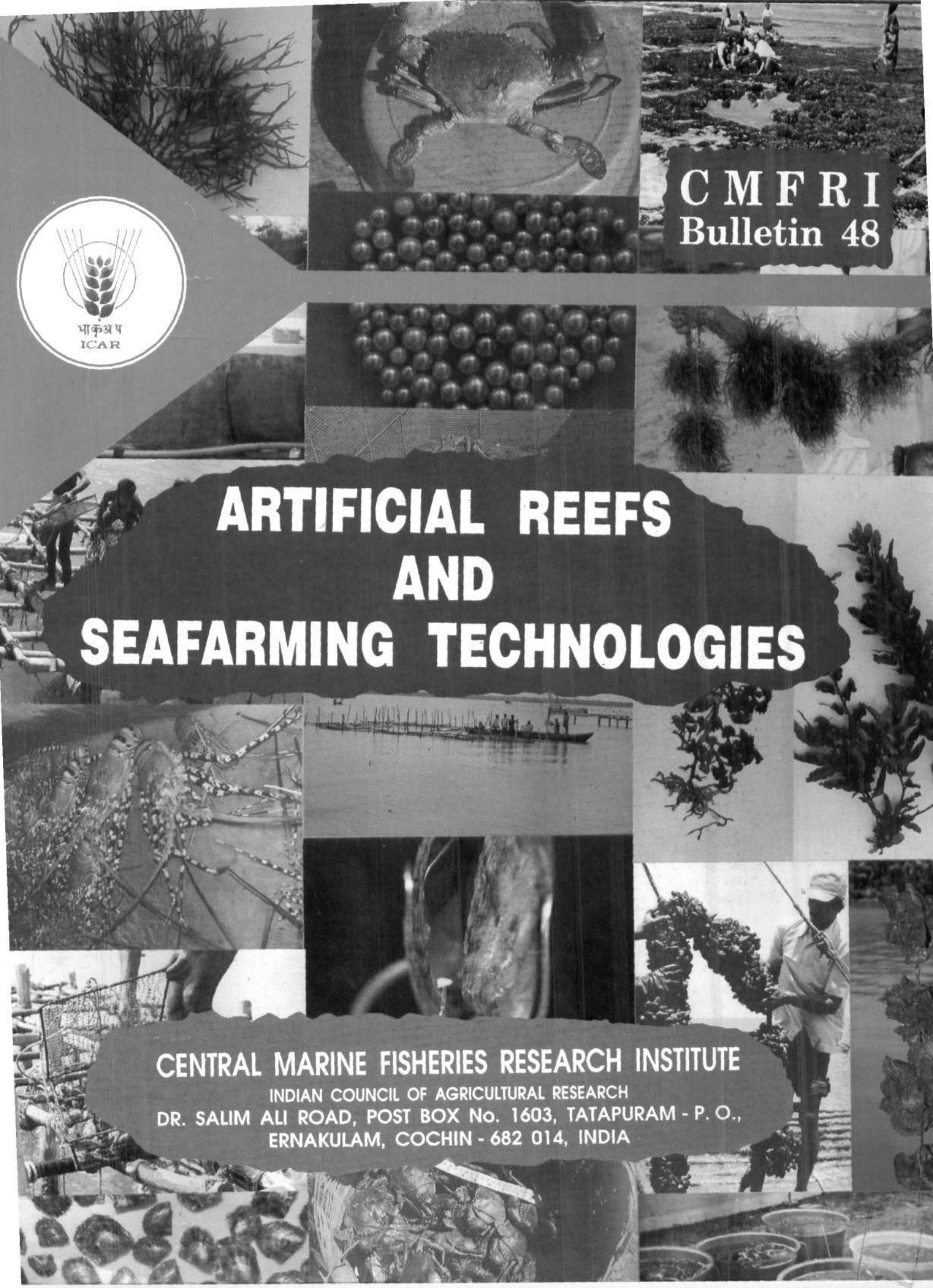

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CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
DR. SALIM ALI ROAD, POST BOX No. 1603, TATAPURAM - P. O.,
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Dr. K. Rengarajan

