ISSN 0254-380 X

No. 215
January-March 2013

Marine Fisheries Information Service

Technical and Extension Series

Central Marine Fisheries Research Institute
(Indian Council of Agricultural Research)
Post Box No. 1603, Cochin - 682 018
www.cmfri.org.in

Marine Fisheries Information Service

No. 215 * January-March, 2013

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

CONTENTS

Isurus oxyrinchus

Sardinella longiceps

Hydatina zonata

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.

Emerging light and hand jigging fishery for cephalopods along Ratnagiri coast, Maharashtra

Sujit Sundaram and David Sawant
Research Centre of CMFRI, Mumbai

Cephalopods have emerged as one of the prime foreign exchange earners in India. Trawl nets operating up to 100 m depth account for nearly 85% of the cephalopod landings and use of high opening bottom trawl nets resulted in rapid increase in production. Other gears that exploit cephalopods as bycatch are boat seines, purse seines and dol nets. Jigging, a specialised fishing method developed for cephalopods in Japan, has slowly emerged in India too. Cephalopod jigging by hand has been reported along various places such as Vizhinjam, Kanyakumari, Palk Bay coast, Tuticorin, Karnataka, Devipattinam and Keelakarai in the Gulf of Mannar. The present report of squid jigging off Ratnagiri appears to be the first report from the state of Maharashtra.

In Ratnagiri, three types of boats are used for squid jigging. The boats with outboard engines and fitted with halogen lamps connected to 12 V batteries. The fishermen set out for fishing at 16 00 hrs and return next day at around 06 30 hrs in the morning. The time to reach the fishing grounds is about 3 h and fishing activities last for about 6 h. Generally the fishing is carried out towards the south-west of Ratnagiri. The boats are anchored on reaching the fishing grounds. Lights are put on and since squids are phototropic, they are attracted by the illumination and aggregate around the boundary zone between the illuminated and shadow zones and they are easily jigged by the sharp hooks around the jigging device. They are then lifted up and gently removed with the help of scoop nets.

Small boats of about 4 m in length fitted with 8 HP outboard engines (Fig. 1) are used to catch squids. The depth of operation is between 14-15 m. Fishermen generally do not use jigs in these small boats. Only one person in the boat engages in fishing by light jigging. The squids are caught by scoop nets, when they congregate near the boats, attracted to the light. The average catch per unit effort (CPUE) of squids is 30-50 kg. Medium sized boats (Fig. 2) which are 5-7 m in length use exclusively jigs and about 3-4 members are generally present in the boat. The boats are fitted with 16 HP outboard engines. The depth of operation is between 15-25 m. The average CPUE of cephalopods is 100-120 kg. Large sized boats (Fig. 3) with an overall length of 6-7 m are also used for squid jigging and are fitted with 24-32 HP outboard engines. The depth of operation

Fig. 1. Small boats employed for squid jigging in Ratnagiri

Fig. 2. Medium sized boats used for squid jigging in Ratnagiri

Fig. 3. Large sized boats used for squid jigging in Ratnagiri

is between 20-30 m. About 4-5 crew members are engaged in this activity and from this boat, even castnet, locally called as 'paag' are used for exploiting squids using light fishing. The average CPUE of cephalopods is 200-250 kg.

The jigs are made of bakelite moulding to resemble a live shrimp which at the time of operation lures cephalopods. The lures are brightly coloured in different shades. A small lead weight is attached to the lower part of the lure so that it maintains the jig in a proper dorso-ventral position. Another type of jig is also used which is cylindrical in shape and is coated with radium, which glows in the dark (Fig. 4). Both types of jigs have pointed recurved hooks, usually with numbering from 16 to 18 in two rows, attached in the tail region. Baits are not used for jigging. Each jig is tied to a nylon wire rope with length ranging from 6-15 m and is rolled on a wooden frame reel or spindle. The jigs cost ₹ 200 (prawn) and ₹ 100 (radium) per piece and available in the local market in Ratnagiri. The jigs are imported from international market and are sold at Princess Street in Mumbai where there is an entire lane catering to all sorts of accessories that are required for the fishing industry. These jigs are then taken to Ratnagiri market.

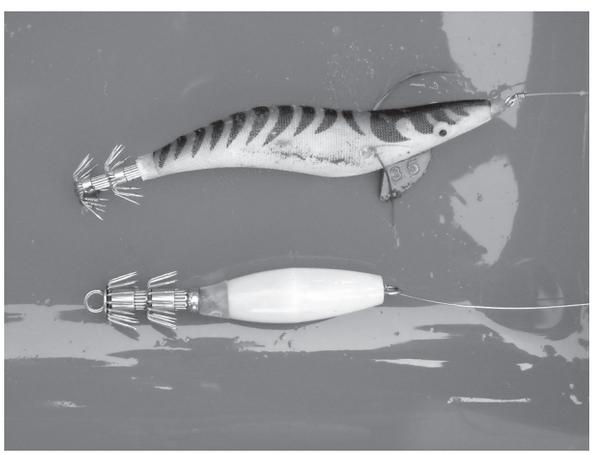

Fig. 4. Squid jigs used in Ratnagiri

The entire catch is unloaded at Rajiwada landing centre. The catch fetches about ₹ 80-100 per kg which is procured by the processing companies and is immediately iced in huge plastic crates. More than 95% of the catch is constituted by the Indian squid, *Loligo duvauceli* (Fig. 5) and the remaining 5% by Pharaoh cuttlefish, *Sepia pharaonis*. The dorsal mantle length (DML) of the squids measured randomly ranged between 71 to 327 mm with the corresponding weight ranging between 23 to 590 g. The dominant mode was in the size group

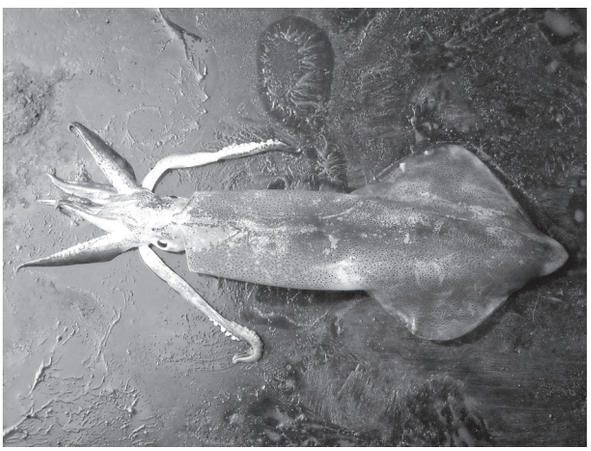

Fig. 5. Indian squid, *Loligo duvauceli* caught by jigging at Ratnagiri

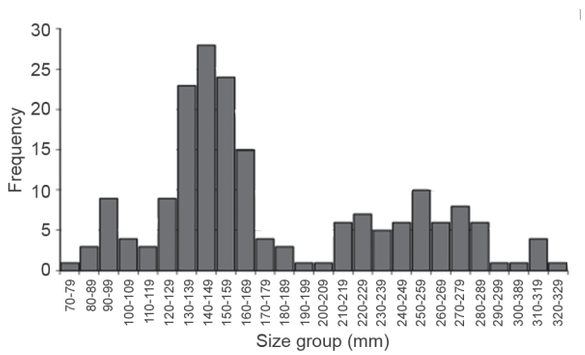

Fig. 6. Size frequency polygon of squids caught by hand jigging from Ratnagiri waters

140-149 mm (Fig. 6). The DML of *S. pharaonis* varied between 224 to 310 mm.

Samples of *L. duvauceli* from the landing centre were brought to the laboratory for further biological analyses. The DML was measured using a digital caliper and total body weight (TBW) (± 0.01 g) was determined using an electronic balance, after the specimens were dried on blotting paper. The DML ranged from 70 to 310 mm with the corresponding weight ranging between 20 to 484 g. The food items in the gut were in well crushed and macerated condition, therefore it was possible only to categorise into groups. The Index of preponderance was estimated as suggested by Natarajan and Jhingran (1961). It was observed that, 78.6% of the stomachs were empty and they fed mainly on fish (96.8%) followed by prawn and squid (1.6% each). Maturity studies were carried out following Silas (1985) and it was found that 78.6% were in gravid condition, 7.1% in mature and 14.3% in immature condition. Fecundity ranged from 1,640 to 2,870 numbers. The sex-ratio was observed to be 1:0.8.

Since the catch is extremely fresh, it fetches very high price and the fishery has become lucrative. Many fishermen are gradually getting engaged in squid jigging. The present observation reveals the emergence of a new fishery for cephalopods along the Ratnagiri coast in Maharashtra. In contrast to the cephalopod catch by trawl net, the present exploitation by jigs is highly selective and brings in comparatively larger sized cephalopods belonging to one species and the freshness of the catch makes it much more commercially viable. With the introduction of improved facilities such as introduction of powerful artificial light attracting systems, mechanisation of jigging operations, financial assistance as well as technical know-how to the fishermen *etc*, squid jigging fishery could contribute to enhanced cephalopod production from Maharashtra waters.

An overview of dry fish landings and trade at Visakhapatnam Fishing Harbour

Madhumita Das, Prathibha Rohit, G. Maheswarudu, Biswajit Dash and P. V. Ramana
Regional Centre of CMFRI, Visakhapatnam

Fish drying is an age old practice and was adopted as a practical method of preserving fish that have not been immediately consumed or sold in the fresh market. Improved fishing techniques and infrastructure resulted in increased fish catch, better marketing, processing and curing facilities. The advent of multiday trawling at the Visakhapatnam Fishing Harbour further boosted the availability of fish and its processing into value added products. However, drying still remains the cheapest and popular mode of fish preservation. Dried products are in great demand both within and outside the country and form an important source of protein rich food in various forms. Fish drying over the years, has grown from a subsistence kind of occupation to a full-fledged flourishing business. Dried fish now caters to different sectors such as quality fish/prawns for human consumption, and low value fishes for the preparation of fish feed as well as poultry feed. At Visakhapatnam Fishing Harbour (Fig.1), the annual production of dry fish ranged from 6- 9% (2225 - 4831 t) of the total fish catch during 2005-2009. Species

Fig.1. Dry fish yard at Visakhapatnam Fishing Harbour

composition of the dry fish produced at Visakhapatnam Fishing Harbour (July - December 2009) is summerised in Table 1.

Table 1. Species composition (%) of dry fish at Visakhapatnam Fishing Harbour during July- December, 2009

Species	%
Trichiurus lepturus	17.8
Sardinella longiceps	5.4
Rastrelliger kanagurta	10.8
Encrasicholina sp.	6.9
Decapterus sp.	6.5
Pellona sp.	1.0
Thryssa sp.	2.2
Scomberoides sp.	2.0
Other carangids	3.0
Sphyraena jello	0.3
Nemipterus sp.	0.6
Other perches	1.7
Saurida sp.	6.1
Upeneus sp.	3.2
Leiognathus sp.	3.5
Secutor sp.	3.5
Gazza sp.	3.5
Johnius sp.	8.9
Tachysurus sp.	2.3
Cynoglossus sp.	1.0
Drepane sp.	0.6
Acetus sp.	2.0
Solenocera sp.	3.3
Small crabs	0.3
Trash fishes	2.0
Parastromateus sp.	0.7
Scomberomorus guttatus	0.9

The process of drying involves enzymatic or microbial activity on the fresh fish in the presence or absence of salt. The dried product retains most of the nutrient goodness of fresh fish with higher concentrations of proteins, vitamins, iron and calcium. When packed and stored properly, dry fish has a shelf life of more than two years. Dried fish prepared for human consumption is in great demand both in the coastal as well as interior areas. There is a good export market too available for dry fish. In the interior areas, dry fish form an important source of animal protein supplement which is consumed as a main dish or used as a flavouring agent in combination with other staple food items. Even in the coastal region where fresh fish is in abundance, small shrimps such as *Acetes* (Fig. 2), whitebaits, flatfishes, silverbellies (Fig. 3), small scads, lizardfish and sciaenids are preferred in the dried form. However, all species of dry fish are in great demand during the fishing ban period when there is shortage of fresh fish in the market. Care is taken to maintain hygienic conditions when the fish are being dried for human consumption.

Fig. 2. Dried *Acetes* at Visakhapatnam Fishing Harbour

Fig. 3. Dried silverbellies at Visakhapatnam Fishing Harbour

The fishes for this purpose are generally salt cured and then dried on clean cement platforms made especially for this purpose or on coir/palm mats on the beach close to the landing centre. Depending on the fish used, salt curing is done for a day or two in big cisterns. The fish is then drained and spread as a single layer for sun drying. Drying hours again depend on the consumer's requirement. Partially dried fish is relished in some countries and in some parts of India too. For this, the cured fish is drained and dried for 4 to 5 h and then packed in baskets and sent for marketing. In fully dried products, the cured and drained fish is sun dried for 24 to 48 h. This is then packed in baskets, gunny bags or boxes (Fig. 4) and sold in the market. Ribbonfish and mackerel are the two resources which have a good market price both

in the wet and dried condition. The ribbonfish has a great demand in the export market, but only the large sized clean and undamaged fishes are accepted by the exporters. The smaller and damaged ribbonfishes are generally dried. Mackerel too is in good demand in the fresh form, but when huge quantities are landed by the trawlers, major part of the catch is sent for drying (Fig. 5).

Fig. 4. Dry fish packed in gunny bags and baskets

Fig. 5. Dried mackerel at Visakhapatnam Fishing Harbour

Trash and low value fish drying

The trash fish brought to the shore by trawlers forms nearly 2% of the total marine fish catch and the entire trash is used only in the dried form as fish meal which is used for fish feed production. At Visakhapatnam, the trash after auctioning is dried for some hours by mixing minimum quantity of salt and transported to Thimapuram beach where it is dried before being used for the preparation of fish meal. The low value fishes generally referred to as trash, include squilla, small sized silver bellies, clupeids, carangids, crabs, perches *etc*, are directly sun dried on the sandy beach without any sort of processing. These fishes are dried for a day or two and then packed into gunny bags and transported to the fish meal plants where they are further processed. The oil is extracted separately and the residue powdered to get the fishmeal. The fish meal is the main protein component in the preparation of aquafeed, poultry feed and pet feed. The residual slurry is a very good source of manure in land based agriculture. The fish meal is rich in protein and a good source of minerals; therefore it is in great demand for the preparation of feeds and food supplement. The processed fishmeal powder is also marketed as a fish protein concentrate which is used as food additives to enrich and enhance the nutritional value of the diet. The present market rate of dry fish at Visakhapatnam Harbour is given in Table 2.

Table 2. Price of different dry fishes at the Visakhapatnam fishing harbour

Fish group	Price (₹ per kg)
Ribbonfish	60 - 80
Seerfish	300 - 500
Whitebaits	100 - 120
Mackerel	50 - 60
Scads	15 - 20
Other carangids	30 - 60
Sardines	15 - 20
Black pomfret	200 - 250
Lizardfish	60 - 80
Goatfish	20 - 30
Croakers	40 - 60
Silverbellies	20 - 30
Thryssa	20 - 30
Shrimps	80 - 100
Acetes	40 - 50
Trash	6 - 14

Quality fish drying

Fishes like seerfish (*Scomberomorus guttatus*) and pomfrets (mainly *Parastromateus niger*) which have very high commercial value in the fresh fish market are also dried under situations of huge landings of small sized fishes, shortage of ice and slash in the price of fish in the market *etc* . At Visakhapatnam Fishing Harbour during the months of August and September, seerfish juvenile landings is high and some quantity of these fishes are seen to be dried in the drying yard of the harbour (Fig. 6). It is also observed that seerfish of 1/2 kg size when dried, fetches 25-50% more economic value than that of wet fish.

Onboard fish drying

Fish drying onboard the fishing vessels itself has become popular. Fish dried in such a way is cleaner and devoid of sand and other unwanted materials which is observed in the case of land drying. The

Fig. 6. Dried seerfish at Visakhapatnam Fishing Harbour

fishes that are to be dried onboard are salted, strung in the from of long garlands and then hung on the deck for drying. Rows of strung fishes are displayed in the form of tents (Fig. 7). The space available above the cabin is also effectively used for drying

Fig. 7. Rows of strung fishes displayed in the form of tents, onboard fishing trawler

the fish (Fig. 8). On reaching the shore, the dried fish is packed and auctioned as is the system followed for fresh fish brought by the units. This has a double advantage for the boat owners; these fishes do not unnecessarily use space in the fish hold and also save on the cost of ice to be used to keep the fish in fresh condition. The fishes that are generally

Fig. 8. Drying of excess fish above the cabin of fishing boat

dried onboard include whitebaits, silverbellies, ribbonfish, scads, flatfishes, sciaenids and *Thryssa* (Fig. 9).

