

Some Indigenous Fishing Gears and Methods for Squids & Cuttle Fishes along S. W. Coast of India

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Cephalopods have shot into prominence as an important export commodity and the outlook is definitely in favour of further growth. To keep pace with this surge in commercial activities, an intensification of the exploitation of known resources by a redeployment of the existing gears and crafts is the need of the hour. Efficient indigenous fishing gears which are the outcome of long tradition and perfected by trial and error over a long period are in existence for several fisheries all along India's coastline. Though squids and cuttle fishes are landed as bye catch in several common gears, hook and line and its variations are used exclusively aiming squids and cuttle fishes as target species and contribute to lion's share of landings in South-west coast of India. An account of some indigenous gears and methods employed in exploiting squids and cuttle fishes along South-west coast of India is furnished here.

Efficient indigenous fishing gears which are the outcome of long tradition and personal experience and perfected by trial and error over a long period are in existence all along India's coast line. The array of such gears which stand out as testimony to the ingenuity of artisanal fishermen is rather bewildering. Their diversity stems from inequalities in possession of capital for investment and definite local preferences and consequently certain types of fishing gears predominate certain stretch of coastline. With all the money that

has been pumped into mechanised fishing over years both by Government and private entrepreneurs, the truth that 65% of the total fish production in the country is contributed by traditional crafts and gears of artisanal fishermen is a fact to be reckoned with. A study has indicated that the productivity, profitability and objective contributions to national economy of fishing units of artisanal types are on an average as good as or better than those of mechanised vessels - though the same cannot be said of the earnings of individual

fishermen (John Kurien & Rolf Willman 1982).

FISHERY OF SQUIDS AND CUTTLE FISHES

There is paucity of information regarding the potential cephalopod resources of the country. The known stock of squids and cuttle fishes are within our inshore waters, the present exploitation being confined to 45 m depth. The biomass of reported stock of oceanic squids is still without definite quantification in terms of space and time. From 93 tonnes in 1961, the cephalopod production in the country has recorded many fold increase. The estimated annual cephalopod production in India during 1978, 1979, 1980 was 15931, 15032 and 11335 tonnes respectively. *Loligo duvaucelli* is the most important species of squids caught by hook and line followed by *Doryteuthis singhalensis*. Important species of cuttle fish landed in S. W. coast of India is *Sepia pharaonis* while *Sepioteuthis lessoniana* is caught by hand jigs in Ramanathapuram district of Tamil Nadu. Other important species which constitute the fishery of this region are *S. aculeata*, *S. elliptica*, *S. piella intermis* (Luther *et al* 1982). *Symplectoteuthis ovalansiensis* is the species of oceanic squid reported to be fairly abundant in seas around India. 14% of this total landings is accounted for by hook and line, 60% by trawls, 13% by shore seines and 2% by dol nets (Silas *et al.* 1982). Though they are landed by different types of gears as 'bye catch', hook and line and its different versions are used exclusively aiming squids and cuttle

fishes as target species. In S. W. coast of India such gears account for lion's share of landings.

BAITS AND BEHAVIOUR RELEVANT TO FISHING

Bait is the single most crucial factor in these types of fishing compared to which other components like the types of gear or craft are of lesser consequences. Baits serve not only the purpose of attraction but also of indirectly impounding the organism. Habits of squids and cuttle fishes are to attach themselves to the bait organism with their tentacles and suckers while feeding, and cling to it till hauled up. The sizes of the hooks play only an insignificant role and hooks ranging from nos. 5 to 10 are used with equal success. Hooks often serve only the purpose of piercing the bait for attachment which is at times achieved by wooden splinters. Even lines without hooks are used; but bait is indispensable. Cuttle fish or squid do not devour the baits or hooks; but prefer to extract nutrients through the easily vulnerable softer parts of the body of bait organism like eyes etc. with help of the mouth surrounded by membraneous circular lip beset with many papillae and horny jaws.

