staff in Andhra Pradesh

reduced to 46% during 2016 from 51% during 2015 (Fig. 3). This decline was coupled with a dramatic rise in the share of mechanised sector from 29 % (2015) to 41% (2016). The non-motorised sector which has historically been an important contributor came down to 13% during 2016 compared to 20% in the previous year.

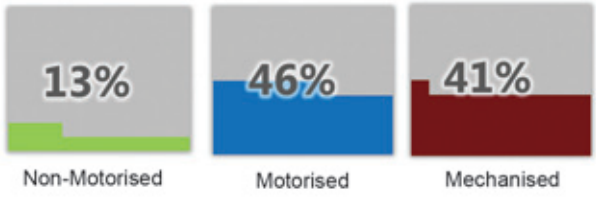

Fig. 3. Sector-wise contribution to marine fish landings in Andhra Pradesh

Mechanised trawl (MTN), outboard ring seine (OBRS) and outboard gillnet (OBGN) contributed significantly to the marine fish landings in the state. While the catch volumes in trawl net remained similar to that in 2015, those from outboard ring seine and outboard gillnets declined (Fig. 4). The catch per unit effort was maximum (1.9 tonnes/ unit) for mechanised gill net among all gears.

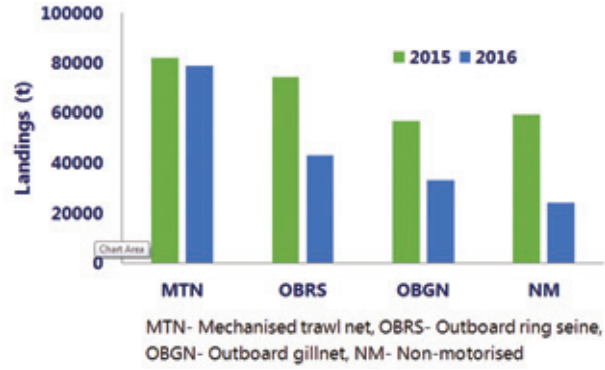

Fig. 4. Major gears that contributed to the landings during 2015 and 2016

In the year 2016, the maximum fish landings was recorded during January to March. The periods July-September and October-December contributed almost equally to the total landings in the reporting year. During the year, a 61-days ban on fishing using mechanised and motorised boats was implemented by the government from April 15. The landings during April – June therefore accounted for only 15% of the total landings of the state.

Marine fish landings in Tamil Nadu and Puducherry during 2016 - An overview

*Grinson George[1], K. Ramani, D[1]. Pugazhendi[2], Sindhu K. Augustine[1] and T. V. Sathianandan[1]
[1]*ICAR-Central Marine Fisheries Research Institute, Kochi*
[2]*Madras Research Centre of ICAR-Central Marine Fisheries Research Institute, Chennai*
**e-mail:grinsongeorge@gmail.com*

Tamil Nadu, with a coastline of 1076 km has 363 landing centres while the 45 km coastline of Puducherry has 26 landing centres in 2 fishing zones (Puducherry and Karaikkal). Fishing is done using different combinations of fishing crafts and gears. The recent trend of fish landings in Tamil Nadu showed a slight decrease in landings in 2016 (7.07 lakh t) compared to 2015 (7.09 lakh t). In spite of this, Tamil Nadu was ranked second among all maritime states contributing 19.5% of the total marine fish landings in the country during 2016. The landings of Puducherry were 0.45 lakh t in 2016 with a reduction of 33,958 t compared to 2015. The major contribution was from Karaikkal region (67%).

In Tamil Nadu the contribution of pelagic and demersal fishes were 54% and 29% respectively while the crustaceans (9%) and molluscs (8%) accounted

With inputs from P. Jaiganesh, S. Selvanithi, C. Chandrasekaran, J. Balaji, S.Pradeep, A. Kumar, S.M. Sikkandhar Bhatcha, A. Ramesh, A. Gandhi, P. Villan, N. Boominathan, S. Mohamad Sathakathulla, N. Ramasamy, C.S. Santhana Kumar and P. Rajendran, FRAD field staff in Tamil Nadu.

for the rest. Among 12 districts in Tamil Nadu, Ramanathapuram recorded 2.07 lakh t, Nagapattanam 1.21 lakh t, followed by Cuddalore 1.07 lakh t. Rameswaram-Verkode fisheries harbour, Nagapattinam fisheries harbour and Cuddalore fisheries harbour were the major harbours in these districts. The annual landings were maximum in 4th quarter (30.6%) followed 3rd quarter (30.1%) and 1st quarter (21.7%). The lean period was in the 2nd quarter (17.6%).

The major resources landed in Tamil Nadu were lesser sardines (13.4%), oil sardine (11.45%), silverbellies (10.8%), cephalopods (7.7%) and Indian mackerel (4.6%) which constituted 47.9% of total landings in Tamil Nadu (Fig. 1). Though, there was a slight decrease in the catches of oil sardine in Tamil Nadu during 2016, this species has emerged as a major fishery resource. Higher volume of oil sardine landings than that in Kerala was recorded in 2016. Ribbon fishes and tuna (*K. pelamis*) catches increased while lesser sardines declined. Lesser sardines, oil sardines and silverbellies retained their positions as top 3 resources in order during 2015 and 2016. Scads declined drastically (-70%) during 2016 compared to previous year.