Fig. 9. Ribbonfish dried onboard fishing vessel

Dry fish trade

The fish dried at this harbour is sent to the local fish market, interior markets of Andhra Pradesh, markets of adjacent states (Tamil Nadu, Karnataka and Orissa) and north east states and also to several other countries (Sri Lanka, Singapore and Burma). In Andhra Pradesh, Nakapalli is the dominant dry fish trading centre. Hygienically dried and well packaged dried fish are sold at attractive prices in the supermarkets in India as well as in gulf countries fetching a good income for the fisher folk of Visakhapatnam. There is still scope to increase the production and demand of dry fish. Another important aspect of dry fish trade is proper distribution of the dry fish packets within the marketing chain. The marketing structure should aim at ensuring remunerative price to the producer of dry fish and narrow down the price spread between the producer and the consumer.

Fish drying at Visakhapatnam has undergone a sea change in the recent years. Earnest efforts are made to keep the quality of the dry fish meant for human consumption. Special drying platforms have been constructed for drying purpose to prevent contamination of sand and other pollutants. The locals have also been exposed to the use of drying racks and the use of both sun and electrical dryers for hygienic and effective drying of fish. The trash after auctioning is transported to Thimapuram and Bhimli beach where it is beach dried before being used for the preparation of fish meal.

Fish drying and marketing is generally the forte of the women folk though a few men have now

entered the business. The activity that started off as a subsistence form of occupation has now developed into an organised sector providing employment and economic security to those engaged in this activity at Visakhapatnam Fishing Harbour. These women are engaged fulltime in procuring, curing, drying, packing and marketing of dried fish at Visakhapatnam by adopting certain hygienic and marketing strategies. Further popularisation of drying racks and identifying separate fish drying yards near to the fishing harbour will go a long way in improving the quality of the fish dried and also increased utilisation of dry fish for human consumption. This in turn will increase the income of the fisher folk engaged in fish drying, generate interest among others to take up fish drying activity as fulltime employment and in general improve the living standards of the coastal fisher folk.

Feasibility and growth of hatchery produced green mussel (*Perna viridis*) spat in Bhimili Estuary, Visakhapatnam, Andhra Pradesh

P. Laxmilatha, T. Nageswara Rao, M. Prasada Rao, P. Pattnaik, S. Padmaja Rani, Loveson Edward and S. Veena
Regional Centre of CMFRI, Visakhapatnam

The Bhimili Estuary situated in Visakhapatnam District of Andhra Pradesh is a fairly large but shallow estuary and supports the livelihood of over 5000 fishers. Nearly 3000 clam/oyster pickers exploit the bivalve resources of this estuary. The Gostani River joins the sea at Bhimilipatnam carrying freshwater from Anantagiri hills, Padmanabhan, Boni, Pandrangi, Taditorru, Gudivada, Chittivalasa, Jutmill, Mulakuddu and Nagamayyapalem.

Green mussel (*Perna viridis*) spat was produced in the bivalve hatchery of Visakhapatnam Regional Centre of Central Marine Fisheries Research Institute. Hatchery produced spat of *P. viridis* were transferred to Bhimili Estuary to study the suitability of the site for mussel farming, for monitoring growth performance of the mussel and also for mussel culture demonstration. The hatchery produced spat of 17.7 mm APM (antero-posterior measurement) and 0.6 g weight, were stocked in velon mesh bags and placed in netlon cages and suspended from a rack erected in the Bhimili Estuary at a depth of 2 m in the month of February. After two months, when the spat attained over 25 mm size, they were removed from the velon mesh bags and stocked in netlon cages. The growth was monitored from the 47th day onwards. The shell length, shell width, shell thickness, total weight and meat weight were recorded. The growth rate per day and specific growth rate % (SGR %) were calculated. The SGR was calculated using the formula:

$$SGR\% = [(\ln L_2 - \ln L_1) / (T_2 - T_1)] * 100$$

where, L_1 and L_2 are mean shell length/mean shell width/mean shell thickness/mean total wet weight at times T_1 and T_2 in days.

The green mussel recorded good growth in the Bhimili Estuary. They attained a final mean size of 36.45 mm APM, 20.15 mm DVM (dorsoventral measurement), 12.18 mm thickness and total weight of 5.75 g in 195 days of rearing (Fig. 1). The growth

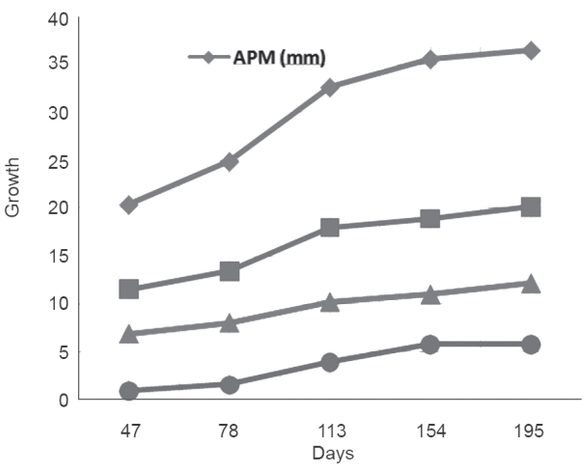

Fig. 1. Growth of *Perna viridis* in Bhimili Estuary

rate per day was 0.11 mm APM, 0.06 mm DVM, 0.04 mm thickness and 0.03 g total weight. The specific growth rate % (SGR %) in terms of APM was 0.39, DVM 0.38, shell thickness 0.39 and in terms of total wet weight 1.24. The mean meat content was 21%. Nearly 20 kg of mussels were harvested at the end of the culture period.

The salinity in the estuary ranged from 30-32‰ during the culture period, however, it was very low during September recording 11‰. The mean dissolved oxygen recorded was 3.78 ml l^{-1} with the highest value of 5.52 ml l^{-1} recorded in April and lowest value of 1.28 ml l^{-1} observed in May. The mean biological oxygen demand (BOD) recorded was 1.29 ml l^{-1}. The mean gross primary productivity (GPP) was 0.31 mg C l^{-1} h^{-1} and mean net primary productivity (NPP) was 0.21 mg C l^{-1} h^{-1}. The mean chlorophyll *a* value was 0.33 mg m^{-3} recording the highest value of 0.72 mg m^{-3} in September; the mean chlorophyll *b* value was 0.41 mg m^{-3} recording a high of 1.02 mg m^{-3} in September; and the mean chlorophyll *c* value was 0.52 mg m^{-3} recording a high of 1.3 mg m^{-3} in September. Mean values of ammonia, phosphate , nitrite and nitrate recorded at the culture site during the experimental period were 0.10 µg l^{-1}, 0.13 µg l^{-1}, 1.14 µg l^{-1} and 1.96 µg l^{-1} respectively.

The farming trial established that Bhimili Estuary is a good site for mussel farming. The hydrological conditions were conducive for good growth and meat content was also fairly high. However, during February – March, there was significant mortality due to predation by crabs. Therefore, if the farming activity is commenced after March, the culture will be more viable and sustainable. Significant resource of edible oyster and clams exists in Bhimili Estuary and this offers scope for integrated farming. Therefore Bhimili Estuary can be considered as a suitable site for small scale integrated farming of mussels and oysters. However, since local people are not aware of the edibility of mussels and do not consume mussels, it is necessary to create awareness regarding the high protein value as well as market demand of green mussels. There is need to convince the local people that mussel farming is an alternative livelihood option which is simple, ecofriendly, economically viable and sustainable.

First record of the swordtip squid, *Loligo edulis* Hoyle, 1885 from the north-west coast of India

Sujit Sundaram and Bala Mhadgut
Research Centre of CMFRI, Mumbai

Cephalopods are caught mainly as bycatch in the bottom trawl and due to the growing demand for cephalopods in the international market; they are exploited all along the Indian coast and stands second in the all India production. In Maharashtra, cephalopods are mainly exploited by shrimp trawlers and the main fish landing centers for cephalopods at Mumbai are New Ferry Wharf (NFW) and Sassoon Docks. Cephalopods contribute 12.5% towards the total fish catch in Maharashtra (CMFRI, 2010).

With the increased exploitation and expansion of fishing grounds, new records of cephalopods are reported from various places all along the Indian coast. Out of the 60 cephalopod species recorded from Indian waters, only 15 are commercially exploited (Silas *et al*., 1985). Indian squid *Loligo duvauceli* is the most commercially exploited cephalopod along Maharashtra coast. A new entrant of squid species, *Loligo edulis* Hoyle, 1885 (Fig. 1 and 2) commonly

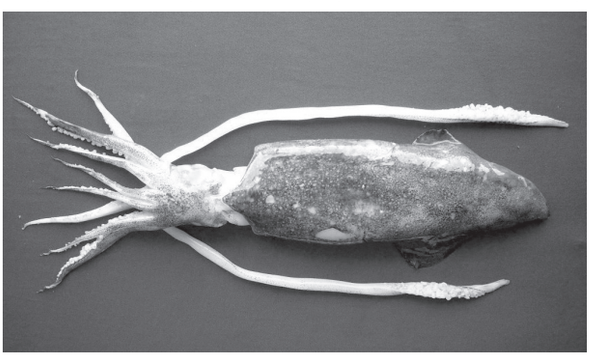

Fig. 1. *Loligo edulis* Hoyle, 1885 (Dorsal view)

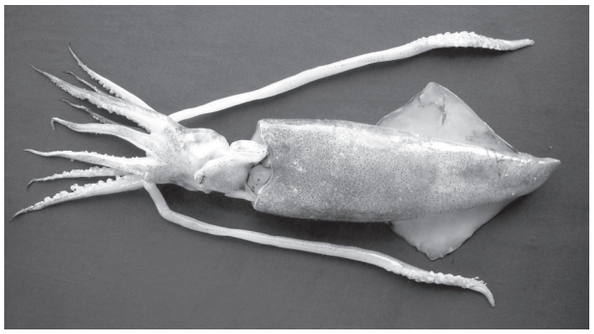

Fig. 2. *Loligo edulis* Hoyle, 1885 (Ventral view)

known as 'swordtip squid', was observed in trawl catches at New Ferry Wharf and Sassoon Docks, Mumbai, Maharashtra. The specimens were brought to the laboratory and identified to species level based on the identification characters as described by Roper e*t al*. (1984).

Some of the important distinguishing characters of the species are as follows:the mantle is moderately stout to elongate and mature males may be more slender (Okutani *et al*., 1987). A cutaneous ridge on the ventral surface is generally present, but they are absent in the specimens collected from Mumbai., which was also not mentioned by Voss (1963), Adam (1973) and Jereb and Roper (2006) in their description of specimens from the Philippines, Red Sea and the Indian Ocean respectively. The fins are rhombic, their posterior margin slightly concave and also the fins become slightly longer than wide in adult specimens. Arms are moderately long forming about 25-45% of mantle length. The arm formula is variable - 3.4.2.1 or 4.3.2.1. Tentacular clubs are expanded with 30 to 40 sharp conical teeth. The gladius is long and moderately narrow.

L. edulis is distributed in the Western Pacific: Northern Australia, Philippine Islands and northern South China Sea to central Japan. It is a neritic species occurring in 30 to 170 m depth. It overwinters in deeper waters, migrating inshore in spring and summer forming large aggregations and spawning in sandy bottoms in 30 to 40 m depth (Jereb *et al.,* 2005).

The occurrence of *L. edulis* is reported for the first time from the north-west coast of India. Mohamed and Nagaraja (1991) have reported similar species of *Doryteuthis* from Mangalore coast.

The species entered the fishery in Mumbai waters probably from the year 2000 onwards but the catch was very less. Over the years the landings increased in New Ferry Wharf and the peak landings were observed in 2011 (Fig. 3). The species were caught from about 30-40 m at 70-80 km north off Mumbai coast. They were observed in the catch almost throughout the year but were more pronounced during the period October – January. The Occurrence of *Doryteuthis* sp. is highly seasonal and is usually associated with the north flowing coastal current during November-December (Mohammed and Nagaraja, 1991). At Sassoon Docks (new jetty), heavy landing of *Loligo edulis* ranging in length between 90 to 229 mm was observed on 18th February 2011 (Fig. 4). The fishing ground was south of Mumbai in the depth range of 40-50 m. About 2 t was landed by a single trawler. Apart from *L. edulis,* the catch also comprised *L. duvauceli*.

Fig. 3. Landings of *Loligo edulis* at New Ferry Wharf

Fig. 4. Landings of *Loligo edulis* at Sassoon Docks

L. edulis morphologically resembles *L. duvauceli* and is distinguishable essentially by the arm sucker dentition. A comparative morphometric difference observed between the two species is given in Fig. 5 and 6. The arm III sucker ring teeth of *L. duvauceli* is broad and squire (Fig. 7) while in *L. edulis* they are distinct, longer and slender squire (Fig. 8). *L. edulis* is reddish in colour with concentrated chromatophores compared to *L. duvauceli*. According

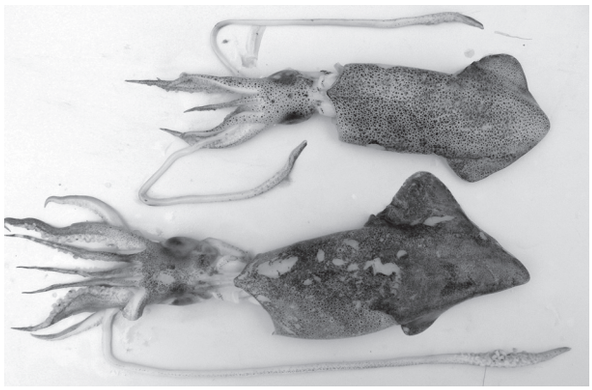

Fig. 5. Dosal view of *Loligo duvauceli* (above) and *Loligo edulis* (below)

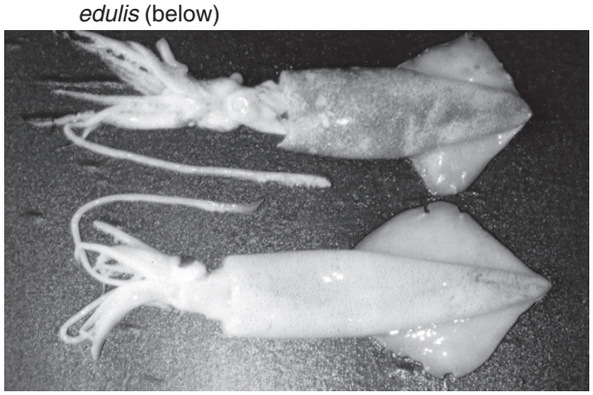

Fig. 6. Ventral view of *Loligo duvauceli* (above) and *Loligo edulis* (below)

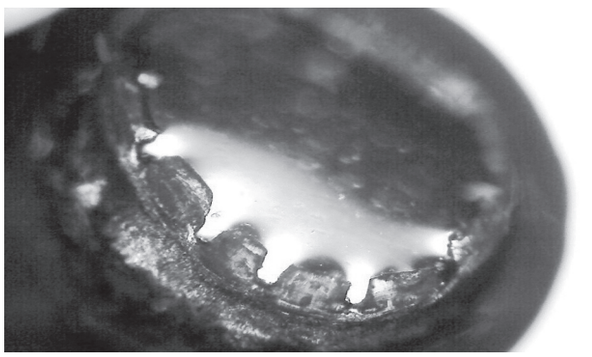

Fig. 7. Arm III sucker ring teeth of *L. duvauceli*

Fig. 8. Arm III sucker ring teeth of *L. edulis*

to Jereb and Roper (2006) there exists different 'forms' within the species, *L. edulis*. The species is characterised by marked polymorphism, both by locality and by season (Okutani *et al.*, 1987; Natsukari and Tashiro, 1991). Three forms were identified for this species by Sasaki (1929) with *L. edulis budo* Wakiya & Ishikawa, 1921 as one of the forms. According to Natsukari *et al*. (1988), they could be different seasonal 'forms' of the same species. Okutani *et al.* (1987) clearly pointed out that *L. edulis* is a species characterised with polymorphism by locality and by season within the range of its distribution. The species also shows the same polymorphism in Mumbai waters with the normal form in the winter months of November to February and the 'budo form' during the rest of the period.

Hundred and eight specimens of *L. edulis* were analysed for biological studies. The dorsal mantle length (DML) was measured using a digital caliper and total weight ($\pm$ 0.01 g) was determined using an electronic balance after the specimens were dried on blotting paper. The measurements were taken as described in CMFRI manual (1995). The stomach condition was ascertained as per Kore and Joshi (1975). The food items were in well-crushed and macerated condition and therefore they were categorised into groups. The Index of preponderance was estimated as suggested by Natarajan and Jhingran (1961). Maturity studies were carried out as per Silas *et al.* (1985).