The most successful bait is the live crab of the species *Neptunus sanguinolentus* present in the surf region. Hooks are attached almost on one tip of the pointed portion of the carapace which makes the live crab free to kick about in water, the movements of which attract the cuttle fishes. With broad carapace and protruding appendages, crabs

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offer several surfaces for attachment of many cuttle fishes at the same time. When cuttle fishes approach a live crab to prey upon, crab in turn catches them with its claws and holds them till they are hauled up. If cuttle fishes are the winners in the process of fight, they entwine the crab with tentacles and pedunculate suckers and open the abdomen held permanently flexed under the carapace and extract the nourishments including the gonads and deposits of fats through the groove in the thoracic sterna. Small specimens of sepia and loligo are also used as baits with high degree of success. Hooks are attached to the posterior tip of the body leaving the head and appendages free. They are first preyed upon from the head region especially the eyes. The target organisms attach themselves on different parts of the bait and sometimes one upon the other, enmasse. Another important bait is spiny lobster especially its head portion, which was being used extensively till their demand due to export increased. Hooks are struck on the head region in between the two antennules. Cuttle fish start feeding upon the head region. Several specimens are found attached to the carapace, tail and appendages of the spiny lobsters.

Several kinds of fishes are used as baits in this fishery like species of *Lactarius*, *Scianids*, *Sauridae*, *Caranx*, *Pellona*, *Silago*, *Trichiurus* and *Mureana*. Whenever large specimens are used they are cut into pieces and chunks of 30 g to 50 g are attached to hooks. Smaller fishes like *Apogon* and

Therapon etc. are put as a whole. In the case of fishes also cuttle fishes first feed upon the head portion especially the eyes and when cut pieces are attached, the hooks with head portion as the bait land more catch than other chunks of flesh.

In these parts, cuttle fish are landed during the period of August to January with peak being September to November. Peak landings of squids are recorded during March and September. Fishing for cuttle fish is carried out during day time and since they dwell close to the sea bottom the gear has to be operated as bottom drift. Fishing for squids is carried out during nights and since they congregate in surface or column waters, the fishing gear is operated as surface drift. Rarely during the months of August and September, it is possible to fish squids even during day time when they are believed to migrate up for enjoining the warmer surface waters. Fishing for squids is most successful during moonlit nights. Fishermen sometimes take advantage of lights from passing ships which gets reflected in water where squids congregate. Cuttle fish often occur as scattered individuals or in isolated groups of two or three in very shallow waters close to the shore. Squids are found generally in small shoals and a little farther from the shore.

TYPES OF GEARS

FISHING SPEAR

It resembles a hunting spear, metallic and rod shaped with a lance point at one end and an eyelet at

the other. It is used for fishing cuttle fishes, spiny lobsters and demersal perches. They are of two sizes; only the smaller one being usually employed for cuttle fishes. This measures 100 cm to 120 cm in length and 10 mm in diameter, with a pointed barb welded on to a side of the tip. Barb which forms the arrow head is 3 cm long and set at about 30° angle to the rod. A coil of rope is passed through the eye of the tackle which is kept twisted around the forearm while firmly holding the rod at its base at the time of fishing. The larger one is 200 cm in length and 1.5 cm in diameter with barb attached with help of a pin.

When an organism is located a fisherman dives down (skin diving), approaches the animal from its lateral side and strikes the arrow head into the body thereby arresting its movements. Such operations are carried out up to a depth of 15 m. This method is becoming obsolete since the catches landed are invariably injured and mutilated and some times not accepted by processors and also due to the risk involved in fishing.

