

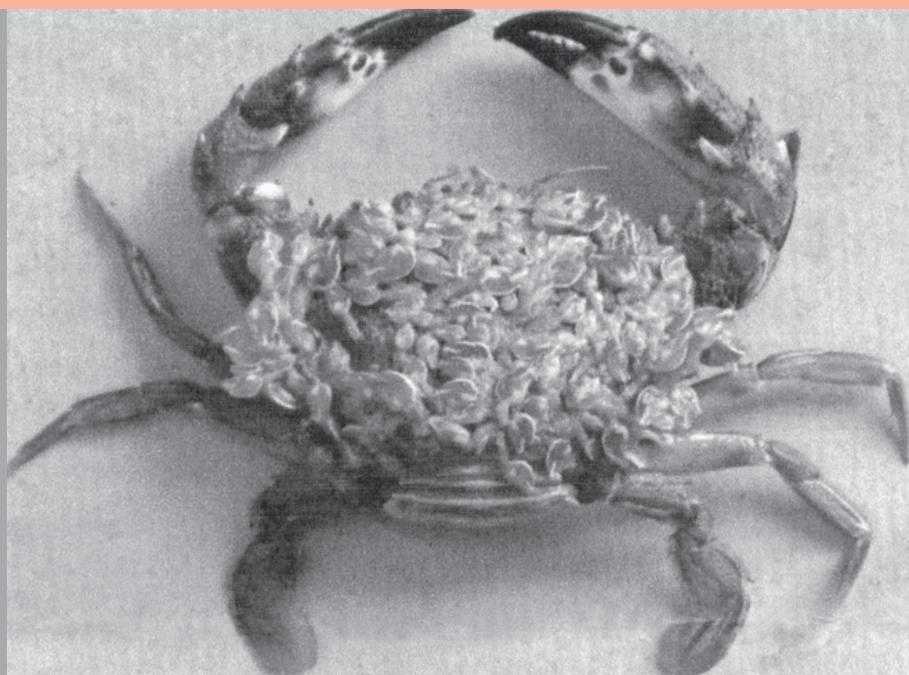
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## Fish aggregating devices used for cephalopod fishery along the Karnataka coast

FADs are traditionally used by fishermen to attract and aggregate fishes closer to the shore. Such practices were based on their knowledge that fish tend to congregate over submerged structures. These objects are known to attract fish efficiently and increase

the productivity of the area as they provide shelter from predators, serves as feeding grounds by providing surface area for fish food organisms and even act as suitable spawning ground by giving substratum for the attachment of eggs for many fishes.

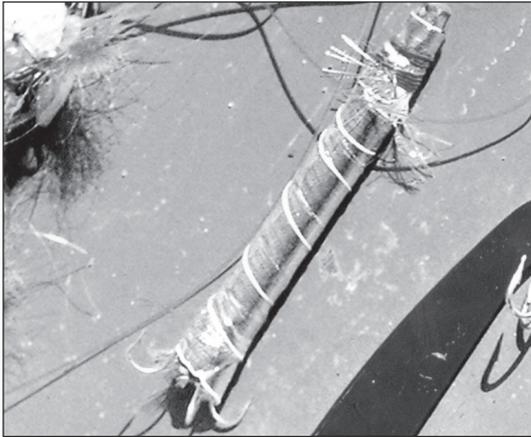


Fig. 1 Hand jigs fabricated using lead-weight and hooks

Major share of cephalopod landings of Karnataka is contributed by multiday trawlers, followed by singleday trawlers and purseseiners. However, during 2004 a group of fishermen from Kanyakumari installed FADs for the first time in Karnataka waters for the exploitation of cephalopods. Generally, fishermen from Kanyakumari, who normally operate hooks and lines, migrate towards the northwest coast for fishing during September-January when the weather in their traditional home grounds becomes unfavorable for fishing.

**Deployment of FAD:** The operational area for the fishery extends off Manjeshwara in south (north Kerala) to Byndoor in north (Karnataka). Prior to the commencement of actual fishing operation, few trips are made to survey and select suitable areas for laying the FADs. Since rocky reefs and muddy areas



Fig. 2 Fibre boats used in cephalopod fishery

in coastal waters are biologically more productive than sandy areas, rocky substratum with firm bottom and flat profile is preferred for deploying the FADs. A preliminary survey of the sea bottom is carried out using ridged lead weight (1-1.5 kg with grooves) to fix the areas with rocky substratum. A rope is tied to the weight and it is dragged on the sea bottom. Survey is done perpendicularly to the shore from 10 m depth onwards. The lead-weight is periodically lifted for examining the type of sediment adhering to the grooves. The selected sites are marked using GPS and the prefabricated FADs are installed in these areas at depths varying from 25 to 45 m.

FADs introduced in Karnataka were fabricated using coconut fronds fastened with nylon ropes. These are eco-friendly and on decay promote growth of periphyton and other food organisms. This in turn attracts large number of fishes and cephalopods as they provide ideal feeding and breeding ground.

