Artificial Reefs and its Importance in Marine Fisheries Management

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Focal Points at a Glance: At this time of decline in marine capture fisheries, the authors tell us that there is an immediate need to promote the setting up of artificial reefs in the sea. In this context, the authors give details of artificial reefs.

The concept

Artificial reefs (ARs) use the natural behaviour of fish to gather and concentrate around floating or any other stationary objects like tree leaves and shipwrecks. This aspect of fish behaviour is being exploited to attract them to artificial substrates by traditional fishermen all over the world. Fishes may get attracted to these artificial reefs for various reasons like shelter, food or even for breeding purposes. Artificial reefs/ Artificial fish habitats (AFH) serve as a substrate for growth of smaller organisms and thereby promoting the growth of smaller and bigger fishes in and around. In recent years, artificial reefs of various kinds are being installed in the sea by many countries. These are considered effective in the aquatic environment, with the idea of improving the fish catch as well as preserving the ecosystem by providing habitat for fishes.

Importance of Artificial Reefs

Nowadays the need for artificial reefs is growing in India, since the fishery resources of the inshore areas are being intensively exploited. There is a considerable increase in the fishing effort, especially by mechanised vessels all along the Indian coast. Heavy competition among different kinds of fishing vessels has led to reduced incomes and moreover, in a multi species fishery, management measures like seasonal fishing ban adopted for conservation will have a limited effect. In this context, artificial reefs as a device for increasing the fish biomass gets importance. Artificial reefs deployed in

inshore waters enhance the biological productivity and fishery resources by serving as sanctuaries and nurseries or breeding grounds. This area with nutrient rich planktonic food is the best nursery ground for larval survival and growth. Artificial reefs may help in the regeneration, recovery and conservation of marine resources of inshore waters and thereby improve catches by artisanal gears. They can also serve as a recreational facility by providing avenues for sport fishing and related activities.

Types of Artificial Reefs/Fish Habitats

There are basically three types of ARs

1. ARs or bottom AFH placed on the sea bottom

2. Surface AFH anchored or drifting near the surface

3. Sub .surface or Midwater AFH anchored in the water column

Site selection

Type of reef to be set up is selected depending on the fishery resources of the region. The selection of site for deployment is more important since it decides the success of such a setup:

· A firm sand or shell bottom is the most suitable for an AR to prevent subsidence

· Sites with strong tidal currents which are prone to erosion; mouths of river where siltation may bury the reef; soft clay, silt and sediments; high wave energy locations and areas with

seasonally shifting sand should not be considered.

· The bottom profile should be flat or gently sloping.

· The site should be nearer to a fishing village to simplify the logistics of installation and to minimise travel time. The knowledge of fishermen about the sea bottom should be taken advantage of while selecting the site.

· An AFH can be placed in commercial fishing areas only if the operating fishermen are convinced of its advantages and are willing to install it in their traditional fishing grounds.

Status of ARs in India and World

ARs, otherwise known as fish aggregating devices have a long history. Traditionally, fishermen have used various materials ranging from coconut fronds, coconut stumps, bundles of coconut and other tree leaves, tree branches, floating bamboo poles, old tyres, etc to attract and aggregate fish in the sea. In 1970s, Japanese were the first to implement artificial reef programmes in many villages. The success of this has led to the construction of reefs using concrete blocks. ARs have now become the focus of research in India and in many other countries viz., Australia, Japan, Southeast Asia, the Caribbean, the Pacific islands, Africa, North America and Europe. In India, artificial reefs have been deployed at several places in the States of Tamilnadu and Kerala by CMFRI and several other NGOs. The sea reefs have been found to be greatly beneficial to the artisanal fishermen, getting good catches

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without spending much time.

Design, fabrication and deployment

There are three types of artificial reef modules

1. Reef fish module – Triangular concrete module with square and circular openings around

2. Grouper module – Triangular concrete module with 3 nos of concrete pipes inside

3. Well ring module – Overlapping concrete well rings

Fabrication needs to be done in the village close to the place where deployment has to be made or it can be made in any suitable site covering a cluster of villages. The bidder should ensure that the villagers of the concerned villages can visit the site of fabrication to learn and understand the fabrication process.

The artificial reefs are deployed in the sea within a distance of 2 to 5 km from the shore at a depth range of 6 to 10 fathoms. The exact geographical position of the deployment site has to be ascertained during site selection. The deployment of ARs needs to be done involving the villagers. Considering the number of reef structures to be deployed at each site and the volume and weight of the structures, the deployment is done using sturdy vessel/barge.

Uses of Artificial reefs

· Help attract or aggregate fishes from nearby places

· Will increase the fish catch to many folds when compared to nearby areas

· Will increase the standing stock of the area which in turn increases the fish production

· Helps in minimising the fishing effort so as to increase the fish catch rate,and

· Helps to achieve the primary objective of sustainable fisheries development
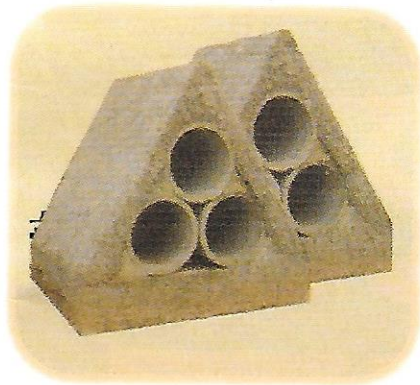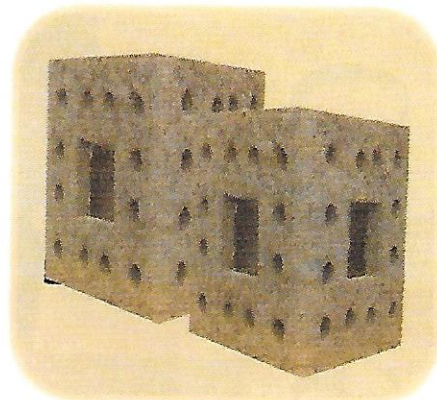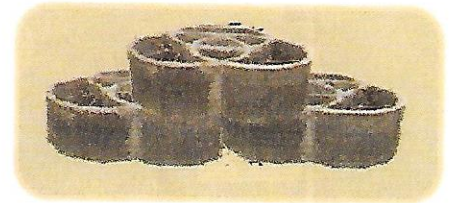

Fig 1: Grouper Module

Fig 2: Reef fish Module

Fig 3: Sea Horse / Well Ring Module