The dorsal mantle length of the species ranged from 59 to 251 mm (males 66 - 251 mm and females 70 - 155 mm) with the corresponding weight ranging from 82 to 250 g. As in all squids, for this species also the females are found to be smaller than males. According to Jereb *et al.* (2005) the maximum mantle length of *L. edulis* is 300 mm and in the 'budo form' the maximum mantle length is 250 mm. However, the maximum mantle length of the species landed at Mumbai was 251 mm. The common size in commercial catches is between 150 to 250 mm in Hong Kong (Jereb *et al*., 2005) but in Mumbai waters they are commonly found in the size group 70 to 80 mm.

Majority of the guts were 'empty' or with 'trace' quantity of food in finely macerated condition. The species seems to mainly feed on 'fish' (90%) followed by 'prawn' (10%). According to Natsukari and Tashiro

(1991), the juveniles feed preferentially on 'crustaceans', whereas the main food for adults was found to be 'fishes'.

This species has a sex-ratio of 1:0.46 and 68.7% of the specimens analysed for the maturity studies were 'gravid' followed by 'mature' (31.3%) specimens. According to Natsukari and Tashiro (1991), the spawning season extends throughout the year, with three detectable peaks in spring, summer and autumn which also seems to be the case in Mumbai waters as gravid specimens are found almost throughout the year. Most specimens from Japenese waters reached full maturity by 150-200 mm. The smallest size recorded for full maturity was 52 mm and 59 mm for males and females respectively. *L. edulis* in the north-western part of the Indian Ocean reaches sexual maturity at 70-80 mm (Shvetsova, 1974). The same trend was also observed in Mumbai waters with the smallest gravid females recorded at 70 mm. It was observed that *L. edulis* matured at a smaller size than *L. duvauceli* and the ova diameter of the species was also larger (up to 2 mm) than *L. duvauceli* and the fecundity ranged between 580 to 1620.

Some cephalopods are known to make seasonal migrations, which are influenced by breeding activity. It seems that in all probability this species may have come to nearshore waters for breeding. Regional distribution and relative abundance of different species of cephalopods have not been studied extensively along the Indian coast and therefore further efforts need to be taken in this direction.

Observation on juvenile sea cucumber occurrence in the shallow waters of Hare Island (erstwhile Pandian Island), Tuticorin

P. S. Asha K. Diwakar and Mary K. Manissery
Research Centre of CMFRI, Tuticorin

Understanding juvenile sea cucumber habitat preferences is very much essential for determining the carrying capacity of a given habitat which enables the successful release of sea cucumber juveniles for restocking purpose. Holothurians occupy different habitats such as rocky shores, sandy beaches, muddy flats, coral reefs and mangrove swamps at different depths. In general, the juvenile sea cucumbers exist in the habitat occupied by the adult but are obscured from view within the sediment or crevices or beneath obscuring objects such as corals and rocks. Juveniles of 21 species of holothurians have already been reported from Indian waters, of which 17 were observed in the same habitat as adults and 4 in the absence of adult.

There are no reports on the availability of sea cucumber juveniles from Tuticorin waters. While doing the routine observations on sea cucumber species diversity in the shallow waters of Hare Island (erstwhile Pandian Island), juvenile sea cucumbers of three species were noticed under rocks (Fig. 1). They were found attached firmly to the rock surface

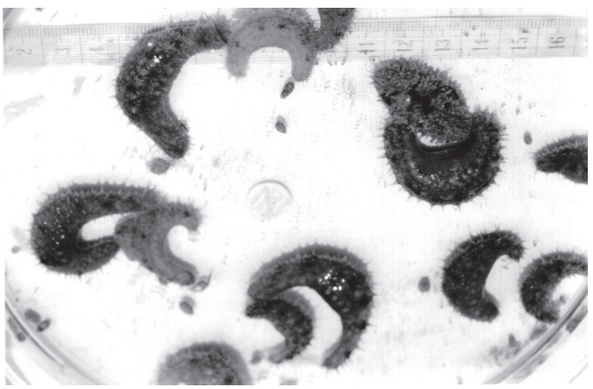

Fig. 1. Sea cucumber juveniles collected from Hare Island

and were covered with sand and extraneous particles concealing their presence from the surroundings.

After noting the morphological characters of the collected holothurian juveniles, spicules were separated from various parts of the body like dorsal as well as ventral tegument, tentacles, podia and pedicels using sodium hypochlorite. The isolated spicules were measured and photographed under microscope, for species identification. The juvenile

sea cucumbers collected were identified belonging to three species *viz., Holothuria cinerascens, Holothuria moebii* and *Holothuria paradalis.* The details of juveniles collected, their morphology and spicule characteristics are given in Table 1.

The general morphological features and the spicule structures of all three species of juvenile sea cucumbers are similar to their adults but with minor variations. The juvenile *H. cinerascens* have beautiful colouration with yellowish green or reddish green papillae and pedicels which were scattered all over the body, such characters are absent in the adults and the adults are reddish brown in colour with red markings in the body. The juveniles have only tables as spicule in the tegument, while adults have tables, rods and plates as spicules in the teguments.

The juveniles of *H. moebii* have three distinct rows of yellowish white pedicels, but adults have four rows of pedicels, which are darker on the dorsal side and lighter on the ventral side. Spicules like buttons are absent in the juvenile *H. moebii,* where as it is the major constituent in adults. The adult *H. pardalis* is light brown in colour with dark patches and have 8 - 15 pairs of brown spots on the dorsal side, whereas juveniles are whitish transparent with yellowish white pedicels arranged in three rows on the ventral side and have nine brown spots in three rows on the dorsal side. The characteristic curved rod spicules, which are present in the adults are absent in the juveniles.

The adult specimens of both *H. cinerascens* and *H. moebii* are two common species of the shallow waters of Hare Island, usually found attached to rocks but *H. pardalis* is a rare species and hence more studies have to be conducted to explore the habitat preference of both adults and juveniles of this species in the Gulf of Mannar area.

Table 1. Details of sea cucumber juveniles collected from Hare Island, Tuticorin

Place	No. of specimens	Morphology	Spicules and measurements	Systematics
Hare Island	15 Nos.	Brownish black coloured body with 9 nos. of orange or brownish black spots on the dorsal side. Pedicels arranged in three rows which are sticky yellowish green coloured or sometimes red or green. Tentacles are reddish brown in colour. Length - 2.4 – 8 cm Wet weight – 3.24 -10 g	Table - (base = 0.04-0.055 mm, spire = 0.045 - .058 mm) Rods - 0.05 - 0.12 mm, Endplate - 0.2 - 0.37 mm, Tegument contains only tables. Pedicels and tentacles have rods and end plates.	Order : Aspidochirota, Family : Holothuroidea Genus : *Holothuria* Subgenus: *Semperothuria* Species : *cinerascens*
Hare Island	18 Nos.	Spindle shaped elongated body with 9 brown spots in three rows on the dorsal side. Pale whitish transparent body with yellowish white pedicels arranged in three rows on the ventral side. Tentacles are transparent light brown in colour. Small juveniles are highly transparent with two brown spots. Length - 1.6 - 7.2 cm Wet weight - 0.34 – 4.18 g	Tables - (base = 0.05 - 0.0825 mm) spire = 0.0425 - .0775 mm Rods - 0.08 - 0.13 mm Button - 0.05 - 0.125 End plate - 0.35 - 0.4 mm	Order : Aspidochirota Family : Holothuroidea Genus : *Holothuria* Subgenus: *Lessonothuria* Species : *pardalis*
Hare Island	9 Nos.	Dark brown spindle shaped body with brown pedicels arranged in three rows. Podia are scattered but sticky. Very small juveniles are highly transparent without any spots. Length - 2.1 - 11 cm Wet weight - 4.4 - 6.05 g	Rods - 0.06 - 0.2 mm End plate - 0.1 - 0.17 mm	Order : Aspidochirota Family : Holothuroidea Genus : *Holothuria* Subgenus: *Selenkothuria* Species : *moebii*

Coastal water deterioration and associated fish mortality due to effluent discharge from a fish meal factory at Pattanamaruthor coast, north of Tuticorin

P. S. Asha and K. Diwakar
Research Centre of CMFRI, Tuticorin

Tuticorin coastal water is under the threat of pollution from various anthropogenic activities. Industrial discharge, untreated sewage effluents and wastes from processing and manufacturing units are the major source of pollution along Tuticorin coast. Most of the industries are letting their effluents in monsoon season in bulk quantities for the rapid mixing and dilution with rain water. Such effluent discharges very often dragged the public attention due to the extent of damages caused to the coastal ecosystem.

An incidence of fish mortality and sea shore deterioration was reported along the coastal waters of Pattanamaruthor coast, north of Tuticorin during the last week of November and first week of December 2011. On enquiry, it was understood that a fish meal factory, located 20 km north of Tuticorin, discharged foul smelling effluents along with rain water to the adjacent sea which caused severe damages to the coastal ecosystem. While inspecting the spot, it was informed that through the broken pipelines, the stored fish body fluid got mixed up with seawater and caused the related problems. Mortality of juvenile fishes of sardine and barracuda were noticed 4 km north of discharge point (Fig. 1). Fishermen complained about the mortality of lobsters and cobia juveniles maintained in cages, 5 km south of discharge point. Sticky oil balls of different sizes were found scattered around the beaches (Fig. 2) in the adjoining areas. Foul smell was experienced along the sea shore, the sea was found highly turbid and black in colour near the discharge point and the fishermen experienced body itching and irritation.

Fig. 1. Fish mortality noticed 4 km north of discharge point

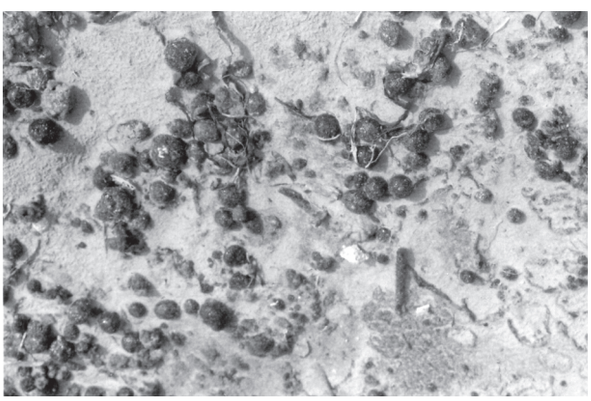

Fig. 2. Sticky oil balls of different sizes found scattered around the beaches

In order to ascertain the extent of damage caused and the possible reason for fish mortality, a follow up survey was conducted on 7th December 2011 and seawater samples were collected for analysis of water quality parameters and sediment for analysing oil and grease content, from two stations. Station 1 (St.1) -Tharuvaikulam, 20 km south of discharge point and station 2 (St. 2) – Pattanamaruthor the affected area *i.e.*, the discharge point. Sampling was again done at four stations on 16th December 2011 by fixing the stations St.1 and St. 2 as same along with two additional stations *viz*., St. 3, about 3 km north of St.1 and St. 4 about 7 km north of discharge point. The oil sludge was also quantified to assess the extent of oil pollution along the beaches of four stations. At St.1 the oil sludge was estimated around 0.6 kg m^{-2}, while at St. 2 - the oil sludge was estimated around 2 kg m^{-2}. At St.3, sludge was found immersed

in the beach sand and estimated around 1 kg m^{-2}. At St. 4, no sludge formation was noticed. Due to the prevailing current and wind pattern towards the northern direction, the oil sludge formation was noticed 5 km north of discharge point and 3 km south of discharge point. All the parameters were analysed following the standard procedures and the results are given in Table 1.

The analysis of water quality parameters of the samples collected on 7th December 2011, indicated not much variation in salinity and pH among stations. The dissolved oxygen concentration was nil at the discharge point (St. 2) and lower than normal value at St.1. Very high organic load, evident from the high BOD (biological oxygen demand) value of 21.41mg l^{-1}, higher than permissible limit and high suspended solids of 0.438 g l^{-1} at St. 2 indicated pollution due to organic waste. The depletion of oxygen to nil level also indicated the anaerobic process of decomposition in the area. Higher nutrient levels, especially nitrite and phosphate were also noticed in the seawater at discharge area. Ammonia and silicate concentrations were normal at the affected area. The oil content estimated was 40.4 µg l^{-1} and 1160.7 mg kg^{-1} in the water and sediment from St. 2 respectively, which were higher than the permissible limits prescribed by GESAMP. The higher organic load coupled with lack of dissolved oxygen concentration might have caused fish mortality at St. 1 and 2.

Table 1. Water quality parameters recorded at the sampling stations

Date	Sampling stations	Air temperature (°C)	Water pH	Salinity	DO (ppt)	BOD (ml l^{-1})	Chlrophyll (mg ml^{-1})	Ammonia (µg ml^{-1})	TSS (µg ml^{-1})	CO_2 (g l^{-1})	NO_3 (mg l^{-1})	NO_2 (µg l^{-1})	PO_4 (µg l^{-1})	Si O3 (µg l^{-1})	Oil content (µg l^{-1})	Water (µg l^{-1})	Sediment (mg kg^{-1})
07-12-2011	St. 1	26	27.8	7.92	36.61	1.5584	1.37	2.2744	0.0309	0.305	0	0	0.5524	0.56	0.0089	–	–
"	St. 2	26.5	28	7.65	33.38	0	21.41	1.9947	0.0229	0.438	0	0	1.348	1.673	0.0079	40.4	1160.7
16-12-2011	St. 1	27.5	28	8.2	33.11	1.198	3.0825	2.7808	0.0369	0.267	0	0	0.6629	0.1521	0.0067	23.84	1076.05
"	St. 2	29.5	30	8.1	33.38	0.959	3.7674	0	0.0767	0.504	14	0.00058	1.3258	2.4332	0.0067	80.8	2137.3
"	St. 3	29.8	30.2	8.25	33.65	2.3976	0.6848	3.1916	0.0377	0.315	0	0	2.2017	1.7235	0.0049	56.96	427.07
"	St. 4	30	30.2	8.42	32.57	2.6374	1.37	0.474	0.0323	0.288	0	0	1.1768	1.5207	0.0067	34.88	0

The result of the water quality analyses of samples collected on 16th December 2011, indicated no variations in the salinity, pH and temperature between stations. Though the level of dissolved oxygen concentration improved, still very low with the lowest of 0.9590 ml l^{-1} observed at the affected area (St. 2) followed by 1.19 ml l^{-1} at Tharuvalkulam (St.1). Dissolved oxygen concentration was normal in the waters of St. 3 and 4. The BOD value was normalised in the affected area, still higher than the limit prescribed by the Central Pollution Control Board was noticed at St. 2 and 1. Chlorophyll was absent in the affected area (St. 2) and normal at St. 1, 3 and 4. The total suspended solid level was also still higher in the water at St. 2 and normal at St.1, 3 and 4. The presence of CO_2 was detected only at St. 2. The level of ammonia, nitrite and phosphate were also still higher in the water at St. 2. Extremely high values of oil content was noticed in the water (80.8 µg l^{-1}) and sediment (2137.3 mg kg^{-1}) at St. 2. The oil content estimated in the water and sediment of other stations (St.1, 3 and 4) were also higher than the permissible limit as specified by GESAMP.

From the results of the present study, it could be inferred that the anaerobic decomposition of high organic load present in the coastal waters, due to the effluent discharge had led to the depletion of oxygen. Along with this, the high oil content in the water and sediment were the causative agents for the coastal water deterioration and associated fish mortality. Though the fish meal factory used edible fish, oil sardine as raw material for their process, the body fluid on prolonged storage, might have produced, obnoxious substances like trimethylamine, ethylmercaptan and even poisonous compounds such as hydrogen sulphide by bacteriological and enzymatic decay. Due to the timely interference of the concerned State Government Department, it was told that the factory stopped further discharge of stored effluent and took immediate remedial measures.

Impact of the cyclonic storm 'phyan' on marine fisheries along the Sindhudurg coast of Maharashtra

Bashir Ahmed Adam Shiledar, Punam A. Khandagale and Veerendra Veer Singh
Research Centre of CMFRI, Mumbai

During the month of November 2009, coastal districts of Maharashtra were severely hit by a cyclonic storm 'phyan' that devastated the coastal structures and adversely impacted marine fisheries and allied activities. This cyclonic storm developed as a tropical disturbance, south-west off Colombo in Sri Lanka on 4th November, 2009. Over the next couple of days the disturbance gradually developed before weakening, as it made landfall on southern India on 7th November. After the disturbance emerged into the Arabian Sea, it rapidly became more marked and early on 9th November, the India Meteorological Department (IMD) reported that the disturbance intensified into a depression and designated it as Depression ARB 03.