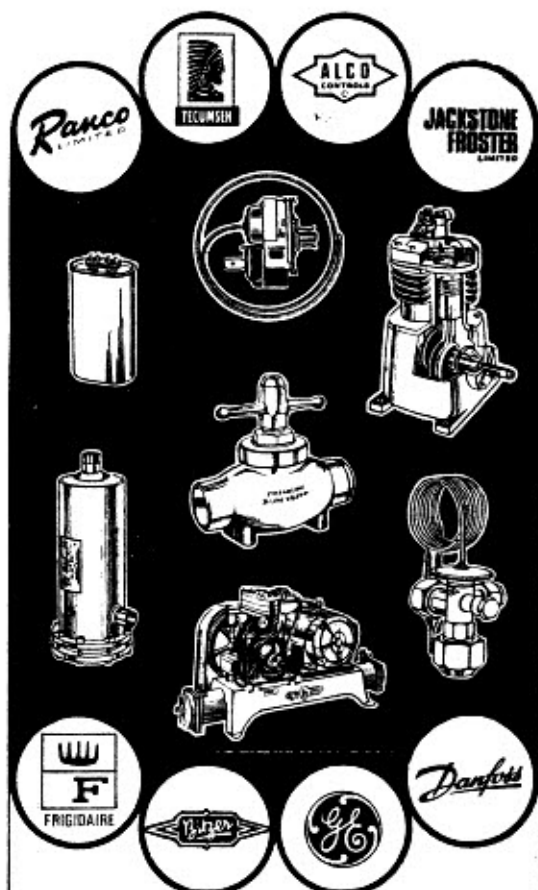
HAND LINES

This is the tackle widely employed by the local fishermen for catching squids and cuttle fishes in these parts and it consists of a barbed round bent sea hook no. 9 which is whipped to a nylon monofilament fishing line of 0.75 mm to 1.00 mm in diameter. Some times a second hook also is attached on the line, 150 cm above the first one. A piece of iron wire, 20 cm in length is tied to this end about 150 cm from

the second hook. This in turn is attached to a long nylon monofilament fishing line. An iron weight of 200 gm is attached from the middle of the wire to enable the line to sink to the bottom. If the underwater currents are very strong weight will be increased. Bait is attached to both the hooks. The gear continues to drift along the bottom while operated for cuttle fish. But in the case of squids they are operated as surface drift and no weight is added.

Fishing operations are carried out from a catamaran and after reaching the ground the baited hook is cast into the sea and the required length of the line is released. The line is held by the fishermen in their hands and two or three fishermen simultaneously conduct fishing from the same craft. When the 'bite' of the cuttle fish is felt on the line, it is hauled up at a fast steady pace and when the catch comes along side within the reach, the entire thing is scooped up with a scoop net. Cuttle fishes which are inclined to escape will release their grip on the line and disentangle themselves by the time the gear traverses up by 2 to 3 meters in water, after which they remain stuck to the gear till hauled up. When larger specimens of cuttle fishes are caught and it becomes inconvenient to collect them with scoopnet, a long pole with a large fish hook fixed at the tip is extended into the water and specimens collected with it. When large shoals of squids are encountered several small squids are used as baits and they are threaded on the fishing line with the help of hook in the form

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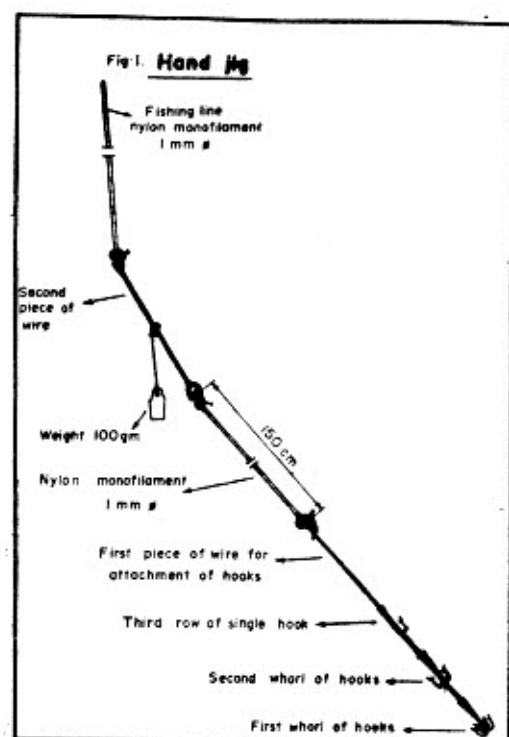
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of a ring and the whole artifice is thrown into the water. Squids are found to attach on all baits.

HAND JIGS

It was mentioned earlier that, while fishing with hand lines, cuttle fish sometimes releases its grip on the line and escapes after having been carried up by 2 to 3 meters. Under such conditions fishing with these locally fabricated multiple row hand jigs is successfully resorted to. Perhaps their vernacular name 'Nangooram' has its origin due to the shape of the gear which resembles that of a grapnel anchor.



