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 live-baits, 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., corrymbose, 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. Epizoic 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-
ment there has granted subsi-
dies for reef construction since
1930. In 1985, over 200 arti-
ficial reefs have been construc-
ted along the U.S. coastline and
recently, the U.S. National Fish-
ery Enhancement Act mandated
the development of the National
Artificial Reef Plan in ocean fish-
ery development and ocean re-
source management.

The artificial reef structure
employed for the investigation
was designed by Dr P. P. Pillai,
and fabricated with the assist-
ance of Lakshadweep PWD at Mi-
nicoy. It consists of a 2-m di-
nétre, 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. Four-
teen discarded car tyres, arrang-
ed 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 pie-
ces are used to maintain the gap
along the inner periphery of
tyres. The M.S. rods are bent
well above the tyres thus pro-
viding 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 ac-
roporid 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, Sci-
entists at the Minicoy Research
Centre of CMFRI revealed that
within fifteen days of reef age,
filamentous algae and zooplank-
ters such as mysids and cope-
pods started accumulating pro-
fusely on and around the reef
structure. Colonisation of the
reef structure, by fishes such as
Caesio pisang, Dascyllus aruan-
us, D. trimaculatus, Abudef-
duf sefasciatus, Cheatocon aur-
iga and Thalassoma umbros-
tigma have started from the
35th day of reef age. Recent in-
troduction of Chromis caerus-
leus, a resident bait species to
the ARS was found to be suc-
cessful thereby proving the ef-
fectiveness of CMFRI’s attempt
in this line of technology. Encou-
raged by these results, the arti-
ficial reef development and de-
ployment has been taken up as
one of the priority programmes
of the Institute at selected Cen-
tres.