The Joint Typhoon Warning Centre (JTWC) issued a tropical cyclone formation alert. Later that day the JTWC designated the system as Cyclone 04A that was likely to hit coastal districts of Maharshtra *viz*., Sindhudurg, Ratnagiri, Raigad, Thane and Mumbai. During the next day, the depression turned towards the north-east (Fig. 1).

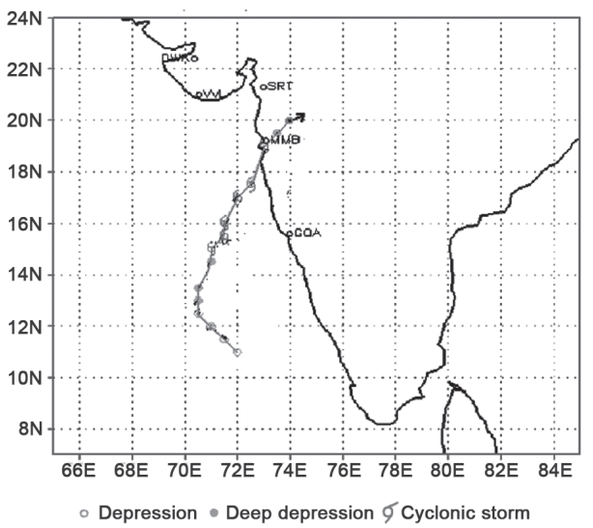

Fig. 1. Track of cyclonic storm, 'Phyan' during 09-12 November 2009

The cyclonic storm severly affected the marine fisheries of Sindhudurg district (Fig. 2) at three major places *viz*., Vengurla, Malvan and Deogad, causing loss of boats, fishermen and vast distruction.

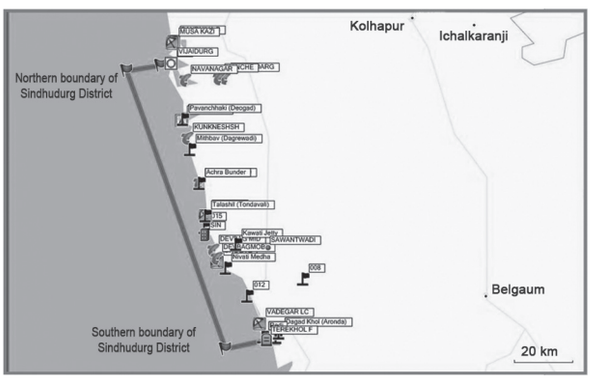

Fig. 2. Major fishing villages along Sindhudurg District, Maharashtra

The cyclone hit Sindhudurg at 02 00 hrs on 11th November 2009. The cyclone entered from Goa coast with a speed of 60 to 70 km h^{-1}, first at Vengurla Taluka, followed by Malvan and Deogad coastline. Cyclone affected fisher population of Shiroda, Aravali, Mooth, Ubhadanda, Navabag, Dabhoswada, Kelus, Khavana and Nivati. In this region, 40 fibre boats and 2 rampan hodi were broaken and several fishing nets were washed away in the sea (Fig. 3a, b and c). Protective weir was washed away at Kelus (Kalvi).

The cyclone hit Malvan area at about 02 30 hrs and it affected the entire coastline (Fig. 4a, b, c). Fishermen could not save their vessels due to high tide and darkness. Cyclone lasted for almost 6 h. Five trawlers were completely broken and washed ashore. A total of 60 fibre boats were broken and 3 rampan as well as 600 fishing nets were washed away in the sea.

In Deogad, totally 5 fibre boats gone for fishing were missing with 13 crew members. Out of these, 3 boats were from Deogad and 2 from Vijaydurg. Cyclone caused heavy distruction in the area,

Fig. 3. Coastal destruction caused by the cyclone 'phyan' along the Vengrula coast in Sindhudurg district

Fig. 4. Coastal destruction caused by the cyclone 'phyan' along the Malvan coast in Sindhudurg district

uprooting trees and damaging houses. Two fibre boats gone for fishing from Deogad reached shore, one named 'Muktai' at Ratnagiri with three members safely, while another boat named Madhupriti reached Harne (Ratnagiri).

As a precaution, all trawlers from Malvan were retained at Deogad (Anandwadi) upto 18th November 2009, for safety. Because of collapsed trees and electric poles, the electricity supply was disrupted for about 18 h in all the three talukas. In all the three talukas, Phyan made havoc causing heavy financial losses. However, State Government provided financial package to the affected fishermen to compensate losses.

Pelagic sting ray, *Pteroplatytrygon violacea* (Boneparte, 1832) landed at Tuticorin

K. Kannan, L. Ranjith, K. Sureshkumar, K. P. Kandan, K. John James,
S. Mohamed Sathakkathullah and M. S. Madan
Research Centre of CMFRI, Tuticorin

Pelagic sting ray, *Pteroplatytrygon violacea* (Boneparte, 1832) belongs to the family Dasyatidae (largest stingray family) and the family comprises 8 genera and 89 valid species (Froese and Pauly, 2012). In Indian waters, about 50 species of rays have been recorded so far, of which 18 species belong to the family Dasyatidae (Raje *et al*., 2002; 2007). In India, *P. violacea* has been previously reported by Akhilesh *et al.* (2008) and Zacharia *et al*. (2009). As this is the first report of male *P. violacea* from the east coast of India, a detailed morphometric comparison is presented here (Table 1).

On 12th February, 2013 a single specimen of *P. violacea* (Fig. 1 and 2) measuring 100 cm (total length) with a weight of 2090 g was caught in large meshed gillnet, locally called as Paruvalai operated from Vallam (type of plank built boats of Tuticorin) at Tharuvaikulam landing centre in Tuticorin. The gear was operated between 100 and 150 m depth, at a distance of 50 to 60 nautical miles off the coast. The landed specimen was brought to the laboratory of Tuticorin Research Centre of CMFRI for further investigations.

Table 1. Morphometric comparison (% of total length in mm) of *Pteroplatytrygon violacea* captured off Tuticorin coast with specimens caught from Arabian Sea off Cochin (Akhilesh *et al*., 2008) and North Sea (Ellis, 2007)

Morphometric Characters	Tuticorin coast (Male)	Arabian Sea (off Cochin) (Male)	North Sea (Male)
Total length	100	102	99.5
Disc width	44.9	46.08	42.2
Disc length	34.41	34.31	33.7
Pre-orbital length	7.1	5.49	5.3
Eye diameter	2.11	1.57	1.6
Inter-orbital distance	3.82	6.57	4.1
Pre-spiracular distance	9.23	7.35	6.9
Length of spiracle	2.63	2.55	2.2
Inter-spiracular distance	7.57	7.65	7.7
Pre-narial distance	5.44	5.1	4.8
Inter-narial distance	4.56	4.41	4.2
Pre-oral distance	6.59	6.27	6.3
Mouth width	5.15	5.39	4.9
Interspace first gill slits	8.79	8.82	8.5
Interspace fifth gill slits	5.85	6.47	6
Snout to first gill opening	12.3	11.37	10.8
Snout to fifth gill opening	16.19	16.57	15.7
Snout to cloaca (anterior) distance	29.39	29.9	29.6
Cloaca (anterior) to end of the tail	69.01	70.1	71.4
External clasper length	7.7	6.18	5.5

Fig. 1. *Pteroplatytrygon violacea* caught off Tuticorin (dorsel view)

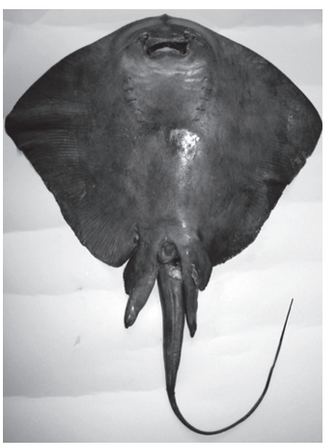

Fig. 2. *Pteroplatytrygon violacea* caught off Tuticorin (ventral view)

Description

The body is thick, wider than long with purple dark coloration on the dorsal and ventral surfaces of the broad wedge shaped thick disc. Disc surface is normally without any granulations. Snout broad, small terminal lobe present, anterior margin evenly convex. Eye very small with thick eyelid, inter-orbital space very broad. Nostrils short and circular. Mouth small with numerous short, bifurcated papillae in continuous row across floor; prominent labial furrows and folds, lower jaw weakly convex. Single spine in the tail. Single row of small, short, sharp thorns commencing near nuchal area. The specimen is identified as *P. violacea* based on morphological and morphometrics of the male representatives described from North Sea (Ellis, 2007) and Arabian Sea (Akhilesh *et al*., 2008)

The species is distributed in tropical and subtropical Atlantic, Indian and Pacific Oceans. In the last few years the species has also been reported from very shallow waters, close to shore (Vaske and Rotundo, 2012). *P. violacea* is listed in the IUCN Red List of the Threatened Species, as "Least Concern", however the stock status of the species needs to be carefully monitored.

A pregnant female spinner shark, *Carcharhinus brevipinna* (Muller & Henle, 1839) landed at Tharuvaikulam, Tuticorin

M. Sivadas, L. Renjith, Mohamed Sathakthullah, K. John James and K. Suresh Kumar
Research Centre of CMFRI, Tuticorin

In Tuticorin, sharks are caught incidentally in trawl net and drift gillnet and there is no targeted fishery for sharks in this region. The magnitude of landing is also not very high. On 9th August 2012, a female *Carcharhinus brevipinna* was noticed at Tharuvaikulam landing centre (Fig. 1). It was caught in drift gillnet operated off Manappad at a depth of around 40 m. The shark was auctioned for ₹ 60,000/-. Since there is no local market for sharks, generally they are sent to neighbouring districts like Kanyakumari or to Kerala state.

The specimen was a pregnant female,with a total length of 283 cm weighing around 150 kg. The shark carried 18 pups, nine pups in each uterus (Fig. 2). Each pup was enveloped by a membrane which was filled anteriorly with a translucent yellow fluid. Each had a highly vascularised placenta attached to the posterior part of the uterus through an umbilical cord. In one uterus, there were 5 males and 4 females, whereas the other uterus contained 3 males and 6 females. The total length of the pups ranged from 31 to 53 cm and weighed 507 to 606 g. The pups almost resembled grown up shark with fully developed fins and claspers but without teeth. Details of the morophometric measurements of the pups are given in Table 1.

Fig. 1. Pregnent female spinner shark (*Carcharhinus brevipinna*) landed at Thiruvaikulam, Tuticorin

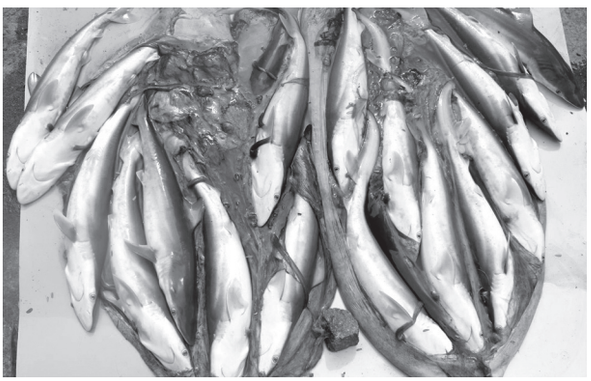

Fig. 2. Pups in each uterus after cutting open the enveloping membranes

The maximum size of the species recorded in FAO species identification sheet is 280 cm (Fisher and Bianchi, 1984). The number of young ones reported varied from 3 to 15 per litter and the size at birth is reported as 60 - 75 cm (Raje *et al.,* 2007). The present observation on the size of the fish and the number of young ones appears to be the maximum recorded for the species.

Table 1. Morphometric measurements (cm) of eight pups collected from *Carcharhinus brevipinna* landed at Tuticorin

	Pups							
	P1	P2	P3	P4	P5	P6	P7	P8
Measurements	M	M	F	M	F	F	M	M
Total length	52	51	50	52	52	53	51	52
Fork length	41	40	39	42	41.5	41	41	42
Standard ength	38	36	35	38	37	37	37	37
Snout to 1st dorsal	17	16	16	17	17	16.5	16	17
Snout to 2nd dorsal	32	31	31	32	32	32	31	32
Snout to pelvic	26	25	25	27	26	27	25	26
Snout to pectoral	13	12.5	12	13	13	13	12.5	13
Snout length	7	6.5	6	6.5	6.5	7	6.5	7

New record of kobi cuttle fish, *Sepia kobiensis* Hoyle, 1885 from the Bay of Bengal, off Karaikal coast of south India

S. N. Sethi and N. Rudhramurthy
Research Centre of CMFRI, Chennai

On 16th October 2012, kobi cuttle fish, *Sepia kobiensis* were caught by trawl gears operated along the Karaikal coast (lat 10^0 49' 11.01" N; long: 79^0 43' 79.52"E) of south India at a depth of around 100-200 m . The specimens were identified as *Sepia kobiensis* Hoyle, 1885 based on the identification characters as described in Jereb and Roper 2005 (Fig. 1 and 2). This species has not been reported earlier and therefore considered as a new record to the inshore waters of Bay of Bengal along Karaikal coast. It is a demersal cuttlefish inhabiting up to 160 m depth and has been found to occur in Mumbai waters along the west coast of India.The occurrence of the species in the fishery along Mumbai coast is highly seasonal, constituting a fishery during October-December with peak landings in November.

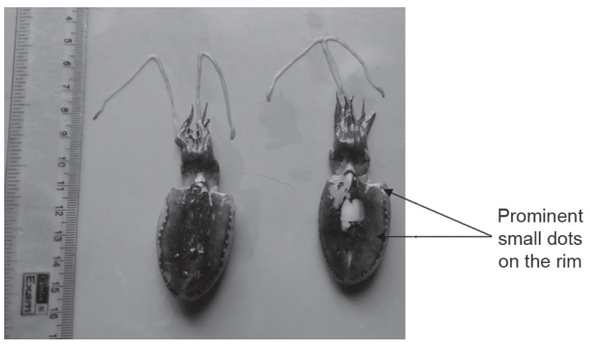

Fig. 1. Dorsal view of *Sepia kobiensis* caught off Karaikal coast

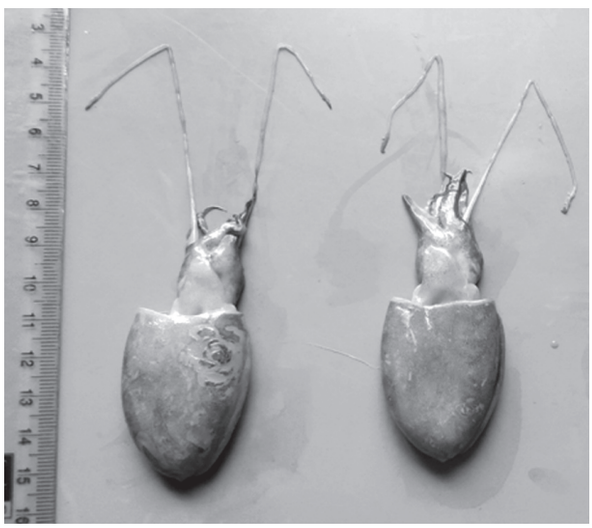

Fig. 2. Ventral view of *Sepia kobiensis* caught off Karaikal coast

Taxonomic position and distribution

Class: Cephalopoda, Subclass: Coleoidea, Infraclass: Decapodiformes, Superorder: Decabrachia, Order: Sepiida, Family: Sepiidae, Genus: *Sepia,* Species: *kobiensis,* Hoyle, 1885.

The species is known to be distributed worldwide in Western Pacific: South China Sea, East China Sea, and Yellow Sea to southern and central Japan (Jereb and Roper 2005).

Description

The mantle is elliptical with a width 45-50% of the mantle length. The antero-dorsal margin is acutely and triangularly protruded, while the ventral margin is gently concave. The fins are narrow, starting below the mantle opening and is about 80% of mantle length. The funnel is slender, reaches the base of the ventral arms and the funnel valve is short and conical in shape. Swimming membrane is poorly developed in the ventral arms. The arms are short, attenuate and sub-equal in size. The arm suckers are globular quadric serial in size with those in the median rows larger than the marginal ones. Left arm in males is hectocotylised and suckers are greatly reduced in size. The oral surface is hollowed out and transversely ridged. Tentacles are long and thin, tentacular club short and narrow. Tentacular suckers are arranged in eight rows transversely with five suckers of the third longitudinal row much larger than the others. Swimming keel is broad extending proximally beyond base of club and the protective membrane is poorly developed.

