

Artificial Reef Research

Artificial reefs are man-made underwater structures that provide habitat for many types of fishes. Fishes are attracted towards artificial reefs because the reef shelter the fish from predators and make good feeding sites. The creation of man-made structures to enhance marine resources is the basis of a specialised branch of marine technology known as artificial reef development.

The dependence of pole and line tuna fishery on the availability of live-baits has been well documented. For successful tuna clipping, availability of desired species of live-baits in required quantity at correct time and space are prerequisites. At Minicoy, where CMFRI has been undertaking investigations on tunas and tuna livebaits, it was observed that the availability and abundance of live-baits evinced changing pattern in the recent past due mainly to the ecological stress such as environmental deterioration, fluctuations in the seasonality of migrant live-bait species and over-exploitation of the bait fish resources consequent to the introduction of mechanised vessels in tuna fishery.

The major habitats which harbour reef fishes including live-baits at Minicoy are the reef flat, reef front, inner lagoon reef, lagoon shoals and sand flat. The association of major bait fish species with different types of corals viz., corymbose, pedicillate, ramose and flabellate types in this ecosystem has been documented earlier. However, at present, the lagoon of Minicoy is a modified ecosystem compared to that of two decades ago. Large number of corals, especially the *Acropora* thickets were found to have suffered mass mortality during the late seventies. Excessive siltation and sedimentation resulted from the deepening of

the boat channels and subsequent influx of water coupled with greater degree of accretion were the major causative factors for the mass destruction of corals, and subsequent deterioration of baitfish habitats in the southern part of Minicoy lagoon. It is in this context that CMFRI at Minicoy started experimental investigations with artificial reef structure (ARS) with the objectives of concentrating tuna live-baits in a limited area and thereby improving fishing opportunities, and providing improved habitats for these fishes by capitalizing on the relationship between available living space and the abundance of marine resources. This study forms one of the technical programmes under the Institutes' Research Project on investigations on tuna live baits in Lakshadweep.

Artificial reefs are man made underwater structures that provide habitat for many types of fishes. Fishes are attracted towards artificial reefs because the reef shelter the fish from predators and make good feeding sites. Epizotic and epiphytic organisms, zooplankters, smaller fishes and many other members of aquatic food chain find a home within or around the reef. The creation of man made structures to enhance marine resources is the basis of a specialised branch of marine technology known as 'artificial reef development' through which fishes could be concentrated within a smaller area, by offering an increased food supply. The first artificial reef was built before 1790 in Japan by commercial fishermen and the Govern-



Preparation of R.C.C. with rod holders

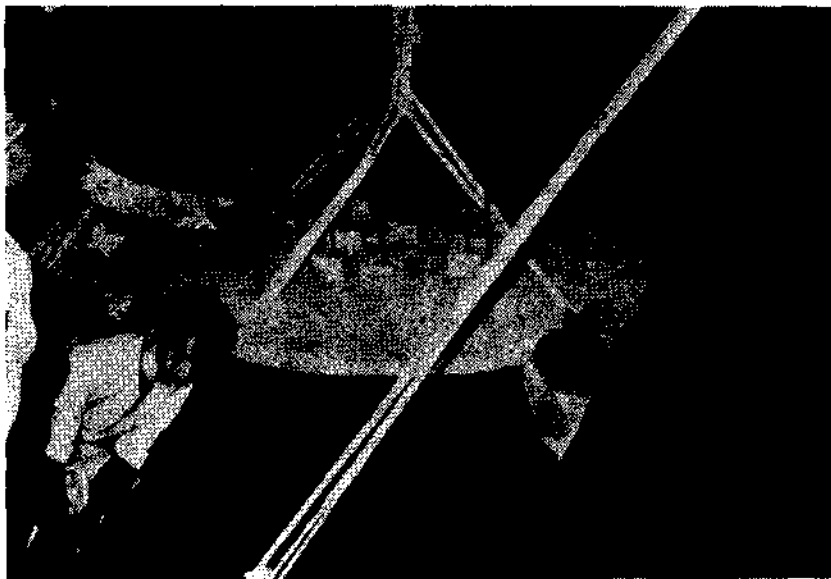
ment there has granted subsidies for reef construction since 1930. In 1985, over 200 artificial reefs have been constructed along the U.S. coastline and recently, the U.S. National Fishery Enhancement Act mandated the development of the National Artificial Reef Plan in ocean fishery development and ocean resource management.

