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INDIAN COUNCIL OF AGRICULTURAL RESEARCH
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Editor

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FISH AGGREGATION DEVICES AND ARTIFICIAL REEFS

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Introduction

The principle of fish aggregation is based on the tendency of fish to concentrate around floatsam and sunken structures for food, shade and shelter (hide-out from predators). The technology is quite popular in Japan, Philippines, United States of America and the Pacific Island countries, and has been in vogue for a long period. For the first time in India this technology was introduced through the pioneering efforts of Raja (1986) who designed and fabricated an indigenous Synthetic Fish Aggregating Device/Artificial Reef (FAD/AR) made from High Density Polyethelene (HDPE) - Patent Registration No. 650/MAS/87. The results of preliminary experiments were highly encouraging and were presented by Raja (1986). Subsequently, all aspects of the FADs/ARs were discussed in detail at the National Fishermen's Forum meeting held at Bangalore, and was well received and appreciated by the participants.

Structure

A single unit consists of a multisided 'hut' shaped frame made of HDPE pipe which were sealed at both ends by heat treatment (extrusion welding) and joined together with nuts and bolts.

Attractants/Appendages are comprised of HDPE pipe pieces, used automobile tyres and HDPE netlon cones. Plastic strips (black and green colour) are also attached to these attractants to increase their visual attraction.

Anchors are attached to the four corners of the structure. In addition, stones are also attached to provide the structure with maximum stability, so that it can neither drift away nor be shifted from the site of installation. The structures can be installed on the sea-bed ranging from 2 to 4 m in depth, 5-10 km from the shore.

Five such units, tied to form a pentagon, can be installed to form an artificial reef. To identify the location of the sunken structures, marker buoys are attached to them by means of varnished steel chains.

Benefits of FADs/ARs and other applications

Trials have shown that the installation of FADs enabled thousands of cephalopodes to colonise on these submerged objects and algae also proliferated over them. This provides an excellent environment for various types of marine organisms to grow and thrive, producing further link in the food chain. Moreover these structures in due course of time become good fish habitats enabling a variety of fishes to use it as a safe breeding ground. Observations have shown that about 18 species of fish which were not found in the inshore waters, have been attracted and captured around these structures. Most of them were predatory bigger fishes and commercially important varieties.

These devices can also be used as a mechanism to demarcate territorial waters for the artisanal fishermen. The day-to-day problems and conflicts of the traditional fishermen with the mechanised boat operators can be solved by forming a semicircular installation of these structures covering 3 to 5 coastal fishing villages.

A welcome bonanza from the FADs/ARs

During March, April and May 1992, the artisanal fishermen of the fishing villages of Injambakkam near Madras, were pleasantly surprised to find an increasing share of squids and cuttlefish in their catch, whenever they fished nearer to the FADs/ARs installed, about 8 km off the coast.

But, to the personnel of "THE WAVES", which had in the first place installed these FADs/ARs in Injambakkam this phenomenon came not as a surprise, but as vindication of the results of their earlier experiments with these structures.

During the initial experiments with FADs, various designs and attractants were tried out. One factor that caught the attention of the author, who conceived the idea, designed and conducted experiments with the FADs, even during the early trials, was the large amount of cephalopod eggs found in the netlon cones attached to the main frame. It was opined that these eggs would initially act as an additional attractant to various fishes and in the later stages contribute to the formation of an habitat for the cephalopods themselves. This is exactly what has taken place in Injambakkam.

It is now a proven fact that the FADs/ARs installed by "THE WAVES" are instrumental not only in aggregating the inshore fishes, but also in attracting various commercially important varieties of deepsea fishes to the nearshore waters, especially to the vicinity of these submerged structures.

The capture of cephalopods in appreciable quantities from the area surrounding these structures has yet again emphasised the capabilities of the FADs/ARs and has infact opened up new economically important vistas for the marine artisanal fishermen.

A detailed survey of the gear used, the method of operation and the season best suited for cephalopod fishing were conducted by the author's team in collaboration with the local fishermen.

Gear

The gear is locally known as the 'Manivala' and basically comes under the category of bottom net, trammel nets. A typical net of this type consists of three separate pieces or units that are joined together end to end at the time of operation.

Each unit is about 35 to 40 m in length and around 2 m in depth. It is made up of two outer walls of large mesh netting and a central wall of finer twine and much smaller mesh size. The

outer walls (armours) are almost half the depth of the central wall (lint). The fishing principle is that the fish or squid while swimming, inadvertently hits the lint (inner wall) which is then pushed through the armous (outerwalls) to form a pocket in which the animal is trapped.

The head rope is made of two polyethelene ropes of 3 mm diameter and are provided with a number of PVC floats (30 mm diameter and 10 mm thickness) and the meshes of the lint are equally distributed between them, the mounting being done in simple reaving method. The foot rope bears a number of lead weights as sinkers, at the rate of three sinkers for every float.

On the top and bottom, on the lint, there are selvedges of three meshes depth and made of thicker twine. The material used for the inner and the two outer walls are nylon. The armours (outer walls) are attached to the last row of meshes of the selvedges of the lint (inner wall).

Craft

The craft used is the traditional Kattumarans which are quite popular especially along the east coast. They are the best suited to negotiate the choppy waters of this region.

Operation

Two fishermen in each Kattumaran carries one full length of net consisting of three separate units, each of 35 to 40 m and joined together end to end. The fishermen paddle out to the vicinity of the FAD/AR at about 6 o'clock in the evening and on reaching the ground set their net about 50 m away from the FAD/AR. The net is simply payed out starting with one and with the craft kept moving in the opposite direction. To mark the nets each group employs thermocoel buoys, with different ensignia and colours, attached to either ends of the net. The net is then left in the sea and the fishermen return to the shore. The net is left overnight to fish and the hauling is done usually in the early hours of the day.

The catch are mostly found entangled in the pockets formed by the middle layer in the meshes of the outer layers on either side.

Catch

During the season the fishermen usually get around 20 to 25 kg per day per craft. During the beginning and ending of the season, the catch is low with 8 to 10 kg per day per craft. The cephalopod catch is sorted and sold in two size categories - those weighing less than half a kg and those weighing more than half a kg, fetching an average price of Rs. 22 and Rs. 26/kg respectively

(as reported by the local fishermen). But in the open market the price is more than Rs. 40/kg. Other catches in the net are usually perches and prawns.

Reference

- RAJA, G. 1986. Synthetic Fish Aggregation Devices in India. *National Seminar on Ocean Resources. Ocean Data Centre, Anna University, Madras.*