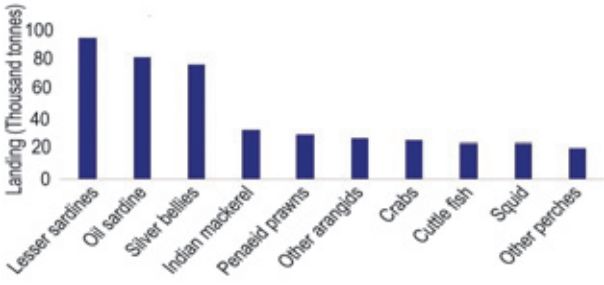

Fig. 1. Top ten resources in Tamil Nadu during 2016

In Tamil Nadu, the mechanised sector continued to dominate with contribution of 78.1% followed by motorised and non-motorised sector with 21.3% and 0.6% respectively, in 2016. The major gears operated in the mechanised sector included single & multiday trawlers, gillnetters, hooks and lines and ring seines. The landings by single and multiday trawlers during 2016 formed 75.2% of the total marine fish landings in the state. The landings of single day trawlers increased by 88,832 t and fishing effort by 60,604 unit operations when compared to last year. However the catch per hour reduced from 103 kg to 99 kg in 2016. In multiday trawlers, the landings reduced by 33,042 t and the unit operations drastically declined by nearly half. A significant decrease was noticed in the landings of mechanised ring seiners, from 10,913 t in 2015 to 171 t in 2016. Significant reduction in the unit operations of ring seines, catch per unit effort and catch per hour were also noticed in 2016. Landings from mechanised gillnetters increased from 10,508 t to 18,394 t in 2016 and the catch per hour increased from 34 kg in 2015 to 96 kg in 2016. The major gears operated in the motorised sector were bag net, gill net, hooks & lines, ring seines, shore seines and trawl nets with major contribution by motorised gillnet (85,234 t).

The major resources landed in Puducherry were penaeid prawns (10.7%), cephalopods (10.2%), oil sardines (8.3%), barracudas (5.5%) and goat fishes (5.5%). These major resources constituted 40% of the total landings of Puducherry. The contribution of pelagic and demersal fishes were about 43% and 34% respectively followed by crustaceans (13%) and molluscans (10%). The maximum production was recorded in 3rd quarter (43.57%) followed by 2nd quarter (20.11%) and 1st quarter (19.32%).

The major part of marine fish landings in Puducherry was from mechanised sector (86.7%). Motorised and non-motorised sectors contributed 13.3% and 0.04% respectively during in 2016. Multiday trawlers and single day trawlers together contributed 82% of the total landings the state. The landings of multiday trawlers in Puducherry decreased from 67,695 t in 2015 to 27,997 t in 2016. The CPUE of multiday trawlers reduced from 3103 kg per trip in 2015 to 1626 kg per trip in 2016. While considering the single day trawlers, the landings increased from 1940 t in 2015 to 8883 t in 2016. The number of trips by these trawlers also increased and catch per hour reduced from 67 kg in 2015 to 32 kg in 2016.

In Tamil Nadu and Puducherry, change in the trawl fishing pattern was observed. The fishing days in multi-day trawling reduced with compensatory

increase in single day trawling effort. A general observation is that mechanised vessels are now operating as a team with one vessel employed for scouting fishes.

Marine mammal strandings along the Indian coast mapped

*Shelton Padua, V. Kripa, R. Jeyabaskaran, J. Jayasankar, D. Prema, R. Lavanaya, Seban John and P. Vysakhan

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

The stranding locations of marine mammals namely blue whale (*Balaenoptera musculus*), Bryde's whale (*Balaenoptera edeni*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*) and minke whale (*Balaenoptera acutorostrata*) along the Indian coast were mapped (Fig. 1) using passive method. The data was collected for the period 1874 to 2016. It was seen that the western coast is more prone to marine mammal strandings. But all the five species studied were found to be stranded along both eastern and western coast. This possibly indicates better reporting of marine mammal strandings from the west coast than the east coast. Among the strandings, 68% of the stranding occurred after 2000 and 32% occurred during the period 1874-2000.