The artificial reef structure employed for the investigation was designed by Dr P. P. Pillai, and fabricated with the assistance of Lakshadweep PWD at Minicoy. It consists of a 2-m diameter, three-inch-thick RSS slab base on which twelve vertical M.S. rod holders of 10 mm thickness and 1.9 m length are fixed at regular intervals. Fourteen discarded car tyres, arranged in five rows and 6 x 4 inch size wooden block separators are interlocked by these vertical rods. A total number of sixty-two 3 x 2 inch size wooden pieces are used to maintain the gap along the inner periphery of tyres. The M.S. rods are bent well above the tyres thus providing a locking device for the entire structure. The structure has a total height of 1.2 m. The ARS was installed in the area between Tunda Point (southern end of Minicoy) and Viringili on 21 November 1988, where considerable damage to the acroporid corals was reported.

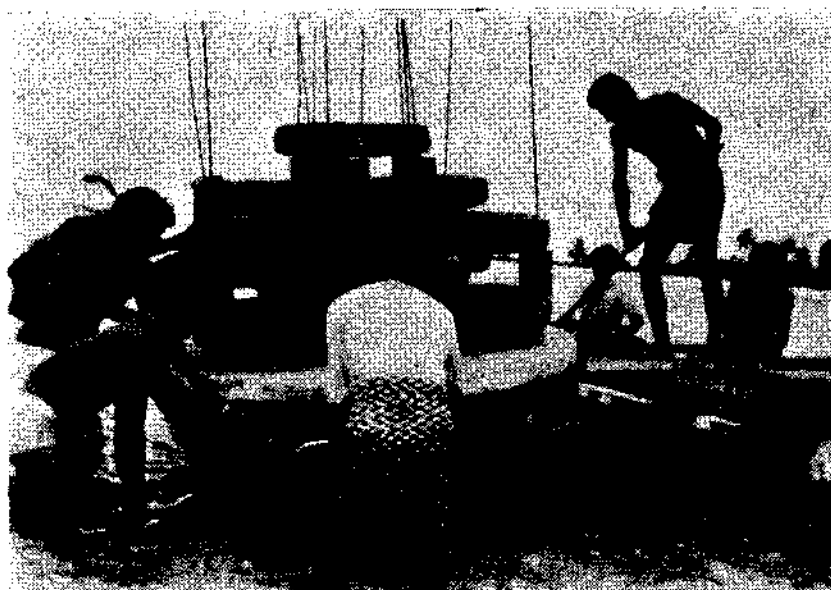
Subsequent monitoring of the aggregating nature of the ARs with its age by Dr P. P. Pillai and Shri T. M. Yohannan, Scientists at the Minicoy Research Centre of CMFRI revealed that within fifteen days of reef age, filamentous algae and zooplankters such as mysids and cope-

pods started accumulating profusely on and around the reef structure. Colonisation of the reef structure, by fishes such as *Caesio pisang*, *Dascyllus aruanus*, *D. trimaculatus*, *Abudefduf sefasciatus*, *Cheateodon auriga* and *Thalassoma umbrotigma* have started from the 35th day of reef age. Recent introduction of *Chromis caeru-*

leus, a resident bait species to the ARS was found to be successful thereby proving the effectiveness of CMFRI's attempt in this line of technology. Encouraged by these results, the artificial reef development and deployment has been taken up as one of the priority programmes of the Institute at selected Centres.



R.C.C. base being installed



The artificial reef structure