Each module of the FAD consists of 50-60 numbers of coconut fronds tied at 0.2 m interval using 3 mm nylon rope into a 10 m long section. These modules are placed at the marked places on the sea bottom and the modules are anchored by fixing weight to both ends of the lines. Anchor used are generally cement gunny bags filled with sand. They are fixed to both ends of the module so that it can neither drift away nor be shifted from the site of installation.

**Operation of FADs:** FADs are positioned on the sea bottom 4-5 days prior to the commencement of fishing. The materials are transported to the site in traditional crafts and the modules are dropped overboard at predetermined locations. Each unit sets about 100 numbers of such FADs at 500 m interval, in east-west direction vertical to the water current along the coast, so as to provide shelter and maximum protection to the shelter-seeking organisms. The modules are installed on the seabed at depth ranging from 25 to 45 m; 25-40 km away from the seashore and their positions are marked using GPS.

The cephalopods, which get aggregated near the FADs, are caught using hand jigs. They are fabricated with barbless steel hooks. Four hooks (No. 9) are wound around lead-weights of 5-6 inches of length in a row, using wire-rope (Fig. 1). Each jig is attached to a

monofilament line of 3 mm diameter. Each fisherman uses one line with a single jig at a time.

The craft used for the fishery resemble the regular outboard craft used for operating the drift-gillnet. These fibre boats with flat bottom assist easy movement on board. They have an Over-All-Length of 7.5 m and are fitted with 9.6 HP outboard engines. Each unit-cost is approximately Rs. 2,00,000/-.

**Jig fishing:** Crew consisting of five members sets out for fishing by 5:30 AM. Each unit carries GPS for locating the submerged FADs. On reaching the ground the craft is anchored above the FADs, so that the vertical jig lines operate right above the FAD. The jigs are released manually to the bottom and as the jigs pass over the cuttlefish shoals, individual cuttlefish gets hooked. The line is hauled up manually and the cephalopods are unhooked on the raised platform of the craft. The operation is repeated and continues as long as cuttlefish are available from the FAD. The fishermen use cotton gloves to protect their hands during the operation. The craft remain anchored through out the jigging operation. Fishing is done at 30-35 FADs on a day so that each FAD is fished once in three days. Operation which commenced at dawn continues till dusk (6.00 PM) and the crafts return to the shore. The crafts do not have

storage facilities and the catch is kept covered without ice on the deck till the crafts return.

Catch consisted only of *Sepia pharaonis*. Cuttlefishes of the size group 160-280 mm supported the fishery during October-November. Females dominated the catch with M:F ratio of 32:68. Cuttlefishes are sorted based on their size and sold. The size categories weighing <500 g are sold for an average price of Rs. 50/kg and that weighing > 500 g fetches an average price of Rs. 70/kg. During September 2004-January 2005, the cuttlefish landings by non-mechanized boats using jigs were estimated at 788 t from 12 units (Table 1).

**Post-Harvest:** The crews operating the jigs are migrants and generally belong to Kerala and Tamil Nadu. Locals involved with this activity finance the fishing unit. They provide advance of Rs. 50,000/- for the craft. These locals are also engaged in the marketing of

the catch and get back their advance with profit in the ensuing fishing season. Three agents in Someshwara, Hejamadi and Malpe are involved in marketing the cuttlefishes caught by jigs. These are taken by the processing plants.

The FADs set using natural materials like coconut fronds are biodegradable as they decay in a very short period of 2-3 months. Hence, they are eco-friendly, at the same time, because of their short-life, it warrants recurring costs for the fishermen. In spite of their small size, it is observed that they act as good habitat enhancement units and help in aggregating large numbers of cuttlefish. However, September-October period is the peak breeding period for *S. pharaonis* and are most likely attracted to submerged objects during the period for attaching their egg masses. Therefore, in spite of increased catch rates with high profits in certain months, such fishing practices, targeting ripe cuttlefishes should be done with prudence.

There are concerns that relate mainly to issues of resource sustainability. The use of FADs increases the vulnerability of the spawners to exploitation resulting in increased catch rates. This leads to rapid depletion of resources and hence such practices are discouraged in many countries. In this regard, there are also concerns on the number of FADs used as well

Table 1. Month-wise cephalopod production from non-mechanized units using jigs

Month	Catch (t)	Effort (units)	CPUE (kg)
Sep 2004	150	120	1,250
Oct	420	240	1,750
Nov	216	240	900
Dec	1.6	15	109
Jan 2005	0.2	3	67
<b>Total</b>	<b>788</b>	<b>618</b>	<b>1,275</b>

as attempts to reduce the fishing effort on the FADs in some countries.

Apart from the biological threat caused by such fishing practices, social problems too have emerged in this area due to gear interaction and access to resource. The high profit rate for the fishermen engaged in this fishery, and the fact that such activity is carried out only by the migrant fisher-folk from Tamil Nadu and Kerala have resulted in discontent among the locals. Further, the FADs get entangled in the trawl nets of single-day boats

which, also operate in the same area leading to conflict between trawl and jig-operators. This may even lead to the destruction of the eggs attached to the FADs. In October 2005, the conflicts among the different groups involved took a bad turn and then onwards jigs have been banned by the District Commissioner of this area.

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