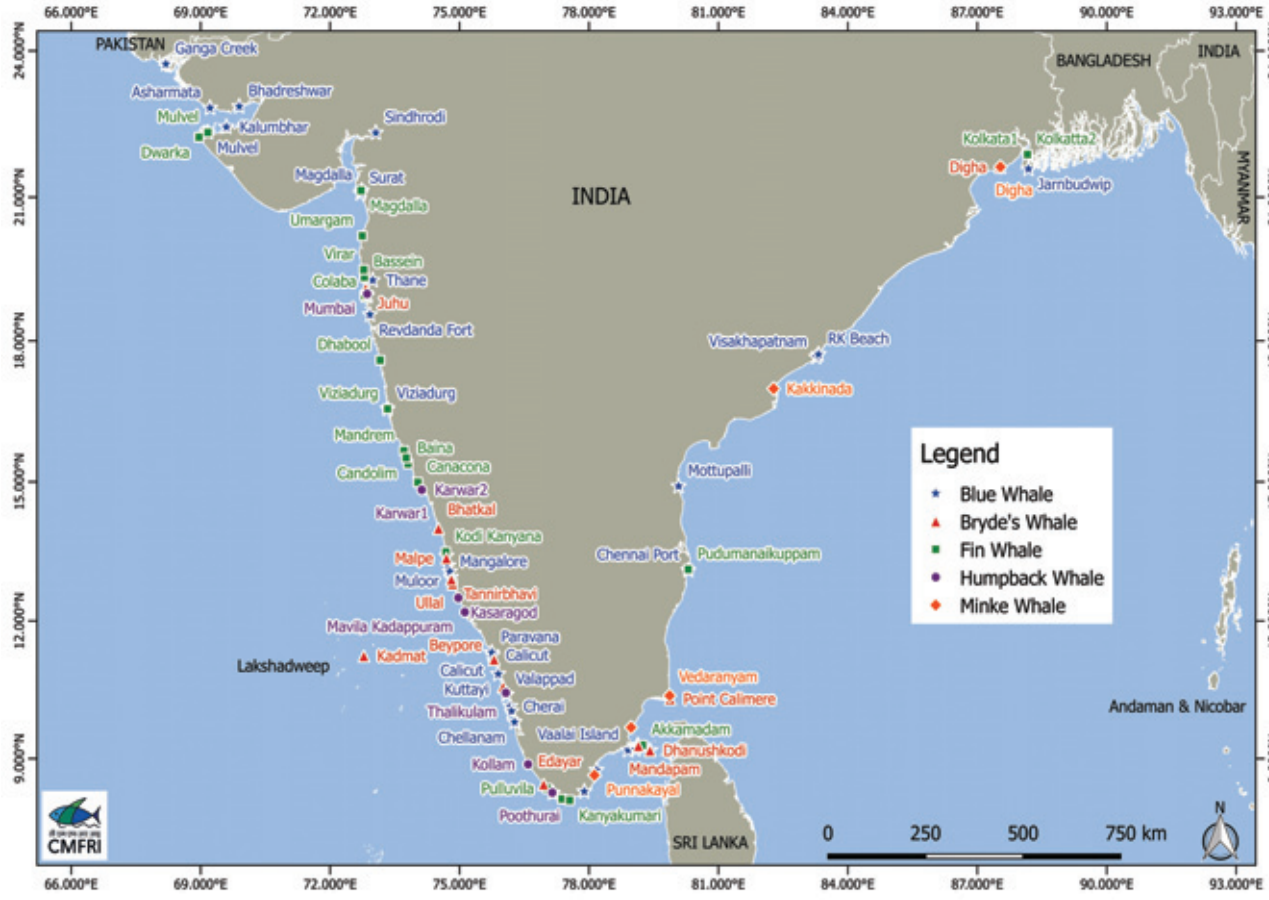

Fig. 1. Locations of marine mammal strandings along the Indian coast

A report on morphological abnormality in *Scylla serrata*

R. Ratheesh Kumar, Swapnil S. Tandel, Vaibhav D. Mhatre and Veerendra Veer Singh
Mumbai Research Centre of ICAR-Central Marine Fisheries Research Institute, Mumbai
e-mail: ratheeshkl4u2@gmail.com

Morphological abnormalities most commonly reported in crabs are alterations in carapace (mainly number and shape of antero-lateral teeth), chelipeds, walking legs and shape of the abdomen. Uran, a fishing village in Raigad district of Maharashtra, supports a good fishery of *Scylla serrata* commonly known as giant mud crab, found in the coastal estuarine and mangrove areas. During a survey conducted in the intertidal zone on 21st August 2017, a live juvenile of *S. serrata* was observed with a bifurcated claw. The crab was a male with 56 mm carapace width. Its right cheliped showed two claws articulating separately from the carpus and second claw emerged from the posterior side of the carpus. Merus of the right cheliped also showed strong rows of spines on both sides unlike in a normal crab. The two claws were well developed and resembled each other, except a slight difference in size.

Abnormal mud crab

The exact reason for the present abnormality is unknown. Certain authors have concluded that such abnormalities may be due to injuries or accidents (Shelton *et al.,* 1981, *J. Embryol Exp Morphol.,* 63: 285-304), infections (Primavera and Quinitio. 2000, *J. Crustacean Biol.*, 20(4): 796-802), mutation due to ionising radiations and toxins (Klein and Koomen. 1993, *Crustaceana*, 64(1): 122-126), or due to extreme environmental conditions (Pandourski and Evtimova, 2009, *Acta. Zool Bulg.*, 61(1): 55-67). Possible reason for the present abnormality may be due to injuries or accident in the chelate leg and its regeneration. Chelate legs are used by crabs mainly for defence/offence, which make it more vulnerable to injuries, autotomy and regeneration.

Unusual landing of blue shark

*Ambarish P. Gop, Jose Kingsly and K. V. Akhilesh
Vizhinjam Research Centre of ICAR-Central Marine Fisheries Research Institute, Vizhinjam
**email: gopidas.ambarish@gmail.com*

On 3rd June 2017, unusual landing of blue shark *Prionace glauca* (Fig.1) was observed at Thengapattanam landing centre in Kanyakumari district, ($8^0$14’21.67"N, $77^0$10’03.87"E) of Tamil Nadu. The sharks had been caught by hook and line units operated off Mumbai coast, by fishermen from

Blue sharks landed at Thengapattanam landing centre

Thoothoor and Thengapattanam. Forty-six sharks, weighing 3.5 tonnes (t) were landed. All were males in the length range of 190-285 cm Total Length (TL) and weight range of 55-80 kg each. Blue sharks are reported to reach sexual maturity at about 180 cm (for males) while females mature by 220 cm (Santiago *et al.*, 2014 *Fisheries Research*, 160:18-32). Other elasmobranchs observed in the landings at Thengapattanam on the same day were spinetail devil ray *Mobula japonica* (3 numbers, 223, 220 and 236 cm Disc Width (DW), pink whipray *Himantura fai* (114 cm DW), tawny nurse shark *Nebrius ferrugineus* (145cm TL), silky shark *Carcharhinus falciformis* (2 numbers), scalloped hammerhead shark *Sphyrna lewini* (181cm TL), bigeye thresher shark *Alopias superciliosus* (200 cm TL) and Pelagic thresher shark *Alopias pelagicus* (234 cm TL).