The gear consists of two or three tiers of hooks attached in a whorl like fashion to a piece of wire of 30 cm length and 2 mm diameter

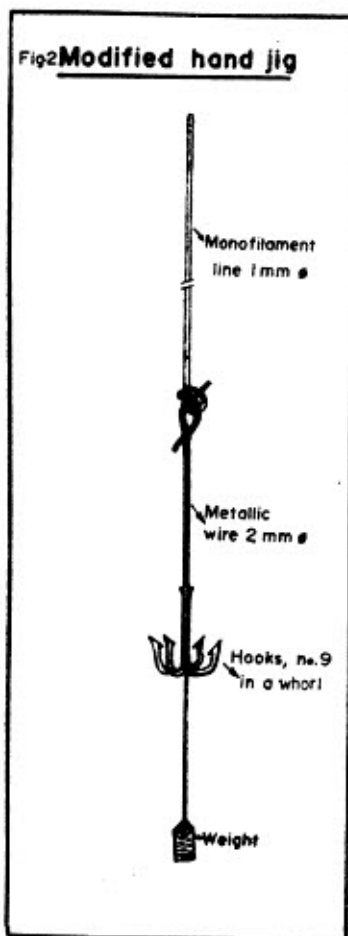
and its attachments. A row of 4 round bent sea hooks (nos. 7 to 9) are whipped to the lower extremity of the wire radially to form the first whorl. 5 cm above this is another row of two hooks attached in similar fashion. A single hook of the size 9 or 10 is attached another 8 cm above this to which the bait is stuck. Immediate reaction to stimuli of these organisms on being frightened, is to dart backwards and escape. The two lower tiers of hooks below the point of attachment of bait are provided taking this behaviour into consideration. The upper end of the wire piece is connected to a piece of nylon monofilament of 0.75 to 1.00 mm diameter and 150 cm length followed by another wire piece of 30 cm length. Fishing line long enough to operate the gear at required depth is connected to this with a suitable knot. An iron weight of 75 g to 100 g is tied to the middle of this second piece of wire. The use of this second piece of wire and attachment of weight on it is significant in that it also enables the jig to stay clear of the entanglements with the line.

This is operated during day time. Catamarans commence the fishing by sun rise, after collecting enough baits. Fishing lasts for two or three hours and 2 or 3 men conduct fishing simultaneously from the same craft. On reaching the ground, the baited gear is lowered to the sea bottom where cuttle fish abound with the line held in the hand. When the bite of the organism is felt on the line, it is first gently pulled up to few centimeters and after making

sure that the animal is within striking reach of the gear, it is pulled fiercely with a deft jerk of the hand when the animal gets hooked on lower tiers of hooks. The gear is then hauled up and catch collected with a scoop net.

MODIFIED HAND JIGS

A device which was introduced very recently, this has proved to be a more sure method of catching



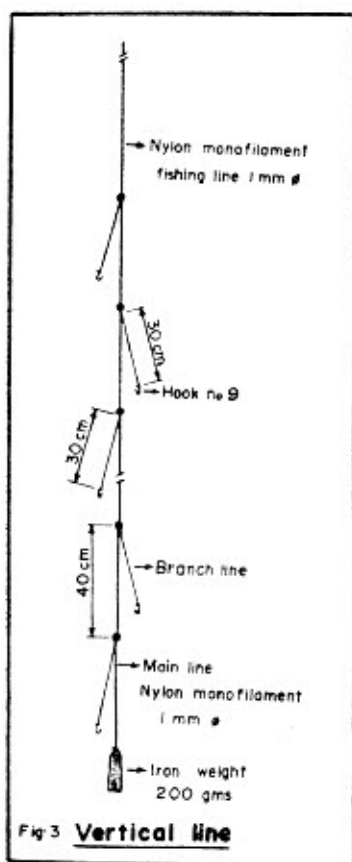
individual cuttle fish, since capture is attempted after locating the organism during day light and always keeping it within the sight. No bait is required.

Cuttle fish of the species *S. pharaonis* can be observed browsing about in very shallow waters close to the shore especially in spiny lobster fishing grounds along S. W. coast of India. After wearing a diving mask and dipping the head enough to submerge the front glass of the mask in water while sitting in the catamaran itself, cuttle fish and other organisms right within the vicinity of the craft upto a depth of 10 to 12 meters can be clearly spotted if water is clear and turbidity less.