Editor

January 1996

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ARTIFICIAL FISH HABITATS IN TRADITIONAL FISHERIES OF SOUTHWEST COAST OF INDIA*

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Abstract

Artisanal fishermen of Trivandrum area in South India are showing keen interest to put up artificial reefs to enhance fish production. Non-governmental organisations working for the welfare of coastal fishermen are giving financial and moral support to these fishermen to deploy more and more artificial reefs. The results of a study made on such reefs are presented in this paper.

Granite stones, truck tyres, coconut tree stumps, concrete well rings and concrete slabs are used for the construction of artificial reefs in this area. A gradual increase in the annual fish catch was noticed at Valiathura (Trivandrum) fish landing centre after the establishment of artificial reefs in this area. It rose from 669.0 tonnes in the year 1988 to 857.5 tonnes in 1989 and to 1442.8 tonnes in 1990. *Sepia pharaonis* was the major component in the catches from these reefs. *Carangoides plagiotaenia, C. malabaricus, Lethrinus harak, Selar kalla* and *Selaroides leptolepis* were caught only from the artificial reef region at a point of time. Underwater studies revealed the congregation of large shoals of small reef-dwelling fishes and other bottom living animals around the reefs.

Introduction

Creation of fishing grounds, which is a human endeavour, is of particular significance to coastal waters in the world. Development of coastal fishing grounds will no doubt increase fish catch and raise the level of living of coastal fishermen. Making artificial fish habitats (AFHs) and utilising them for regular fishing is not a new technique for the artisanal fishermen of southwest coast of India. Since there were plenty of natural reefs in this area, and regular supply of fish from these reefs, the fishermen never felt the need for going in for large scale reef constructions in the past. The introduction of otter-trawling in this area in the sixties have made tremendous havoc to the fishery environment by destroying the natural reefs which used to be an abode for bottom dwelling forms. The impact of bottom trawling on benthic resources and the marine ecosystem began to be felt severley towards the end of nineteen seventies. The reduction in fish production of the traditional sector around this time forced them to adopt new small scale technologies such as use of artificial baits and monofilament nets, motorisation of their country crafts and formation of artificial fish habitats. Since there is rapid increase (1) in the number of artificial reefs in the Trivandrum Coast since 1987 and non-governmental organisations like Programme for Community Organisation (PCO) and South Indian Federation of Fishermen Societies (SIFFS), working for the welfare of coastal fishermen are giving very good support to the reef projects (2 & 3) a study was made during the period 1988 to 1990 and the results are presented here.

Material and methods

As Trivandrum happens to be the centre of activity for artificial reef fishing, the fish landing at Valiathura was observed for three years from 1988 to 1990. Estimates were made separately for the units operated on the reefs as well as in the non-reef areas. The species constituted the catch of both the areas were also identified and listed separately. Underwater surveys using SCUBA were made to assess the fish congregation in the reefs and also to collect samples of benthic communities settled on the reef modules. Onboard observations

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were made to evaluate the fishing by fishermen in the reef and non-reef areas. Environmental data were also collected from both the area periodically.

Distribution of Artificial Reefs

The coastal area (Fig. 1), stretching from Anjengo in Kerala to Enayam in Tamil Nadu, has about 25 artificial reefs. Some of these are privately owned. Some sunken ships at the bottom also serve as artificial reefs. A shipwreck off Anjengo during World War II proved to be a blessing in disguise for traditional hooks and line fishermen. The site became an important fishing ground with rich catches assured in almost all seasons. The hundreds of test rocket covers that fell into the sea off Thumba on the Trivandrum Coast are also turning into fish shelters.