The fishermen of Thoothoor and Thengapattanam are experts in hook and line operations for sharks and conduct multiday distant water shark fishing off Maharashtra and Gujarat coasts at 150-180 km from shore. Large-sized elasmobranchs caught here are landed in southern India, where the meat is salt-dried and sold for domestic consumption. Blue sharks are not regular contributors to the shark fishery in India and are rarely seen in such large numbers as in the present observation. Known to have a widespread distribution in temperate and tropical waters, the blue shark is relatively fast-growing, matures in 4–6 years and products an average of 35 pups in each litter. The IUCN Red list of Threatened species categorises the blue shark as 'Near Threatened'.

Indigenous trawl operations during fishing ban period in Chennai

P. Jaiganesh, S. Chandrasekaran , J. Balaji and D. Pugazhendi
Madras Research Centre of ICAR-Central Marine Fisheries Research Institute, Chennai

North Chennai is a major centre for mechanised fishing with approximately 1200 fishing units. Generally during the fishing ban period, the fishermen from these units either sit idle or enroll as labourers for fishing in permitted traditional fishing units. But during the mechanised fishing ban period in 2017, some of the fishers in North Chennai started mini trawl operations to tide over their lean period. The size of the trawl net was 15 m in length and cod end mesh size of 24 mm. These were operated from fibre boats of 10 m oveall length (OAL) fitted with 10 hp outboard Yamaha engines and having otter boards of 2 feet length and 1.5 feet width. Their fishing grounds in the coastal waters stretching from Ennore to Pazhaverkadu within 20 m depth sometimes extends to a distance of 20-25 km from shore at a maximum depth of 30 m. The duration of a haul ranges from 2 to 3 hours and with hauls per day. Average catch per day ranged from 60 to 400 kg. 40 units operated in 2017. Crustaceans, mostly prawns accounted for 82% of the catch. Juveniles of *Scomberomorous* sp., *Rastrelliger* sp., *Caranx* sp., *Gerres* sp., sciaenids sp., *Thryssa* sp., silver bellies and crustaceans *Metapenaeopsis* sp., *Penaeus* sp., *Parapenaeopsis* sp. and *Portunus* sp. were also observed.

Heavy landing of tranquebar scallop at Cuddalore, Tamil Nadu

P. Laxmilatha, E. M. Chhandaprajnadarsini, S. Pradeep and N. Rudramurthy
Madras Research Centre of ICAR- Central Marine Fisheries Research Centre, Chennai
e-mail: laxmil@yahoo.com

Scallops belong to family Pectinidae and their shells exhibit an extraordinary diversity of shape and sculpture having high demand in ornamental shell trade industry. They are distinct and unique from other bivalves in that they actively swim by ejecting rapid jet propulsion of water. On 15th July 2017, during a regular fishery observation at Cuddalore Fishing Harbour, an unusual, heavy landing of the Tranquebar scallop *Volachlamys tranquebaria* (Gmelin, 1791) along with other gastropods and bivalves was observed in the trawl by catch. The tranquebar scallop constituted about 98% of the total by-catch, and negligible numbers of other species (*Conus* sp., *Murex* sp., *Ficus* sp., *Rapanna* sp. and *Cucullea* sp) were also noticed. They were landed by a the single day trawl unit operated off Cuddalore at a depth of 10 m and sold

Size range of tranquebar scallops landed

@ ₹ 8 per kg. The specimens of *V. tranquebaria* ranged from 28.2-40.7 mm in total length and 4-12 g in total weight. Although, the species has been recorded previously in Gulf of Mannar, Bay of Bengal and Vellar estuary of Tamil Nadu, such voluminous landing of tranquebar scallop is rare.

Artisanal longline fishing for high value fishes off Mumbai, Maharashtra

Albert Idu, Anulekshmi Chellappan*, K.V. Akhilesh and V. V. Singh
Mumbai Research Centre of ICAR-Central Marine Fisheries Research Institute, Mumbai
e-mail: anulekshmic@gmail.com

Sassoon Dock is one of oldest and a major landing center located in Mumbai from where several multiday and single day fishing vessels including trawlers, dolnetters, gillnetters and hook and line units operate. Marine fisheries of Maharashtra is mostly dominated by trawlers and dolnetters while line fishing is done by only a few fishers. The artisanal fishers in Juhu, Colaba and nearby areas of Mumbai are operating a few long line units in small wooden boats (6 - 7 m OAL) or fibre boats fitted with engines of 16 – 24 hp from Sassoon Dock landing centre. Single day short duration fishing trips of about 5 hours with 4-5 crew, are done in the nearshore waters at 10-25 m depths. Targetted species includes cat fishes, groupers, rays, croakers etc.