The cuttlebone is lanceolate and large in the striated zone area (Fig. 3a and b). Shell taper towards the posterior end, acuminate at the anterior end and has a very narrow chitinous margin. The dorsal surface has faint median rib, whereas the ventral surface has a median groove forming a broader depression in the anterior part of the loculus. The inner cone has narrow lateral limbs and the posterior portion is elongated. A cup-like process formed by the outer cone surrounds the inner cone. The spine is long and directed upwards. The animal is dark brown in colour with the exception only in the periphery and the fins, where the chromatophores are very minute and distally placed with prominent small dots on the rim. The ventral side is faint pinkish in colour due to fewer chromatophores developed.

Fig. 3. Dorsal view (a) and Ventral view (b) of cuttle bone of *Sepia kobiensis* caught off Karaikal coast

Revival of fishery of the thinspine sea catfish, *Arius tenuispinis* at Mumbai, Maharashtra

B. N. Katkar, S. G. Raje, Sujit Sundaram and Thakurdas
Research Centre of CMFRI, Mumbai

Catfish landings by trawlers in Mumbai comprise of three major species *viz*., *Arius dussumieri, Osteogeneiosus militaris* and *Arius caelatus* with *A. dussumeri,* forming approximately 30-35% of the landings. However, of late the landings of *Arius tenuispinis* has showed an unusual upward trend at New Ferry Wharf, Mumbai and the species is observed in the catch almost throughout the year. Analysis of *A. tenuispinis* catch data from New Ferry Wharf during the period 1987 to 2012 clearly indicates collapse of the fishery of this species, showing signs of subsequent revival. The landings of this species reduced drastically from 352 t in 1987 and totally disappeared from the catch during the period 2000-2004. From 2005 onwards, there seems to be a gradual revival of the fishery (Fig. 1) (Raje and Vivekanandan, 2008). A similar decline of *A. tenuispinis* was also observed at Visakhapatnam (Lakshmi and Rao, 1992). The percentages of *A. tenuispinis* in the total catfish landings during this period decreased from 12.4% (1987) to nil (2004) and then a gradual increase to 27.3% (2012) indicating a total revival of its fishery in Maharashtra

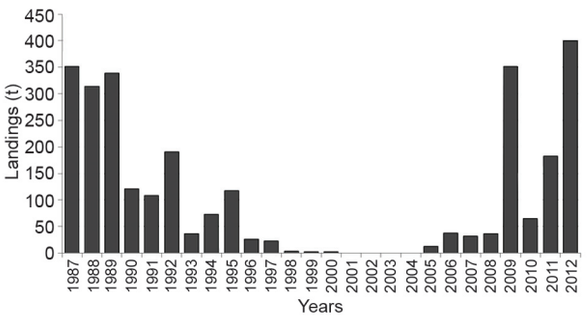

Fig. 1. Trend in landings of *Arius tenuispinis* at New Ferry Wharf, Mumbai during 1987 to 2012

waters. The species composition during this period was: *A. dussumeri* (32.8%), *Osteogeneiosus militaris* (27.5%), *A. tenuispinis* (9.2%), *Tachysurs caelatus* (9.2%), *T. thalasninus* (10.9%), *T. jella* (3.2%), *T. sona* (4.4%), *T. serratus* (1.2%) and other catfish species (1.6%).

On 28th September 2009, an unusual heavy landing of *A. tenuispinis,* to the tune of about 450 t was observed at New Ferry Wharf (Fig. 2). The fishing was carried out at 30-40 m depth, 70-80 km off north-west coast. Length measurements were

Fig. 2. *Arius tenuispinis* landed at New Ferry Wharf, Mumbai

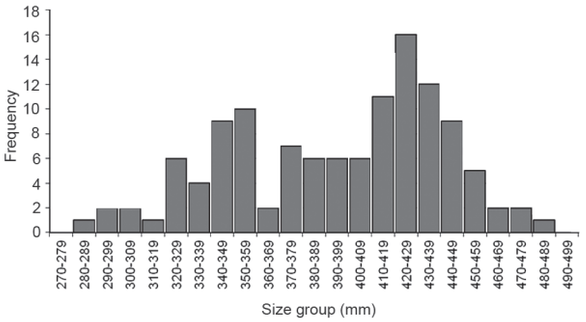

Fig. 3. Length frequency polygon of *Arius tenuispinis* landed at New Ferry Wharf, Mumbai

taken for 120 specimens and the total length ranged from 283 to 486 mm with the corresponding weight ranging from 286 to 998 g. The maximum number of specimens belonged to the size range 420-429 mm (Fig. 3). The catch fetched ₹ 10 per kg at the landing centre. Fifty four specimens of *A. tenuispinis* were analysed for further biological studies. It was observed that 70% of the guts were in 'trace' and 'empty' condition. The species seems to mainly feed on 'fish' (43%) followed by '*Acetes*' (35.4%), other crustacean species (21.5%) and molluscs (0.1%). The sex-ratio observed was 1:1 and all the specimens analysed were in 'immature' condition.

The revival of this resource over the years needs to be studied further. In the year 2009, the landings seems to have increased substantially. Introduction of new type of gear, like bottom trawl for the capture of *A. tenuispinis* could have led to the increased exploitation of the species.

Record of *Octopus lobensis* Castellanos and Menni, 1969 from Maharashtra waters

Sujit Sundaram
Research Centre of CMFRI, Mumbai

Octopuses popularly called as 'devilfish' are caught mainly as bycatch in the bottom trawl. Due to the growing demand for octopus in the international market, octopus fishery is catching up in Maharashtra. The main fish landing centers for octopus at Mumbai are New Ferry Wharf and Sassoon Docks. Octopus contribute 3% towards the total cephalopod catch in Mumbai (CMFRI, 2008). *Cistopus indicus* dominates the octopus fishery in Mumbai waters (Sundaram and Sarang, 2004). The other species of octopus recorded from Mumbai waters are *Octopus membranaceus, Octopus dollfusi* and *Octopus aegina*.

With the increased exploitation and expansion of fishing grounds, new records of cephalopods are reported from various places all along the Indian coast. Ommen (1971 and 1977) identified few species of octopus along the west coast of India. Thirty eight commercially important species have been reported from the Indian seas (Silas *et al*., 1985), however targeted fishery for octopus is lacking.

A new entrant to the octopus fishery in Mumbai waters is *Octopus lobensis* Castellanos and Menni, 1969 (Fig. 1). This octopus is commonly known as 'lobed octopus'. The species was observed in trawl landings at New Ferry Wharf. The depth of operation is about 30-40 m at 70-80 km off north-west coast. The occurrence of *O. lobensis* is reported for the first time from this region. Kripa *et al.* (2000) recorded

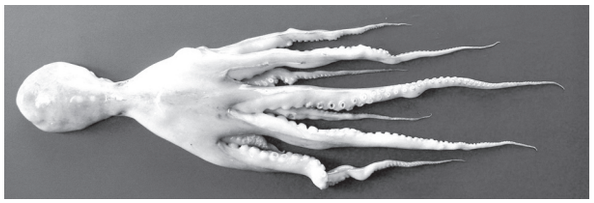

Fig. 1. *Octopus lobensis* Castellanos and Menni, 1969

the occurrence of this species from Kerala waters and is the second dominant species in the fishery contributing 12% of the total octopus catch. The species entered the fishery in Mumbai waters probably from 2006 onwards and present in the fishery almost throughout the year with peak period of abundance during January-April.

O. lobensis is a benthic species occurring in shallow waters down to 60 to 80 m depth. They are found in south-west Atlantic region (Roper *et al.*, 1984). The body of *O. lobensis* is smooth and bulky and the male is larger and heavier than females. Mantle is broad, short and globular with its width almost equal to length. Arms are broad, moderately long and very robust at bases. The arm lengths of twelve specimens were measured to arrive at the arm formula and it was observed that *O. lobensis* has an arm formula of 1 > 2 > 3 > 4. The 3rd left arm of males is shorter as compared to females of the corresponding size. The species has a striking similarity with *Cistopus indicus* but for its stout body and comparatively shorter arm lengths.

According to Roper *et al*. (1984) the maximum mantle length of the species is 100 mm. However, the mantle length of the species landed at Mumbai ranged from 65 to 190 mm with weight ranging from 213 to 1120 g. The mantle length ranged from 35 to 136 mm and weighed 5 to 400 g in Kochi waters (Kripa *et al*., 2000).

Thirty specimens of *O. lobensis* were analysed for biological studies. Majority had guts with 'trace' and 'empty' condition and the food was in finely macerated state. The species seems to mainly feed on 'fish' (66.7%) followed by 'prawn' (15.2%), squids (1.6%) and 16.5% was digested matter. Unlike other octopods, where males are more in number, this species has a sex ratio of 1:1.5. About 50% of the specimens analysed for the maturity studies were in 'mature condition' followed by 'gravid' (37.5%) and very few 'immature' specimens (12.5%) were present. The fecundity of the species ranged from 700 to 4660 numbers and the ova diameter ranged from 1-3 mm. Some octopods are known to make seasonal migrations, which are influenced by breeding activity. It seems that in all probability this species may have come to nearshore waters for breeding.

Octopus resources are almost totally exported and *O. lobensis* fetches high price owing to its bigger size and better quality of flesh. The price range between ₹ 50-70 per kg at the landing centre.

New distributional record of zoned paper bubbleshell sea slug, *Hydatina zonata* (Gastropoda: Hydatinidae) from the Bay of Bengal, off Chennai

Satyanarayan Sethi
Research Centre of CMFRI, Chennai

Two specimens of the paper bubbleshell, *Hydatina zonata* were observed in trawl landings at Kasimedu Fishing Harbour, collected at a depth of 50 - 70 m (clayey sediment) off Chennai coast (13°06' 59.50"N 80°17' 38.99"E). *H. zonata* was noticed in trawl bycatch along with several other fish species. Both were live specimens and vermivorous in nature.

H. zonata is a rare form of sea slug and known to be endemic to the Indo-Pacific region. The species was earlier reported from India from Pamban, Kundukkal Point and Mandapam (Satyamurti, 1952) along the south-east coast, and once from Gujarat (Menon *et al*., 1961) along the north-west coast. Ganesh *et al.* (2012) reported paper bubble shell, *H. zonata*

from the north-east coast of India at a depth of 30 m (silty sediment) off Koyyam in Andhra Pradesh where the river Vamsadhara joins Bay of Bengal. Though a few reports on empty *H. zonata* washed ashore are available (Satyamurti, 1952), the present finding is the first record of live *H. zonata* from the Bay of Bengal off Chennai coast.

Systematics

Class : Gastropoda Cuvier, 1797
Subclass : Ophisthobranchia Milne-Edwards, 1848
Order : Cephalaspidea Fischer, 1883
Family : Hydatinidae
Genus : *Hydatina* Schumacher, 1817
Species : *zonata* (Lightfoot, 1786)

Shell description and morphometric measurements

Shell is ovoid, fragile and thin, light straw coloured with dark brown broad spiral band enclosing white, one near its sunken spire, another in the middle of the body whorl and third one at its lower part. Suture is deep, aperture broad, thin, sharp and surface smooth. Foot is very large, broad and extends beyond the shell while moving. Cephalic shield has two pairs of anterior lobes. Rhinophores are long and broad. The border of the foot, rhinophores, and cephalic shield are margined with white colours, followed by dark chocolate and gradually lighter in the middle. Lower part of the foot is light brown in colour. Shell length 41-45 mm; width 23-35 mm; weight 8-15 g.

H. zonata occur at depths between 50 and 70 m in fine sand. The species was reported earlier as *Hydati5na velum* (Gmelin, 1791) which is its synonym.

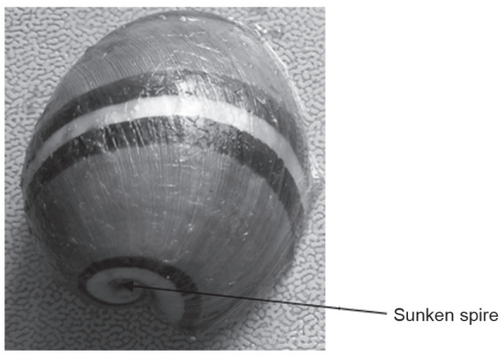

Fig. 1. Dorsal view of *Hydatina zonata* landed at Kasimedu Fishing Harbour

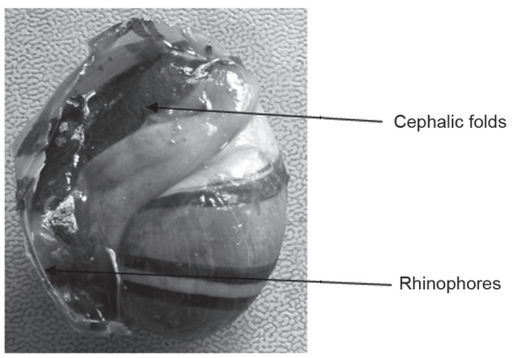

Fig. 2. Ventral view of *Hydatina zonata* landed at Kasimedu Fishing Harbour

Large sized oilfish *Ruvettus pretiosus* (Cocco, 1833) ever recorded from Gulf of Mannar, south-east coast of India

K. Sureshkumar, K. Kannan, L. Ranjith, M. Sivadas and M. S. Madan
Research Centre of CMFRI, Tuticorin

Ruvettus pretiosus belonging to the Family Gempylidae of perciform fishes is closely related to Scombridae. Gempylidae fishes are commonly called as snake mackerels or escolars and this family has 16 genus and 24 valid species. *R. pretiosus* is one of the large sized fishes with the maximum record of 300 cm total length (Nakamura and Parin, 1993). It is bentho-pelagic, reported to be distributed along the tropical and temperate seas of the world. Venu and Kurup (2006) reported the occurrence of snake

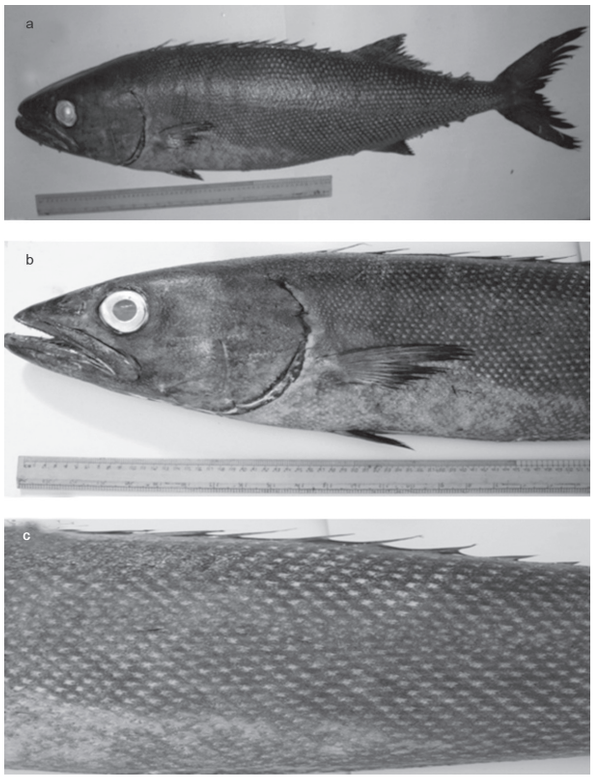

Fig. 1. *Ruvettus pretiosus* caught off Tuticorin coast, Gulf of Mannar (a) Lateral view, (b) Close view of head, (c) Close view of spinous bony tubercle

mackerel in deeper waters along the west coast of India. In south-east coast of India, Balasubramanian and Abdussamad (2007) reported six species from the Family Gempylidae.

On 7th December, 2012 a single specimen of *R. pretiosus* measuring 121.3 cm (total length) with a weight of 9000 g was landed by large meshed gillnet, locally called as Paruvalai operated from traditional fishing craft, vallam (a type of plank built boats of Tuticorin) at Tharuvaikulam landing centre. The gear was operated between 100 and 150 m depth, at a distance of 50 to 60 nautical miles from the coast.

The landed specimen was brought to the laboratory of Tuticorin Research Centre of CMFRI for further investigations. The fish body is elongate with large eyes, canine like teeth, rigid scaly keel on belly, no keels on caudal peduncle, lateral line single, and cycloid scales interspersed with rows of spinous bony tubercles which make the skin very rough to touch. The body colour is uniformly brown to dark brown, pectoral and pelvic fin tips black. The detailed morphometric and meristic characters of the specimen are given in Table 1.