Materials used for the reef construction

Initially, all available materials like granite stones, worn-out tyres, wood stumps (bamboo and coconut), oil drums and pottery waste were used as reef material. Innovation were later introduced and concrete-filled worn-out tyres, concrete well rings and a variety of structures made out of concrete were used (Pl. 1). Notable among them are : the three dimensional chamber-type concrete module and the semicircular concrete module. In some places, a hut-type module made out of bamboo poles was also used.

Site selection and reef building

The selection of the sites for the reef depends on the traditional fishermen's knowledge of the place. They are manually built around 30 m depth covering an area of 150 square metre at a distance of 2-3 kilometre away from the shore, *i.e.* beyond the limit of shore seine operation. The fishermen bring granites in their catamarans and drop them at the site by over turning the catamarans. Then the concrete rings unloaded over them using ropes operated from the catamarans. The automobile tyres, which are stabilised with concrete inside, are placed over this by ropes. Broken pottery which are abundantly available on the coastal area are dropped from the catamarans. Branches of

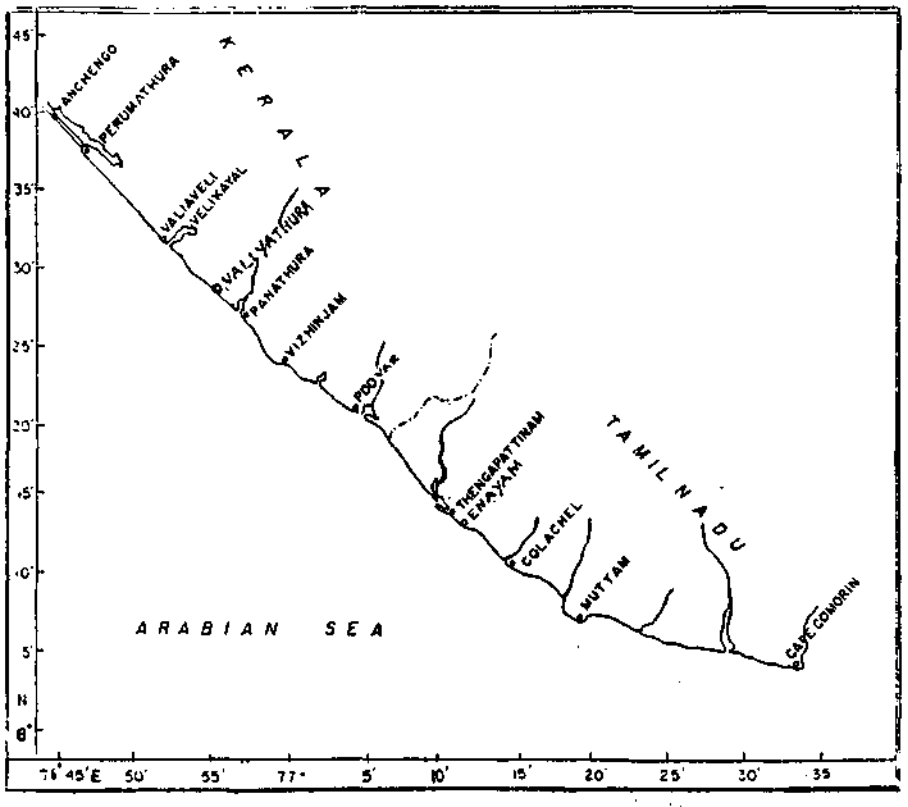

Fig. 1. Map of the study area.