To reduce investment cost, the fishers are using cheap and locally available materials for the fishing gear. The main line is made of synthetic rope (Polypropylene) of 3 mm thickness with an approximate length of 210 m. The mainline contains 60 numbers of 40-60 cm long vertical branch lines at approximately every 3.5 m each with *"J"* shaped

hooks (Hook nos. 5- 6). Sinkers of about 15 to 20 g are placed between every 10 hooks and floats made up of empty plastic bottles, colored with black paint (for easy identification), is tied at the starting of main line. This also connects the anchor line. The length of anchor line is 8 to 15 fathom (according to the depth of operation) and it is tied with the brick. The distant end of the main line is connected to the starting of another line with float and anchor line. This process continues to a total of 20 main lines which in total contain 100 sinkers, 21 floats and anchors (Fig.1). During each fishing trip, fishers carry 3-4 boxes containing five lines each containing 60 numbers of hooks (300 hooks per box and 900-1200 hooks per fishing trip).

The boats venture for fishing at around 8.00am and reaches the fishing ground within one and half hour. The process of shooting of line in the selected fishing area requires minimum of 1 hour. Hauling in of the long line starts after a 30-minute interval and around two hours are required to complete the task. The baits used are small croakers, bombay duck, clupeids (*Thryssa* spp., *Ilisha* spp.) etc. The fishers get good catch of high value fish during the monsoon period. Since mechanised fishing is banned in coastal waters during this perod, and fish supply in general is low these fishers get good returns for their catch. The major high value fishes in the catch are groupers *(Epinephelus malabaricus*, *E. diacanthus)*, snappers (*Lutjanus johnii, L. argentimaculatus*), seabass *Lates calcarifer,* catfishes *(Nemapteryx caelata*, *Arius maculatus)*, sciaenids *(Otolithoides biauritus)* and elasmobranchs (*Himantura uarnak*, *Himantura* spp., *Scoliodon laticaudus, Carcharhinus* spp).

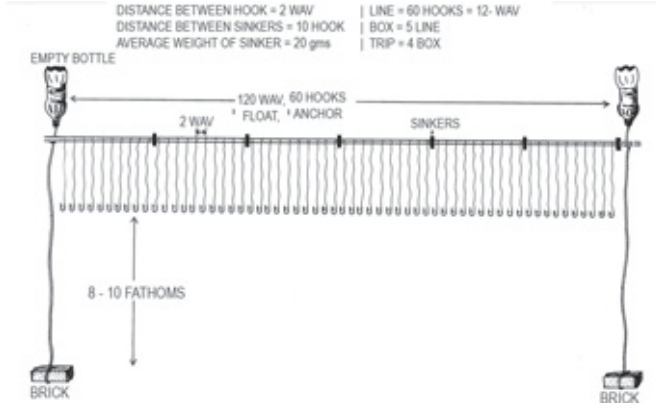

Fig.1. General configuration of longlines used in Mumbai.

Stranding of whale shark off Madhavpur, Gujarat

T. Kumawat[1], D. Divu[1], V. K. Vase[1], K. S. Sukhdhane[1], P. A. Azeez[1], R. Kumar[1], S. Rahangdale[1] and F. Bloch [2]

[1]*Veraval Regional Centre of ICAR-Central Marine Fisheries Research Institute, Veraval*
[2]*Wildlife Trust of India (Whale Shark Conservation Project), Veraval*

A dead male whale shark (*Rhincodon typus*) was found off Madhavpur coast, near the fish landing centre on morning of 28th September, 2017. The investigations were covered at the joint team of ICAR-CMFRI and Wildlife Trust of India (WTI), Veraval, Gujarat. The carcass showed an injury below the first dorsal fin but cause of its death could not be ascertained. Some measurements of the stranded whale shark were recorded before it was buried (Table 1).

Table 1. Morphometric measurements of the whale shark

Parameter	Measurement (cm)
Total length	457.2
Standard length	341.4
Pectoral fin	85.3
Mouth width	60.9
Eye to spiracle	36.6
Inter eye width	88.3
Snout to first dorsal fin	204.2
First dorsal base	42.6
First dorsal fin height	54.8
Inter dorsal	33.5
Inter caudal	54.8
Second dorsal base	21.3
Second dorsal fin height	27.4
Caudal depth	48.7
Caudal fin length (upper lobe)	115.8
Clasper length	18.0

Observation of extensive bed of giant mangrove whelk in Minicoy, Lakshadweep

Shijin Ameri[1], P. Laxmilatha[2], K. A. Labeeb[1], A. Kathirvelpandian[3]
[1]*ICAR-Central Marine Fisheries Research Institute, Kochi*
[2]*Madras Research Centre of ICAR-Central Marine Fisheries Research Institute, Chennai*
[3]*Peninsular and Marine Fish Genetic Resources Centre(Kochi), ICAR-National Bureau of Fish Genetic Resources*
**e-mail : laxmil@yahoo.co.in*

Terebralia palustris (Linnaeus, 1767) is a species of Caenogastropod belonging to the family Potamididae, distributed widely in Indo-Pacific region and African coast. An extensive bed of *T. palustris* approximately 500 m long and 70 m wide, appearing like a canal stretching into the beach was observed along the south west coast of Minicoy Island, Lakshadweep. An average of 85 snails per square meter area was found in the intertidal mangrove mud flats. The population was dominated by adults (82 mm size) followed by sub adults (55mm size) and juveniles (25mm size). The mangrove whelks are an integral component of mangrove ecosystems as they retain primary carbon by consuming leaf litter. Their reproductive cycle is closely associated with mangroves. The females oviposit at low tide and deposit egg masses on pneumatophores, roots, trunks and fallen branches of mangroves. It was observed that while larger snails of *T. palustris* can only eat mangrove leaf litter, detritus is the main food item consumed by juveniles. A detailed study on the feeding behavior of juvenile and adult snails can throw light on their role in biogeochemical cycle of intertidal mangrove mud flats.