Table 1. Morphometric and meristics features of *Ruvettus pretiosus*

Morphometric characters	Measurement (mm)
Total length	1213
Standard length	1014
Head length	280
Eye diameter	49
Snout length	102
Upper jaw length	145
Lower jaw length	150
Pre-dorsal length	258
Pre-pectoral length	280
Pre-pelvic length	320
Pre-anal length	730
Meristics characters	**Number**
First dorsal fin	XIV
Second dorsal fin	18
Dorsal finlets	2
Pectoral fin rays	13
Pelvic fin rays	5
Anal fin rays	18
Anal finlets	2

Mohan *et al*. (2011) reported occurrence of *R. pretiosus* (total length - 550 mm) at Chennai coast in the year 2009. Along Tuticorin coast, the occurrence of *R. pretiosus* coincides with onset of deep sea fishing season; during November and December (Balasubramanian and Abdussamad, 2007; Mohan *et al.*, 2011). The species generally fetches low price in the local market, perhaps due to its high oil content *i.e.*, 20% by weight contains indigestible wax esters which contribute 90% of the fat content (Yohannes, 2002) and is mostly sundried after removing the skin. In Australia, the consumption of oilfish caused food poisoning outbreaks resulting in diarrhea, abdominal cramps, nausea, headache and vomiting (Shadbolt *et al*., 2002).

Shell boring polychaete (*Polydora* sp.) infestation in black lipped pearl oyster *Pinctada margaritifera*

P. Laxmilatha, P. Pattnaik, M. Prasada Rao, T. Nageswara Rao and S. Padmaja Rani
Regional Centre of CMFRI, Visakhapatnam

Black lipped pearl oyster *Pinctada margaritifera* of size ranging from 3 to 40 mm were collected from the rocky beach of Lawson's Bay along Visakhapatnam coast and were reared in the marine hatchery of the Visakhapatnam Regional Centre of CMFRI. The oysters were reared in 1 t capacity fibre glass tanks in 32‰ filtered seawater, provided with continuous aeration and mixed microalgal diet comprising *Isochrysis galbana* and *Cheatoceros calcitrans.* During the course of domestication for a period of nearly 22 months, the oysters were regularly cleaned of fouling and boring organisms at monthly intervals. The growth was also recorded periodically. During this period, infestation by the shell boring polycheate *Polydora* sp*. on P margaritifera* was observed. *Polydora* sp., is the most common shell boring polychaete reported in pearl oysters. *Polydora* sp. belonging to Family Spionidae, is an opportunistic polychaete found to infest pearl oysters, edible oysters. mussels, scallops and abalones This annelid polychaete worm constructs a U-shaped burrow with mud and detritus, with opening at both ends. The polychaete worms bore into the shell from the margins as well as the centre. They tunnel through the horny periostracum and then into the prismatic and nacreous layers. The oyster responds by secreting a layer of conchiolin layer over the worm and the burrow, later covering it with nacreous shell, which results in the characteristic "mud blister". The blisters are of different shapes, *viz*., straight, wavy, u-shaped depending on the course of perforation (Fig. 1 and 2). Tumour-like protrusions are observed near the adductor scar. Compound blisters are formed when two or more worms lay the tunnels close together. Blisters are found on single shells as well as on both shells.

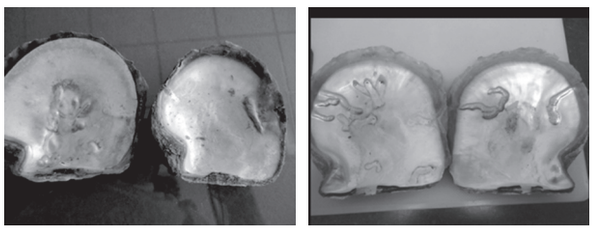

Fig. 1 and 2: Blisters and scars formed on the shells of *P. margaritifera* by *Polydora* sp.

The polychaete worm is yellowish brown/deep red in colour, about 3 cm long, segmented and has numerous bristles and tentacles all along the segmented body. The anterior region has several palps waving vigorously, and the posterior end is almost blunt and saucer shaped (Fig. 3 and 4). Another form of the *Polydora* sp. was also observed which had several palps on the anterior end, highly segmented body and lateral bristles but tentacles were absent. A tapering tail which was almost blunt and saucer shaped was present in this form (Fig. 5).

Fig. 3. *Polydora* removed from its dwelling tube; Inset: *Polydora* stretching out from the tubes

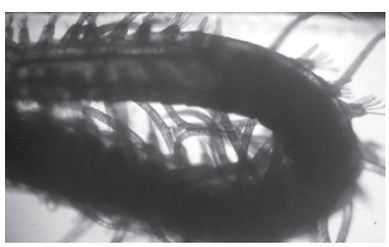

Fig. 4. Segmented body of *Polydora* with bristles and tentacles

The infestation was more in larger oysters (older oyster) than the younger ones. This has been reported in other pearl oyster species also, due to the erosion of the periostracum in older oysters. The infestation by the boring polychaete did not affect the growth and mortality was rare. In severe case of infestation, it affected the tissue of the oyster and was found to be highly emaciated. Such oysters will not be suitable for pearl production by nucleus implantation. Infestation by the polycheate was observed when salinity decreased to <20‰ and temperature below 24 °C. The method for control of this infestation was freshwater or high saline dips for 15-20 min.

Polychaete infestation has been observed earlier in other species of pearl oysters also *viz*., *Pinctada fucata*, *Pinctada chemnitzii* and *Pinctada sugillata* when assessed both in wild and onshore culture conditions. Of the four species caught in wild, the infestation intensities recorded were *P. margaritifera* - 18%, *P. fucata* - 26%, *P. chemnitzii* - 24% and *P. sugillata* - 11%. After a period of six weeks, there was horizontal transmission of the infestation to *P. margaritifera* (6%), *P. fucata* (9%), *P. chemnitzii* (12%) and *P. sugillata* (8%) amongst the healthy stock while under low salinity (<22‰) and temperature (below 24 ^{0}C) the infestation was found to be 9% in *P. margaritifera*, 14% in *P. fucata*, 32% in *P. chemnitzii* and 18% in *P. sugillata*. However mortality was negligible (max. 7% in case of *P. chemnitzii*) in a period of one year of culture under onshore conditions.

Rare landing of the wahoo, *Acanthocybium solandri* (Cuvier, 1831) at Visakhapatnam Fishing Harbour, Andhra Pradesh

V. Uma Mahesh, M. V. Hanumantha Rao, M. Satish Kumar, Shubhadeep Ghosh and G. Maheswarudu
Regional Centre of CMFRI, Visakhapatnam

Rare occurrence of the wahoo, *Acanthocybium solandri* (Cuvier, 1831) was observed at Visakhapatnam Fishing Harbour on 14th February 2013 (Fig. 1a, b & c). The genus *Acanthocybium* is closely related to *Scomberomorus* and is represented by a single species, *A. solandri*. The seerfish group (*Scomberomorus* and *Acanthocybium* genus) contributes less than 2% to the total landings from the western Indian Ocean (FAO Area 51, FAO, 1994). Seerfishes contributed on an average 3.49% to the total marine fish landings of Andhra Pradesh during 2001 - 2011 and are fished by gillnets, boat seines, shore seines, hooks & line and trawl nets. The species composition observed during 1982 - 2012 in seer fish landings in India was: *S. commerson* 54%, *S. guttatus* 45%, *S. lineolatus* 0.7% and *A. solandri* 0.3%.

Wahoo is considered as a high quality food fish worldwide. The species is locally called as “pallapu konemu” in Andhra Pradesh. The length of *A. solandri* landed at Visakhapatnam Fishing Harbour ranged from 120 to 143 cm with weight ranging from 8 to 16 kg and all the four fishes landed were caught by hooks and lines operated from motorised craft at depths of 800 m. The present record is the highest from the east coast of India, both in terms of length and weight.

The body is elongate, fusiform and slightly laterally compressed. Mouth is large with strong teeth closely set in a single series, the teeth triangular, compressed and finely serrated; snout about as long as the rest of head. Gill rakers are absent. Possess two dorsal fins, the first with 25 spines and the second with one spine and rays, have 8 dorsal and anal finlets and possess 2 small flaps (interpelvic process) between pelvic fins and 2 smaller keels on each side of the caudal fin.

Unlike the three species of *Scomberomorus* which are primarily coastal, *A. solandri* is an oceanic species occurring offshore beyond the continental shelf. Wahoo is a highly migratory species and adapted for swimming in high-speed bursts and are amongst the fastest fishes known. A burst speed of 77 km h^{-1} has been recorded for an 8 kg fish. A large percentage of *A. solandri* are landed by the troll

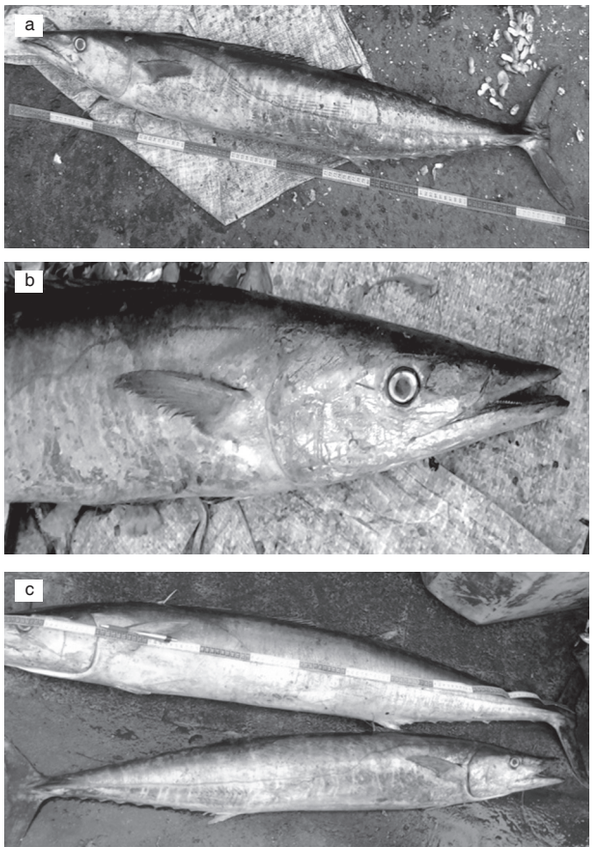

Fig. 1a, b & c. *Acanthocybium solandri* landed at Visakhapatnam Fishing Harbour

fishery in the Lakshadweep Islands. In Lakshadweep, the species is also occasionally caught during November-March by fishermen using No. 1 hooks, baited with mackerels, scads, flyingfish, barracuda, horse mackerel and squids.

Table 1. Morphometric measurements of the smallest specimen of *Acanthocybium solandri* landed at Visakhapatnam Fishing Harbour on 14th February 2013

Total length	120.0 cm
Fork length	117.0 cm
Standard length	111.0 cm
Height of the body	23.0 cm
Operculum length	28.0 cm
Eye diameter	3.4 cm
Head length	23.0 cm
Length of first dorsal fin	34.4 cm
Length of second dorsal fin	16.5 cm
Length of pelvic fin	13.0 cm
Length of pectoral fin	19.0 cm
No. of dorsal finlets	8 finlets
No. of ventral finlets	8 finlets
Length of anal fin	9.0 cm
Length of caudal fin	21.0 cm
Height of caudal fin	18.5 cm
First dorsal spines	XXVI spines
Second dorsal spines, rays	I spine, 15 rays
Anal spines, rays	III spines, 10 rays
Pectoral fin spines, rays	II spines, 22 rays
Pelvic fin spine, rays	I spine, 5 rays
Caudal fin Keel	2 smaller keels
Interpelvic process (between pelvic fins)	2 small flaps
Total weight	8.0 kg
Sex	Male
Stage	II
Stomach	Empty

Landing of giant sized Indian threadfin, *Leptomelanosoma indicum* (Shaw 1804) at Visakhapatnam Fishing Harbour, Andhra Pradesh

V. Uma Mahesh, M. V. Hanumantha Rao, M. Satish Kumar, P. Suresh Kumar
Shubhadeep Ghosh and G. Maheswarudu
Regional Centre of CMFRI, Visakhapatnam

Polynemids form less than 1% of total marine landings in India. Threadfins are highly esteemed as food fish and contribute about 0.41% towards the total marine fish landings in Andhra Pradesh (2001-2010) and are fished by gillnets, shore seines, ring seines and trawl nets. A giant sized Indian threadfin, *Leptomelanosoma indicum* (Shaw, 1804) was landed at Visakhapatnam Fishing Harbour on 11th December 2012 (Fig. 1a & b). Polynemids are locally called as “maga”. *L. indicum* measured 91cm

Fig. 1a & b. *Leptomelanosoma indicum* landed at Visakhapatnam Fishing Harbour

in total length and weighed 7 kg (Table 1) and was caught by mechanised trawler operated at depth of 70 m. The present record is the highest (both in length and weight) so far recorded from east coast of India.

Previous records of *L. indicum* landed at Mumbai (Karbhari *et al*., 1988) were 170 cm in total length and 50.08 kg in weight. Mohamed ((1955) observed fish of 142.3 cm in length and 27 kg in weight of this species. According to Kagwade (1968), length of *L. indicum* ranged from 84 to 110 cm with dominant size group at 91 – 100 cm.

Species description

The body is elongate and fusiform, the mouth small and inferior; a pointed snout projects far ahead. The jaws and palate possessed bands of villiform teeth, posterior margin of maxilla reaching to level of posterior margin of adipose eyelid. Spinous and soft dorsal fins widely separated, all pectoral-fin rays, except uppermost 2 unbranched. The most distinguishing feature of polynemids is that the pectoral fins have two distinct sections, the lower of which consists of five thread-like independent rays, uppermost not reaching to posterior tip of pectoral fin. Swim bladder present. Scales weakly ctenoid, extending onto head; scales covering most of dorsal, pectoral, anal and caudal fins; lateral line extending onto posterior margin of caudal fin, tri-segmental pterygiophores absent. Tail fins large and deeply

Table 1. Morphometric measurements of *Leptomelanosoma indicum* landed at Visakhapatnam Fishing Harbour

Morphometric/meristic characteristics	Measurement (cm)
Total length	91.0
Fork length	79.0
Standard length	72.5
Height of the body	25.7
Operculum length	21.0
Eye diameter	3.0
Head length	17.5
Length of first dorsal fin	17.0
Length of second dorsal fin	18.5
Length of pelvic fin	13.0
Length of pectoral fin	19.0
Length of pectoral filaments	17.5 (longest)
1st filament to 5th filament length	14.0 - 17.5
Length of anal fin	12.0
Length of caudal fin	21.0
Height of caudal fin	18.5
First dorsal spines	VIII spinesI
Second dorsal spines - rays	spine – 14 rays
Anal spines - rays	III spines – 12 rays
Pectoral fin rays	14 rays (all rays unbranched)
Pectoral filaments	5 pairs (fifth filament longest)
Pelvic fin spine - rays	I spine – 5 rays
Lateral line scales	74
Total weight	7.0 kg
Sex	Female
Maturity stage	VI – A

forked; indicating speed and agility. Head and upper sides of trunk tinged slightly blackish brown, snout and abdominal regions blackish; membranes of first and second dorsal fins and caudal fin blackish, distal part of these fins black; pectoral fin membrane deep black; origin of pectoral filaments dusky yellowish, grading to blackish posteriorly; pelvic-fin origin dusky yellowish and other parts dusky white.

Unusual heavy landings of dolphinfish, *Coryphaena hippurus* at Visakhapatnam Fishing Harbour

K. Ram Mohan, Shubhadeep Ghosh, M. V. Hanumantha Rao, V. Uma Mahesh and G. Maheswarudu
Regional Centre of CMFRI, Visakhapatnam

Heavy landing of the dolphinfish, *Coryphaena hippurus* was observed in hooks and lines at Visakhapatnam Fishing Harbour on 12th October, 2012 (Fig 1a & b) . Around 7,245 kg of *C. hippurus* was landed by 90 units on that day. This is the first instance of such huge landing of the dolphinfish at Visakhapatnam Fishing Harbor. In addition to *C. hippurus,* other species landed were *Thunnus albacares* (3717 kg), *Makaira indica* (1710 kg), *Megalaspis cordyla* (1692 kg), *Euthynnus affinis* (1170 kg), *Katsuwonus pelamis* (828 kg) and *Scomberomorus guttatus* (351 kg). On an average 30 to 40 fishes were landed by each catamaran operating hooks and lines. The catamarans sailed out at 03 00 hrs in the morning and landed their catch by 17 00 hrs in the evening. Fishing ground was southward near to Pudimadaka. Different length classes ranging from 400 to 919 mm were observed in the catch. Several modes were observed in the length frequency distribution. The primary mode was at 590 mm and the secondary modes were at 709 and 499 mm which perhaps may represent individual cohorts in different age groups. Few females in the higher length classes were found to be mature with fecundity ranging from 329540 to 1357007 and ova diameter varying from 0.68 to 1.27 mm. In many of the individuals, carangids were found to be the most preferred food item with an index of relative importance (IRI) of 47.4% (*Decapterus* – 26.9%, *Selar* – 9.2% and other carangids – 11.3%), followed by *Auxis thazard* (IRI of 13.8%) and *Remora remora* (IRI of 13.3%). Gastropods in substantial quantities and digested matter were also encountered in the stomachs. *C. hippurus* was sold at a price ranging from ₹ 70 – 80 per kg. The total revenue earned from sale on the single given day amounted to ₹ 5,43,375/-.