The device consists of hooks of no. 9 arranged radially in a single whorl at the end of a metallic wire 15 cm to 20 cm in length and 2 mm in diameter in shape of a grapnel anchor. Attached to the same tip of the wire in between the hooks is an iron weight 75 g in weight, the function of which is to keep the line stretched perpendicularly downwards in water at the time of fishing. The jig so formed is attached to a nylon monofilament fishing line of 1 mm dia. When the animal is spotted, the tackle is lowered to the water and the line with the jig is brought close to it without disturbing the animal in the least. The unsuspecting organism appears to be unaware of the line closing in and when the jig portion comes almost below the body of the organism it is pulled up fiercely hooking the cuttle fish on the body. Each operation lands only one specimen. At times 12 to 15 cuttle fish weighing 2.5 to 3 kg each are landed on a single day by a single fisherman.

VERTICAL LINES

Vertical lines are being very successfully operated for a variety of fishes in S.W. coast of India. In the case of cuttle fishes they are very effectively employed during the months of September to November in grounds with rocky and uneven sea bottoms. Fishing with this gear is carried out upto a distance of 15 km at depths of 50 to 75 meters using catamaran. The gear is made of monofilament main line of 1 mm dia. kept vertically suspended in water with help of an iron weight of 200 g attached at the lowest end (Fig. 3). 5 to 15 branch lines



are connected to the main line one above the other at a distance of

40 cm apart. But when the shoal is dense and fishing operations very quick, more branch lines are attached closer to each other. The length of each branch line is 30 cm at the end of which a hook (no. 6 to 9) is secured. The length of the main line can be adjusted to suit different fishing depths. This gear in its usual form with artificial baits is locally called 'Attumattu' since it is kept always jerked up and down to lure the fishes. But while used for cuttle fishes, artificial baits are removed and natural baits attached and it is kept stationary without jerks and hence called "kai anchor" in some localities. The end of the line is kept coiled on to the large toes and hauled when the pull of the fish is felt on the line. Catch from each branch line is collected by scoop net separately. There is no fixed period between successive hauls, it being mainly dependent on the rate catching. This gear is not employed for squids but they are sometimes accidentally caught.

Vertical lines are particularly effective in areas where predation upon caught fish prevents the use of conventional bottom set long lines (David A. Olsen *et al.* 1974). The use of vertical lines enables the fishermen to concentrate their efforts on highly discontinuous schools. It also permits small boats to maintain mobility on fishing grounds. Number of units can be easily multiplied by suspending several lines separately using floats and anchors.