Terebralia palustris

Report on the rare quagga catshark landed

*Ambarish P. Gop, Jose Kingsly and P. U. Zacharia
Vizhinjam Research Centre of ICAR-Central Marine Fisheries Research Institute, Vizhinjam
**email : gopidas.ambarish@gmail.com*

Quagga catshark, *Halaelurus quagga* (Alcock, 1899) one of the rarest sharks in the family Scyliorhinidae (Order Carcharhiniformes) was observed at Muttom landing centre, Tamil Nadu on June 5 2017. It was landed as a bycatch in the demersal-trawl operated off Muttom at 150-200 m depths. The male specimen collected measured 298 mm in total length (TL) and its morphometrics were recorded (Table 1). It is reported to attain a maximum size of 370 mm TL only. Very little information is available on the scyliorhinid sharks which mostly comprises small sized sharks with not much commercial importance and the quagga catshark a particular (Akhilesh *et. al.*, 2011, *Zootaxa*, 2781 : 40-48). In the IUCN redlist category quagga catshark is listed as Data Deficient and warrants documentation of available specimens.

Halaelurus quagga landed at Muttom landing centre

Table 1. Morphometrics of *Halaelurus quagga* landed at Muttom, Tamil Nadu

	Length (mm)	% TL
Total length (mm)	298	100.00
Pre caudal length	240	80.54
Pre second dorsal length	189	63.42
Pre first dorsal length	129	43.29
Trunk length	62	20.81
Head length	60	20.13
Pre -branchial length	51	17.11
Pre-spiracular length	31	10.40
Pre-orbital length	17	5.70
Pre-oral length	15	5.03
Pre-narial length	14	4.70
Pre-pectoral length	60	20.13
Pre-pelvic length	116	38.93
Snout-vent distance	121	40.60
Pre anal length	164	55.03
Inter dorsal distance	46	15.44
Dorsal caudal distance	22	7.38
Pectoral pelvic distance	41	13.76
Pelvic anal distance	42	14.09
Anal caudal distance	36	12.08
Eye length	11	3.69
Eye height	3	1.01
Inter orbital width	18	6.04
Nostril width	7	2.35
Internarial space	6	2.01
Anterior nasal flap length	3	1.01
Spiracle length	3	1.01
Eye- spiracle distance	2	0.67
Mouth length	4	1.34
Mouth width	24	8.05
Upper labial furrow length	1	0.34
Lower labial furrow length	4	1.34
Intergill length	18	6.04
First gill slit height	6	2.01
Fifth gill slit height	3	1.01
Trunk height	19	6.38
Head height	18	6.04
Abdomen height	17	5.70
Caudal peduncle height	7	2.35
Head width (maximum)	41	13.76
Trunk width	32	10.74
Abdomen width	15	5.03
Caudal peduncle width	7	2.35
Pectoral fin-length	29	9.73
Pectoral fin-anterior margin length	28	9.40
Pectoral fin -base length	14	4.70

Pectoral fin-height (Maximum width)	24	8.05	Second dorsal fin-height	12	4.03
Pectoral fin -inner margin length	14	4.70	Second dorsal fin- inner margin	7	2.35
Pectoral fin- posterior margin length	24	8.05	Second dorsal fin- posterior margin	11	3.69
Pelvic fin length	30	10.07	Anal fin -length	27	9.06
Pelvic fin anterior margin length	13	4.36	Anal fin-base length	22	7.38
Pelvic fin base length	23	7.72	Anal fin- anterior margin length	20	6.71
Pelvic fin height	12	4.03	Anal fin-height	11	3.69
Pelvic fin inner margin length	12	4.03	Anal fin -inner margin length	9	3.02
Pelvic fin posterior margin length	21	7.05	Anal fin -posterior margin length	16	5.37
First dorsal fin -length	25	8.39	Caudal fin- preventral margin length	31	10.40
First dorsal fin -anterior margin	23	7.72	Caudal fin-dorsal margin length	58	19.46
First dorsal fin-base length	19	6.38	Caudal fin-upper post ventral margin	23	7.72
First dorsal fin-height	15	5.03	Caudal fin- terminal margin length	14	4.70
First dorsal fin-inner margin	6	2.01	Caudal fin- subterminal margin length	15	5.03
First dorsal fin-posterior margin	11	3.69	Caudal fin-terminal lobe length	13	4.36
Second dorsal fin -length	25	8.39	Second dorsal origin- anal fin origin	23	7.72
Second dorsal fin -anterior margin	22	7.38	Clasper outer length	22	7.38
Second dorsal fin- base length	20	6.71	Clasper base width	5	1.68