Fig. 1a & b. Dolphinfish landed by hooks and lines at Visakhapatnam Fishing Harbour

Heavy landings of the shortfin mako shark, *Isurus oxyrinchus* at Cochin Fisheries Harbour

K. S. Sobhana, P. K. Seetha, T. G. Kishore, D. D. Divya, T. M. Najmudeen, Rekha J. Nair, Shoba Joe Kizhakudan and P. U. Zacharia
Central Marine Fisheries Research Institute, Kochi

During January - February 2013, heavy landings of the shortfin mako shark *Isurus oxyrinchus* (Family: Lamnidae) by multiday gillnet-hooks and line units were observed at Cochin Fisheries harbour (CFH) (Fig. 1a & b). *I. oxyrinchus* is generally seen in the landings by gillnet-hooks and line units (operated off the west coast of India extending from Kerala to Gujarat coasts) at CFH, but in small numbers of larger specimens. The start of 2013 fishing season witnessed heavy landings of this species, of a wide size range (100 – 220 cm total length; 7 – 75 kg weight), dominating the shark landings at CFH second to *Carcharhinus falciformis* on certain days. The length-frequency distribution as well as detailed biological aspects of this species is currently being studied as part of the Institute research project on "Assessment of elasmobranch resources of Indian Seas".

The shortfin mako is a fairly large species of shark, an average adult specimen measuring around 3.2 m in length and 60–135 kg in weight, with females being larger than males. The body is brilliant metallic blue dorsally and white ventrally, with distinct line of demarcation between blue and white on the body. The shortfin mako inhabits offshore temperate and tropical seas worldwide. It is a pelagic species that can be found from the surface down to depths of 150 m, normally far from land, though occasionally seen closer to shore around islands or inlets. The shortfin mako is the fastest species of shark and is highly migratory.

I. oxyrinchus feeds mainly on cephalopods, bony fishes including mackerels, tunas, swordfish and may also eat other sharks, porpoises, sea turtles, and seabirds. This is an ovoviviparous shark species, giving birth to live young ones. The species is listed as Vulnerable in the IUCN Red list. In 2010, Greenpeace International added the shortfin mako shark to its seafood red list, a list of fish that are commonly sold in supermarkets around the world, and which have a very high risk of being sourced from unsustainable fisheries. In 2010, the Convention on Migratory Species (CMS) also added the shortfin mako shark to Annex I of its Migratory Sharks MoU.

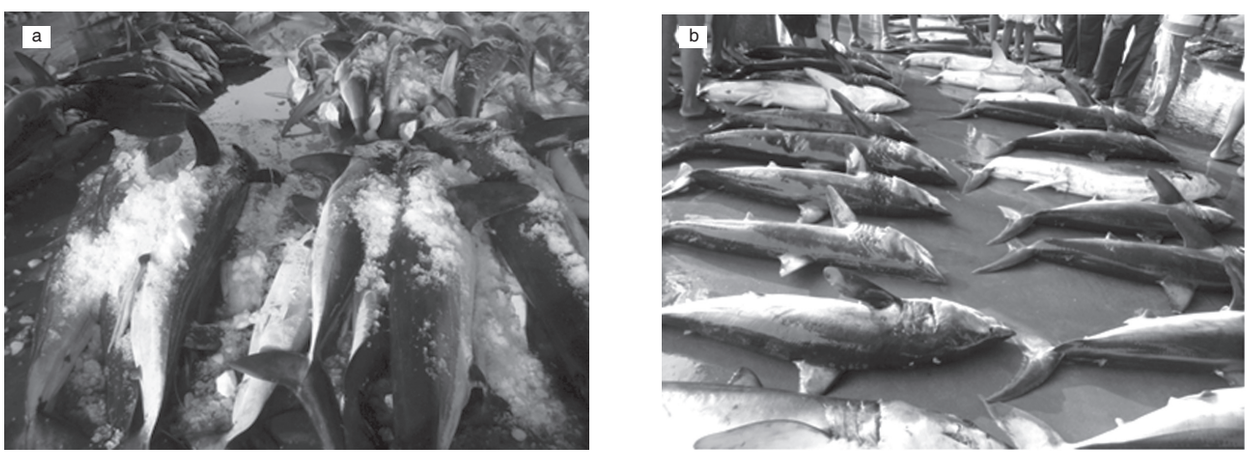

Fig. 1a & b. *Isurus oxyrinchus* landed at Cochin Fisheries Harbour

The rare bluntnose sixgill shark *Hexanchus griseus* landed at Sakthikulangara Fisheries Harbour, Kollam

Sijo Paul
Central Marine Fisheries Research Institute, Kochi

On 15th November 2012, a single specimen of the bluntnose sixgill shark, *Hexanchus griseus* was landed at Sakthikulangara Fisheries Harbour by a deepsea trawler (Fig. 1 and 2). The shark was caught at a depth of 300 m west of Kollam coast

The shark weighing 7 kg had six prominent gill slits, fluorescent bluish green eyes, broad head, rounded snout and blade like teeth (Fig. 3). The detailed morphometric measurements recorded are as follows:

Fig. 1. *Hexanchus griseus* landed at Sakthikulangara Fisheries Harbour (dorsal view)

Fig. 2. *Hexanchus griseus* landed at Sakthikulangara Fisheries Harbour (ventral view)

Fig. 3. Blade like teeth of *Hexanchus griseus* landed at Sakthikulangara Fisheries Harbour

Morohometric parameters (cm)		
Total length	-	138
Standard length	-	94
Tail length	-	44
Eye diameter	-	3
Body depth at 1st dorsal fin origin	-	14
Body depth at 6th gill	-	33
Snout to 1st dorsal fin origin distance	-	77
Snout to eye distance	-	8
Snout to pectoral fin origin distance	-	23
Snout to anal fin origin distance	-	63
Length of mouth	-	27
Inter- orbital length	-	10

Unusual landing of the whitetip reef shark *Triaenodon obesus* at Cochin Fisheries Harbour

K. S. Sobhana, P. K. Seetha, T. G. Kishore, D. D. Divya, T. M. Najmudeen, Rekha J. Nair, Shoba Joe Kizhakudan and P. U. Zacharia
Central Marine Fisheries Research Institute, Kochi

On 28th January 2013, unusual landing of the white tip reef shark, *Triaenodon obesus* (Family : Carcharhinidae) was observed at Cochin Fisheries Harbour (CFH) (Fig. 1a & b). About 500 kg of the

sharks in the length range of 90 – 110 cm and weight range of 2 - 8 kg were landed by gillnetters operated off Mangalore coast at a depth of 30 m. This species is occasionally seen in stray numbers in landings by mechanised gillnet-hooks and line units and this is the first time bulk landing of this species was observed at CFH.

T. obesus, the only member of its genus, is a small shark usually not exceeding 1.6 m in length. This species is easily recognisable by its slender body and short but broad head, tubular skin flaps beside the nostrils, and white-tipped dorsal and caudal fins. The white tip reef shark is distributed widely across the entire Indo-Pacific region. Associated almost exclusively with coral reef habitats, this species is most common at a depth of 8–40 m and is typically found on or near the bottom in clear waters, This is a viviparous species, feeds mainly on bony fishes, as well as octopus, spiny lobsters and crabs. The IUCN has assessed the whitetip reef shark as Near Threatened, noting its numbers are dwindling due to increasing levels of unregulated fishing activity across its range. The slow reproductive rate and limited habitat preferences of this species renders its populations vulnerable to overfishing.

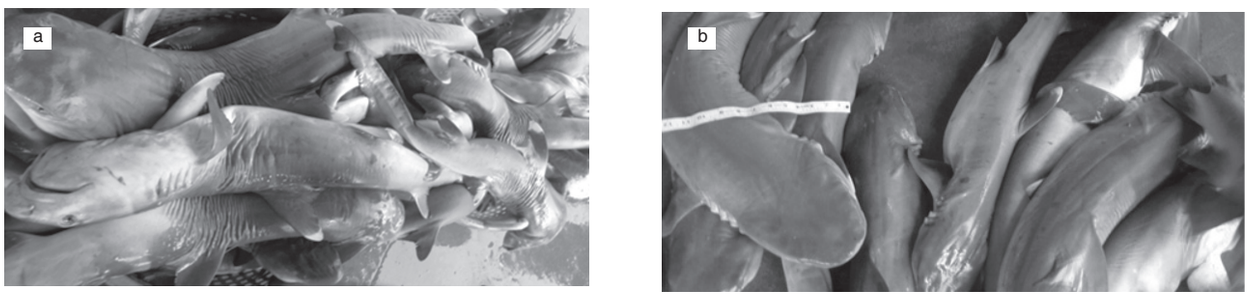

Fig. 1a & b. *Triaenodon obesus* landed at Cochin Fisheries Harbour

Unusual landing of the rare penaeid shrimp *Metapenaeus lysianassa* at Karaikkal, south-east coast of india

Indira Divipala and P. Thirumilu
Research Centre of CMFRI, Chennai

The "bird shrimp" *Metapenaeus lysianassa* (De Man, 1888), (*Kuni era* in Tamil) has been recorded in stray numbers from Mandapam in Gulf of Mannar, Palk Bay, Nagapatinam, Cuddalore, Chennai, Machilipatnam, Kakinada, Visakhapatnam, Paradeep, Sandheads and Andamans. The species is known to attain a maximum size of 55 mm and 90 mm in total length for male and female respectively. On 1st september 2012, while observing the trawl landings at Karaikkal Fisheries Harbour, about 50 kg of *M. lysianassa* (Fig. 1 and 2) was noticed among the shrimp catch (total 60 kg) landed by one of the trawlers. The other species in the order of abundance were *Fenneroppenaeus indicus, Penaeus semisulcatus, Metapenaeus*

Fig. 1. *Metapenaeus lysianassa* landed at Karaikkal Fisheries Harbour

Fig. 2. Largest female of *M. lysianassa* collected at Karaikkal

dobsoni, Parapenaeopsis maxillipedo and *Solenocera crassicornis*. On the day of observation, totally 25 trawlers were operated. In the rest of trawlers, 2 to 4 kg of *M. lysianassa* were caught. The size range (total length) for male and female was 63 - 78 mm and 55 - 95 mm respectively. The male and female sex ratio was 1:4.

Rare occurrence of two stomatopod species from Chennai coast

Indira Divipala and P. Thirumilu
Research Centre of CMFRI, Chennai

A total of 37 species of stomatopods belonging to the family Squillidae are known to occur in the seas around India of which, 17 species are recorded from Chennai coast. While observing the routine trawl landings at Kasimedu Fisheries Harbour, on 20th September 2012, two specimens of stomatopods, which differed from the usual species landed were collected (Fig. 1 & 2). On close examination, they were identified as *Carcinosquilla multicarinata* (White, 1848) and *Clorida latreillei* (Eydoux & Souleyet, 1841). The total length of the former species was 105 mm and the latter 96 mm. Both the specimens were females and hauled from a depth of 40 m off Chennai.

Fig. 1. *Carcinosquilla multicarinata*

Fig. 2. *Clorida latreillei*

C. multicarinata is characterised by several longitudinal carinae on carapace, abdomen and telson and has been recorded earlier from Sand Heads, Parangipettai, Pamban and Mandapam and now from Chennai coast. *C. latreillei* is with a larger teeth on either side of telson and reported from Mumbai, Sundarbans, Chennai and Parangipettai.

Record size black marlin, *Makaira indica* (Cuvier, 1832) landed at Bhimilipatnam, Andhra Pradesh

K. Ram Mohan and M. V. Hanumantha Rao
Regional Centre of CMFRI, Visakhapatnam

A gigantic black marlin, *Makaira indica* measuring 4.3 m in length and weighing around 450 kg was landed at Bhimilipatnam beach landing centre and brought to Visakhapatnam Fishing Harbour on

12th December, 2012 for auction (Fig. 1 and 2) . The fish was caught in FRP outboard motorised craft operating hooks and lines. The fishing ground was north off Visakhapatnam. Biological investigations revealed the marlin to be a male with stomach in half full condition. The fish was auctioned for a price of ₹ 35,000/-

Fig. 1. Large sized black marlin landed at Bhimilipatnam

Fig. 2. Black marlin being cut in to pieces for easy transportation to Chennai market

First report of *Lagocephalus sceleratus* (Gmelin, 1789) from Kollam coast

Sijo Paul
Central Marine Fisheries Research Institute, Kochi

A single specimen of the silver cheeked toad fish, *Lagocephalus sceleratus* was noticed among the catch of *Lagocephalus* spp. landed by a trawler at Neendakara Fishing Harbour on 17th November, 2012 (Fig. 1a & b). The specimen had a total length of 35 cm which was caught at a depth of 60 m off Kollam. The fish belonging to the family Tetraodontidae, has black spots on the upper dorsal side with a green background colour, belly white, silver blotch in front of the eyes and pectoral base black in colour.

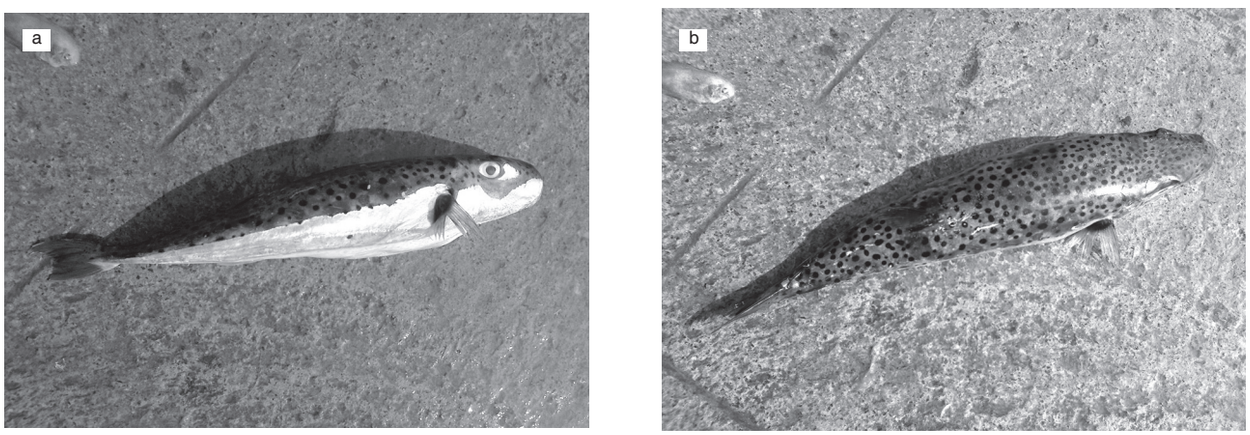

Fig. 1a & b. *Lagocephalus sceleratus* landed at Neendakara Fishing Harbour

Unusual landing of the spotted ocean triggerfish *Canthidermis maculata* at Cochin Fisheries Harbour

K. S. Sobhana, P. K. Seetha, T. G. Kishore, D. D. Divya, S. Dineshkumar, T. M. Najmudeen, Rekha J. Nair and P. U. Zacharia
Central Marine Fisheries Research Institute, Kochi

Unusual landing of the ocean triggerfish *Canthidermis maculata* (Family: Balistidae) was observed at Cochin Fisheries Harbour (CFH) on 11th January 2013 (Fig 1a & b). About 300 kg of fishes were landed in gillnet operated off Cochin at a depth of 20- 30 m. The species is occasionally seen in stray numbers in trawl landings at CFH and this is for the first time a landing of this magnitude is observed at CFH. The fishes were sold at the landing centre @ ₹ 30 – 40/- per kg for local consumption.