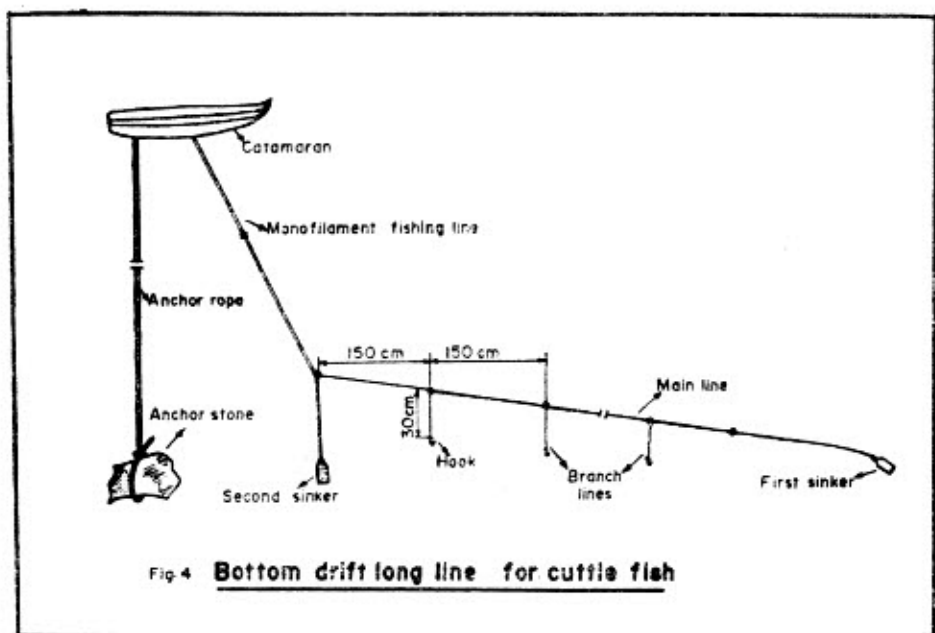
LONG LINES

Cuttle fish forms incidental catch in conventional long lines of this region

known as 'Kochu mattu' when they attach themselves to the body of the fishes that are already hooked. But a long line gear exclusively for cuttle fish also is fabricated and operated in some localities (Fig. 4). This is operated as bottom drift on flat grounds with sandy bottom where cuttle fish congregate for breeding. Non mechanised catamarans operate this gear upto a depth of 60 to 70 m at a distance of 15 to 20 km from the shore; a few boats with outboard motors carry out fishing in still deeper waters.

no. 6 to 9) is tied. Some fishermen attach a second sinker with a line at a distance of 100 cm from the last branch line. The end of the main line remains tied to the craft.

On reaching the ground the first sinker is lowered into the sea followed by proportionate length of the main line, and corresponding branch line with baited hook. After the last branch line and the sinker are launched into the sea, craft lowers its anchor. At the time of fishing the hooks and branch lines remain



Main line is of Nylon monofilament 1 mm dia. at the seaward end of which an iron sinker of 200 g is attached with the help of a lead line. Above this a maximum number of 25 branch lines are attached at a distance of 125 cm to 150 cm apart. The length of the branch line is 30 cm at the end of which a hook (varying from

suspended slightly off the bottom and the craft with the gear continue to drift along with current. Bite or the pull of the cuttle fish will not be always perceived on the line in this case and as such the gear is periodically hauled at an interval of 20 to 30 minutes. While fishing for squids sinkers are not used so

as to allow the gear to drift in top layers. Crafts also do not lower the anchor; but remain adrift in this case.

CONCLUSION

Cephalopods have almost suddenly shot into prominence as an important export commodity and the outlook is definitely in favour of further growth. To keep pace with this surge in commercial activities, an increase in landings by intensifying the exploitation of known resources by a redeployment of existing crafts and gears and methods of fishing is the need of the hour. These methods are low energy and less capital intensive and can be modified to suit different fishing conditions.

Some of the indigenous fishing gears and methods with slight modifications can be operated successfully from mechanised boats. Commercial feasibility of such operations are never in doubt. All these gears are inexpensive and easily fabricated. Combined with a cheap echosounder to locate the ground they can be employed successfully for intensifying the exploitation of squids and cuttle fishes and increase landings. Vertical lines especially hold out great promise as a very suitable gear in this context.

In tropical waters where biological communities tend to be extremely diverse, fishing gear must be able to capture a variety of species to be effective. A characteristic feature of most of tropical fisheries is a strong reliance on the small craft. In a survey in south Pacific, Clutter

(1971) found this to be the general case. Recent fishery developments within that area has concentrated on improving this unit of fishing gear rather than introducing new levels of technology. Development must find ways of maximising and diversifying the catching ability of basic unit of gear (David A. Olsen 1974).

In such nonconventional resources like cephalopods the need is for evolving methods for economically exploiting them by planned diversification of the fishing effort. The experience of some foreign countries show that the business of squid fishing on a large scale with vessels of say 2000-3000 GRT does not pay unless it also aims at catching other fishes (Hotta 1982). Our projected exploitable deep sea cephalopod resources is that of squids and for cuttle fishes we have to continue to concentrate on inshore waters. Squids caught from distant waters are bound to be two to three times costlier than those landed by traditional methods or by small scale sector. At any rate it would take some time before deep sea squid industry comes to play an important role in national fisheries.

ACKNOWLEDGEMENTS

The author is thankful to Dr. C. C. Panduranga Rao, Director and Shri V. C. George, Head of Fishing Gear Division of Central Institute of Fisheries Technology for all the encouragements.

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