Unusual catch of flapnose ray in ring seine

S. Pradeep, K.S.S.M. Yousuf and Shoba Joe Kizhakudan
Madras Research Centre of ICAR-Central Marine Fisheries Research Institute, Chennai
e-mail: cmfripradeep@gmail.com

An estimated 130 ring seiners are employed exclusively to exploit small pelagic resources such as sardines and mackerels along south Cuddalore coast. Occassionally large mobulid rays are also landed in stray numbers as by-catch in the ringseine landings at Cuddalore Fisheries Harbour. There has been no incidence of elasmobranch landings in large quantities by ring seines in this region. However on 15.07.2017, an unusually high landing of an estimated 1. 3 tonne (t) of the flapnose ray *Rhinoptera javanica* was observed. The ring seiner had harvested a shoal of flapnose rays, comprising 122 individuals with disc width (DW) ranging from 90 to 110 cm at 10 m depth off Parangipettai (11°32.398'N, 79°49.916'E).The entire catch was sold for ₹ 120 per kg to traders. The near-shore waters of southeast coast of India, particularly between Chennai and Gulf of Mannar are known breeding grounds for *R. javanica*. Aggregation of breeding population and incidences of bulk landing of this species by shore seiner and bottomset gillnet has been reported earlier (James 1962, *J. mar Biol. Ass India*, 4(2): 217 – 223; Srinivasrengan, 1979 *Indian J. Fish*., 26(1&2): 239). In the present observation, most of the specimens were females but none could be examined for embryonic development to ascertain if it was a breeding shoal. Flapnose rays of similar size group landed in Mumbai were reported to be pregnant and carrying well developed embryo (Thakurdas *et al*., 2006, *Mar. Fish Infor. Ser., T&E Ser.*, 189:22-23). Of late, the declining catch of pelagic resources by ring seine along the Cuddalore coast, has prompted many of the fleets to cease operations or switch to targeting other available resources that show schooling behaviour, including elasmobranchs. Such exploitation can prove detrimental for those elasmobranchs which have high vulnerability and low resilience on account of their slow growth and reproductive traits.

Plastic menace faced by fishers of Satpati, Maharashtra

R.Ratheesh Kumar, Ajay D. Nakhawa, Anulekshmi Chellappan, Vaibhav D. Mhatre, Balu B. Chavan and Veerendra Veer Singh
Mumbai Research Centre of ICAR-Central Marine Fisheries Research Institute, Mumbai

Small conical stationary bag nets (*Bokshi*) are operated by artisanal fishers mostly in creeks, with strong tidal currents in certain regions of Maharashtra. The net is set using wooden pole (*Khunt*) driven at creek bottom against the flood or ebb tide. At Satpati, *Bokshi* nets are operated in the near shore creek for about 16 days in a month at a rate of 2 hauls per day. Here, fishermen are concerned about the increasing quantity of plastic debris entering their nets during fishing operations adversely affecting their livelihood. The plastic menace reduces the life of the gear materials due to clogging of plastics in the nets and the resulting drag on the net which also causes distortion of the *Khunt* position. Moreover, fishers are forced to haul the net within a short soaking period resulting in less fish catch and economic loss.

Three experimental netting operations were done in Satpati creek (19°43E46.67"N, 72°41E45.55"E) in the month of July 2017. Length of the nets operated was 30 m with 4 panels (*Munde*, *Dhishe*, *Patala* and *Khola*) of different mesh size varying from 70 mm to 10 mm from the mouth to the cod end. Length of *Munde* was 10 m followed by *Dhishe* measuring 8 m, *Patala* 10 m and *Khola* (cod end) 2 m. Net was set in the morning during high tide time at about 5m depth and hauling was done after 2 hours. During fishing operation, nets accumulated huge quantities of macro-plastic. More than 80% of the catch in the net was contributed by plastic debris. In each operation about 25 to 30 kg plastic was trapped in the net while the average catch rate of fish was only about 3 kg/hr. Major plastic debris deposited in the net during fishing were plastic bags, plastic bottles/containers, chappals, boots, straps, fishing gear and ropes. Fish collected during the trials were analysed in the laboratory. Thirty nine fish species where recorded from the catch including the commercially important fishes such as ribbon fish (*Lepturacanthus savala*), cat fishes (*Arius maculatus*), bombayduck, mullets, mud crabs, sciaenids and non penaeid prawns (Table 1).

Sorting of fish from plastic debris

Table 1: Major species/groups landed by Bokshi net and their percentage contribution

Major species/group	Percentage contribution
Lepturacanthus savala	12.50%
Arius maculatus	10.45%
Scatophagus argus	8.06%
Puffer fish	7.82%
Harpadon nehereus	6.98%
Mullets	6.70%
Sciaenids	6.52%
Escualosa thoracata	4.32%
Acanthopagrus arabicus	4.02%
Non penaeids	3.85%
Scylla serrata	3.80%
Ilisha spp.	3.49%
Therapon jarbua	3.31%
Gobies	3.22%
Lates calcarifer	3.14%
Eleutheronema tetradactylum	2.75%

The results from the study revealed that several economically important fish and shellfish species are available in Satpati area which can support livelihood of traditional fishermen. But in the present scenario, *Bokshi* net fishers are facing difficulties because of the high incidence of plastic entering the nets resulting in low fish catch and a high fish catch sorting time, low soaking time and gear damage due to the plastic accumulation in the nets. This is a matter of concern which need to be addressed by fisheries management plans emphasizing on addressing the issue of marine plastic pollution.