The species has a circumglobal distribution except for Mediterannian and Western Pacific and inhabits shallow coastal and offshore waters. It is epipelagic nearly all throughout life, often associated with drifting objects and may occur in deep rocky slopes. The species appear to school in large numbers.

From the catch landed at CFH, fishes were randomly sampled and brought to the laboratory and measured for total length as well as body weight and also analysed for maturity stage and gut contents. The fishes ranged between 290 – 375 mm in total length and between 0.5 – 1.1 kg in weight. In all the fishes examined, the stomach had very little amount of digested fish remains. Both male and female fishes examined were in the fully mature or spent condition.

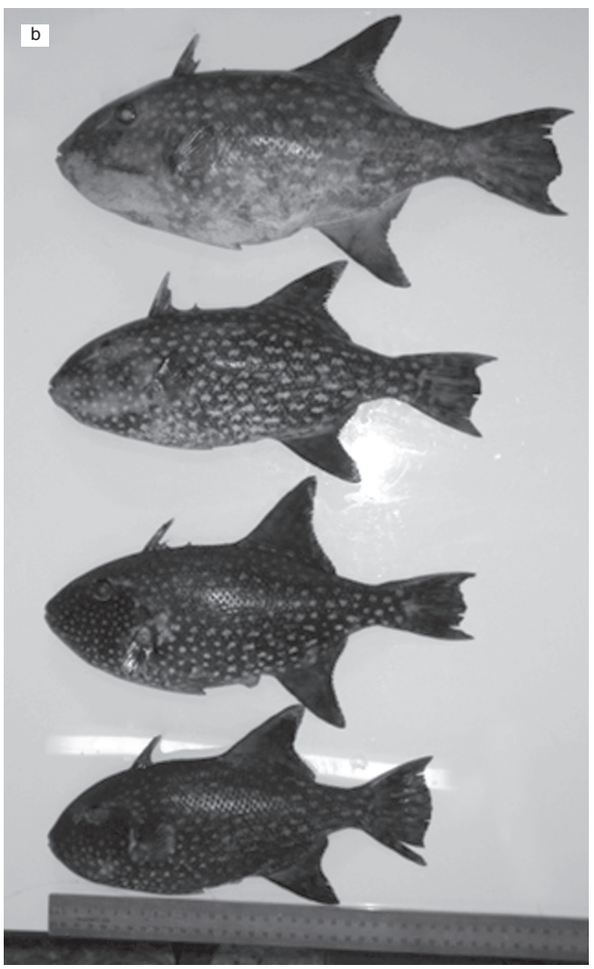

Fig. 1a & b. *Canthidermis maculata* landed at Cochin Fisheries Harbour

Unusual landing of ghol, *Protonibea diacanthus* by purse seine operation at Rewas-Bodni landing centre in Raigad District, Maharashtra

Ramesh B. Rao
Field Centre of CMFRI, Alibag

On 2nd January 2013, about 20 tonnes of ghol, *Protonibea diacanthus* were landed by a purse seiner (99.27 HP) at Rewas-Bodni landing centre in Raigad District (Fig. 1a & b). It was a single day operation with 12 crew members. The fishing ground was at 30 – 40 m depth north-west off the landing centre. The catch comprised 1190 fishes in the weight range of 15 - 18 kg and length 120 – 150 cm. The catch was sold at Sassoon Docks, Mumbai and fetched ₹ 3.45 crores.

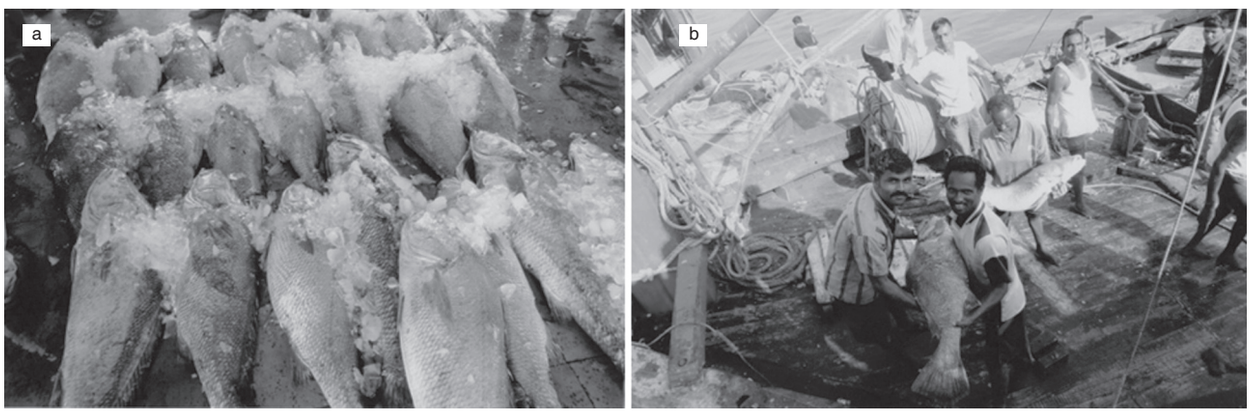

Fig. 1a & b. *Protonibea diacanthus* landed by purse seiner at Rewas-Bodni landing centre

Heavy landing of *Sardinella longiceps* and *Sardinella fimbriata* at Rajiwada landing centre, Ratnagiri

K. R. Mainkar
Field Centre of CMFRI, Ratnagiri

On 5th April 2011, bumper landings of *Sardinella longiceps* and *Sardinella fimbriata* were recorded at Rajwada landing centre in Ratnagiri. The cantch were landed by mini purse seines operated from two crafts with outboard engine (COB) (Fig. 1 and 2), which normally land around 25 – 200 kg of sardines. The details of catch landed by the two COB's on 5th April 2011 are given in Table 1.

Fig. 1. COB 1 loaded with *Sardinella longiceps* and *Sardinella fimbriata*

Fig. 2. COB 2 loaded with *Sardinella longiceps* and *Sardinella fimbriata*

Table 1. Details of landings by the two vessels at Rajwada landing centre on 5th April 2011

Species	Catch (kg)	
	COB 1 (overall length - 7.5 m)	COB 2 (overall length - 7.2 m)
Sardinella longiceps	1200	1300
Sardinella fimbriata	1000	800

The vessels (COB 1 and 2) set out for fishing at 07 00 hrs and 07 30 hrs respectively, with 4 crew members each and operated 9 km north-west off Ratnagiri at 15 m depth. Actual fishing hours lasted for 4-5 h.

Oilsardine (*Sardinella longiceps*) landings by mini purse seiners at Jiwna and Bharadkhol-Divegar landing centres in Raigad District, Maharashtra

Ramesh B. Rao
Field Centre of CMFRI, Alibag

During the months of October 2012 to February 2013, about 80 – 100 gillnetters (24 to 45 HP, 2 to 3 cylinder boats) were engaged in mini purse seine operation and landed bumper catches of the oilsardine, *Sardinella longiceps* at Jiwna and Bharadkhol-Divegar landing centres in Raigad District (Fig. 1). Around 3 to 5 t of oilsardine were landed in single day operations. The fishing ground was about 10 to 15 km north-west off Jiwna landing centre at 8 to 15 m depth. During this season (October-February) every year, when the catch in other gears is poor, fishermen engage in mini purse seine operation and earn fairly good income from this.

Fig. 1. *Sardinella longiceps* landed in mini purse seine at Jiwna landing centre

Heavy landing of *Trichiurus lepturus* by gillnets (tyanijal) at Wairi landing centre in Sindhudurg District, Maharashtra

Bashir Ahmed Adam Shiledar
Field Centre of CMFRI, Ratnagiri

Trichiurus lepturus is one of the commercially important species caught by tyanijal (gillnet) along the coast of Sindhudurg District during the beginning of the fishing season *i.e.*, during September to

October. On 12th October 2012, heavy landings of *T. lepturus* (Fig. 1) was recorded by tyanijal operated from fibre boats, with an average of 200 – 380 kg per boat along with *Rastrelliger kanagurta* (on an average 20 – 50 kg per boat). A toal of 36 units were landed on the same day.

The fish were caught at a depth of 24 m off Wairi and the boats operated between 02 00 to 02 30 hrs, did only a single haul with 3 – 4 crew members and landed between 08 00 to 09 30 hrs. The nets used had a mesh size of 55 mm, made of plastic monofilament having a total length of 700 – 900 m and breadth of 14 – 16 m. The fishes were sold at the landing centre at the rate of ₹ 100/- per kg.

Fig. 1. *Trichiurus lepturus* landed at Wairi landing centre

On the same day, heavy landings of *T. lepturus* was also reported from Dandi landing centre, which is very close to Wairi landing centre. Such a heavy landing of *T. lepturus* is recorded after a gap of about 3 years along the Sindhudurg coast.

Unusual heavy landing of *Penaeus merguiensis* at Jiwna landing centre in Raigad District, Maharashtra

Ramesh B. Rao
Field Centre of CMFRI, Alibag

On 12th February 2013, about 20 – 30 kg each of *Penaeus merguiensis* were landed by 53 trawlers operating from Jiwna landing centre in Raigad District. The trawlers operated (2 days trip) at a depth of 20 m about 10 km south-west off Jiwna. Generally trawl net operations in this region land more of *Prapenaeopsis stylifera* and *Metapenaeus affinis* and do not land much quantity of *P. Merguiensis.* During the month of February 2013, there was marginal decrease in the landings of *P. stylifera*and *M. affinis* when *P. merguiensis* recorded increased landings. The price of *P. Merguiensis* at the landing centre ranged from ₹ 400 to 460/- per kg.

Green mussel (*Perna viridis*) fishing at Rajiwada, Ratnagiri

D. Sawant
Field Centre of CMFRI, Ratnagiri

During the months of December and January, fishery for live green mussels (*Perna viridis*) (Fig. 1) is observed along the coast of Rajiwada in Ratnagiri. Small non-mechanised crafts (locally known as *pagar*) having overall length of 4 – 5 m, with two crew members are engaged in this fishing activity. The live mussels were collected by diving at a depth of upto 3 - 4 m in the area of mussel beds (under Rajwade bridge). The fishing operation lasts for about one hour. The fishing is generally carried out in the morning from 70 00 hrs

Fig. 1. *Perna viridis* collected at Rajiwada, Ratnagiri

to 09 00 hrs and in the evening during 16 00 hrs to 17 00 hrs. The total catch ranges from 100 – 150 kg per day during peak season. The lengh of *P. viridis* caught ranges from 10 to 13 cm. These mussels are kept alive in netbags immersed in water for about 4 to 5 days and sold in local market, @ ₹ 100 - 120 per dozen.

Fishing activity affected by swarming of jellyfish along the Sindhudurg coast of Maharashtra

Bashir Ahmed Adam Shiledar
Field Centre of CMFRI, Ratnagiri

Unusual heavy swarming of jellyfishes were noticed along the Sindhudurg coast of Maharashtra during the months of October and November 2012. The jellyfishes, locally known as zhar/belaka, had dark yellowish gelatinous umbrella shaped bell and trailing tentacles. On 6th November 2012, a total of 1000 kg of jellyfishes were landed in two rampan (shore seine) operations along with oilsardine (Fig. 1). Rampan as well as gillnet operations were severely affected due to these blooms damaging the nets, and the fishing activity by these gears almost came to a standstill on certain days. Though jellyfishes generally occur along this area in small numbers, during October-November 2012, thousands of jellyfishes were observed in the fishing area of rampan and gillnets, upto a depth of 35 m.

Fig. 1. Jellyfish landed in rampan operation

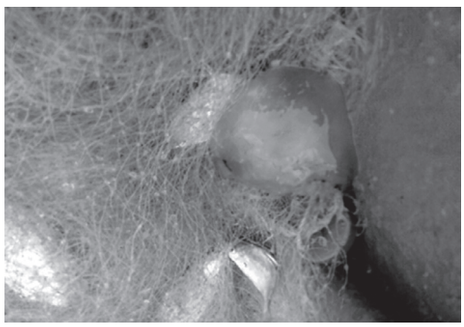

Fig. 2. Jellyfish entangled in gillnet

Green turtle, *Chelonia mydas* stranded at Malvan, Maharashtra

Sujit Sundaram and Sushant Mane
Research Centre of CMFRI, Mumbai

Sea turtles are found all along the coast of India and five species of sea turtles are reported from Maharashtra *viz., Dermochelys coriacea* (Leatherback turtle), *Eretmochelys imbricata* (Hawksbill turtle), *Chelonia mydas* (Green turtle), *Lepidochelys olivacea* (Olive ridley) and *Caretta caretta* (Loggerhead turtle).

On 25th January 2013, a green turtle *Chelonia mydas* was observed stranded at Chivala beach, Malvan, Maharashtra (Fig. 1). It is locally known as

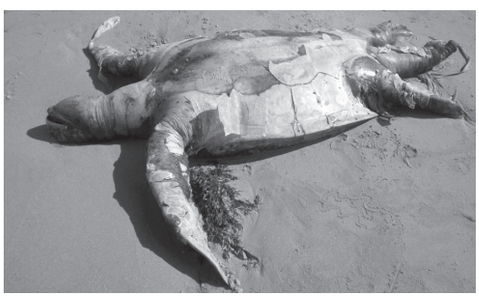

Fig. 1. Carcass of *Chelonia mydas* standed at Malvan

'hirwa kasav'. The turtle measured 90 cm and weighed approximately 85 kg. The carcass was in a state of heavy decomposition. The local fishermen buried the carcass on the beach. Green turtles are known to nest at Ratnagiri, Alibag and Dahanu along the coast of Maharashtra.

There are reports on the accidental stranding and inadvertent landings of marine turtles along the Maharashtra coast, the details of which are provided in Table 1.

In India, live sea turtles especially *C. mydas* which is primarily a herbivore feeding on several species of sea grass is considered as an incarnation of Lord Vishnu and if accidentally caught are usually released back into the sea by the local fishermen. This practice based on religious grounds, goes a long way in the conservational measures of turtles. *C. mydas* is categorised as endangered in the IUCN Red List (IUCN, 2002) and are included in Schedule I of Indian Wild Life (Protection) Act, 1972.

Turtles are under severe threat from fishery related mortality, destruction of eggs and other threats related to development. The major methods to implement management strategies to conserve turtles are modification of shrimp gear such as incorporation of turtle exclusion device (TED), protection of nesting beaches, legislative regulations and public education.

Table 1. Instances of turtle landings along the coast of Maharashtra

Author	Year	Month	Place	Species	Sex	Carapace length (cm)	Weight (kg)	Mode of capture
Karbhari	1981	September	Mumbai	Hawksbill turtle	F	78.3	80.0	Gillnet
Karbhari	1985	April	Dev Bag	Leatherback turtle	—	149.8	100.0	Gillnet
Karbhari *et al.*	1984	April	Mumbai	Olive ridley turtle	M	63.0	48.0	Trawl net
Karbhari *et al.*	1984	September	Vasai	Olive ridley turtle	F	75.0	54.5	Bagnet
Karbhari *et al.*	1985	December	Pawas	Green turtle	M	51.2	38.0	Trawl net
Karbhari *et al.*	1984	April	Vasai	Green turtle	F	66.5	42.8	Bag net
Katkar	1988	April	Ratnagiri	Olive ridley turtle	—	60.0	25.5	Gillnet
Hotagi	1991	May	Bassien Koliwada	Olive ridley turtle	M	68.5	34.8	Bagnet
Katkar	1995	November	Ratnagiri	Olive ridley turtle	—	64.0	30.0	Hook and lines
Jadhav	1996	May	Janjira Murud	Olive ridley turtle	—	71.0	56.0	Stranded
Sujit Sundaram	2008	June	Mumbai	Olive ridley turtle	—	50.5	20	Stranded
and Josekutty	"	June	Mumbai	Olive ridley turtle	—	54.0	27	Hook and lines
	"	July	Mumbai	Olive ridley turtle	—	75.0	49	Stranded
Present report	2009	January	Malvan	Green turtle	—	95.0	80	Stranded

Sperm whale stranded near Talashil landing centre of Maharashtra coast

Bashir Ahmed Adam Shiledar
Field Centre of CMFRI, Ratnagiri

On 14th September 2012, a sperm whale *Physeter macrocephalus* was found stranded in dead condition near Talashil landing centre along the coast of Maharashtra (Fig. 1a & b). The whale (locally called 'tive') measured 13.7 m in total length with a body depth of 1.2 m (in the middle region of the body). The carcass was in semidecomposed condition and was buried in the seashore with the help of JCB machine in the presence of Forest Department officials.

Fig. 1a & b. Sperm whale stranded near Talashil landing centre of Maharashtra coast

Marine Fisheries Information Service

Fish drying onboard fishing trawler