Vibrio ponticus, a new pathogen of cultured cobia

*S. R. Krupesha Sharma[1] and Praveen N. Dube[2]
[1]*ICAR-Central Marine Fisheries Research Institute, Kochi*
[2]*Karwar Research Centre of ICAR- Central Marine Fisheries Research Institute, Karwar*
**e- mail: krupeshsharma@gmail.com*

Most of the members of the family Vibrionaceae are natural inhabitants of marine and estuarine ecosystem and several of them are pathogens in cultured aquatic organisms. Vibriosis caused by some pathogenic *Vibrio* spp., can cause huge mortality in marine fish culture systems. Intermittent mortality with haemorrhagic lesions on the fin, body surface, and head, exophthalmia (Fig.1) and stopping of feeding activity were noticed in cobia (25±5 cm length; 17±4 g weight) reared in sea cages off Polem, Goa during June 2015. The clinical signs lasted for a week with a total mortality of 12%. Isolation of bacteria aseptically from liver and kidney was done.

Fig. 1. Haemorragic lesions and exophthalmia in cobia infected with *V. ponticus*

While the lesions in the present case mimicked typical haemorrhagic septicemia normally seen in vibriosis caused by *Vibrio alginolyticus* and *V. harveyi* in cultured marine fish, *V. ponticus* could also be isolated from liver and kidney of the moribund cobia. The isolated bacteria were confirmed by biochemical and molecular tools. The isolation of *V. ponticus* from diseased fish has not been reported from India so far. The isolate was found to be sensitive to most of the antibiotics except oxacillin for which it was resistant. The bacteria were able to grow up to 40 °C. Interestingly, so far there have been no reports on isolation of *V. ponticus* from cobia. *V. ponticus* was first isolated from mussel, seabream and sea water from Spain (Macian *et al*., 2004 *System. Appl. Microbiol*., 27**:** 535-540). The bacterium was also isolated from the snapper *Lutjanus guttatus* (Gomez-Gil *et al*., 2006, *J. Appl. Microbiol*., 102: 1518-1526). Mass mortality of Japanese seabass (*Lateolabrax japonicus*) in China was found to be due to *V. ponticus* (Xie *et al*., 2007, *Lett. Appl. Microbiol*., 45: 62-67). Isolation and identification of *V. ponticus* and its role in causing mortality in cage cultured cobia requires further investigations considering its virulence in cultured marine fish.

Turtle conservation activities in Tambaldeg village, Sindhudurg district, Maharashtra

Ramkumar Sugumar, K. V. Akhilesh, Swapnil Tandel, Vaibhav D. Mhatre
Mumbai Research Centre of ICAR-Central Marine Fisheries Research Institute, Mumbai

Tambaldeg village in Devgad taluka is a famous tourist place in the Sindhudurg district. During a field visit to Tambaldeg beach on 24th April 2017, six carcasses of adult olive ridley turtle *Lepidochelys olivacea* and one of green turtle *Chelonia mydas* were observed in decomposed state. This beach is a turtle nesting site and the Forest department of Maharashtra with the support of local fishers is undertaking awareness programs for turtle conservation including hoardings displayed on conservation of turtles along the beach. Protection of nesting turtles and eggs is also undertaken by the local communities. The Forest Department of Maharashtra gives an honorarium of ₹ 500 per person for locating a turtle nest. Turtles entangled in ghost fishing nets and incidental catch by trawlers and gillnetters was also observed. However, fishers are reluctant to release turtles entangled in fishing nets since it is difficult without damaging fishing nets. They are well aware of scheduled status of marine turtles and deny poaching. The plan by Maharashtra Government for introducing incentives for release of threatened and endangered species of turtles is therefore being welcomed by all stakeholders.

Dead Bryde's whale washed ashore at Veraval, Gujarat

K. S. Sukhdhane[1], K. K. Prajith[2], V. Vase[1], T. Kumawat[1], D. Divu[1], R. K. Pradhan[1], A. Azeez[1], S. Bharadiya[1], H. M. Bhint[1] and G. Temkar[1]
[1]*Veraval Regional Center of Central Marine Fisheries Research Institute, Veraval*
[2]*Veraval Research Center of Central Institute of Fisheries Technology, Veraval*

Bryde's Whale (*Balaenoptera edeni* Anderson, 1879) measuring 10.4 m in length and weighing about 7 tons was found washed ashore on the beach of Veraval on 4th august 2017. Locally called as "*Machchh*" it was found in dead condition with small injuries in the caudal peduncle and genital region. With the intervention and supervision of forest officials, it was towed ashore and a veterinary officer conducted post-mortem after which it was buried on the shore. Occurrence report and details were entered in the data base of Marine Mammal Conservation Network of India (MMCNI) and also published in local newspaper "Gujarat Samachar" on 6th August 2017. Morphometrics and other observations of the whale recorded were Head Length (2.22m), Length of flipper (1.36 m), Caudal fluke (tip to tip) Dorsal fin height (0.59m), Dorsal fin base 0.48m with body dark gray in color and whitish underneath . On the first day of observation, large quantity of blood was oozing out from the blowholes of the animal. On the second day it started decaying with foul smell emanating and baleen plates became detached from the mouth due to the high wave action.

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.

MFIS