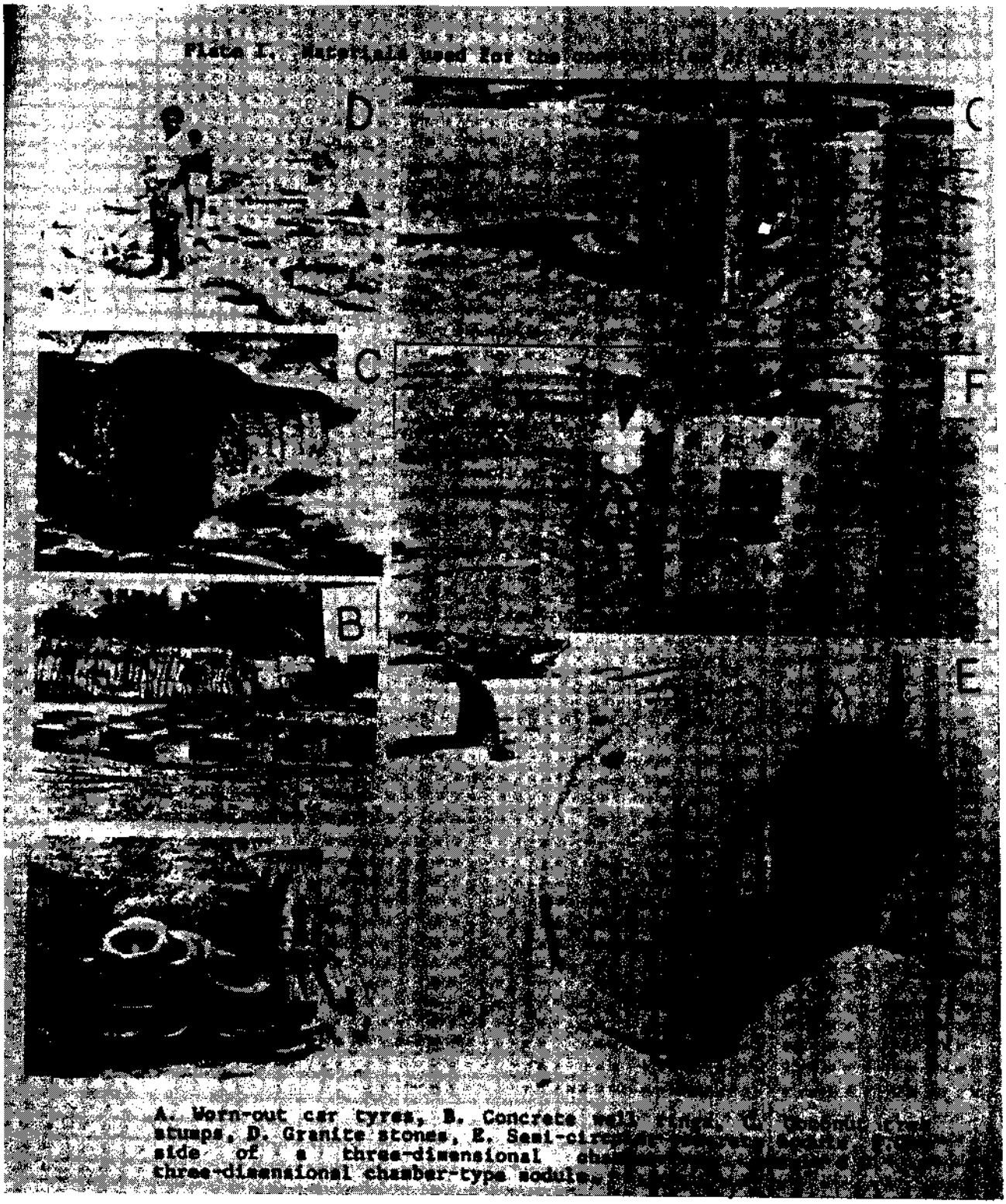

Plate I. Materials used for the [illegible]

A. Worn-out car tyres, B. Concrete [illegible] stumps, D. Granite stones, E. Semi-circ[illegible] side of a three-dimensional cha[illegible] three-dimensional chamber-type module.

"Konna" trees and coconut fronts, which are believed to attract fishes, are also dropped to the bottoms. A visual triangular method is used by the fishermen to locate the site once the materials are dumped.

Results

1. The materials such as truck and car tyres, granite stones, concrete rings and slabs and coconut trees stumps were found to be cheap and suitable as reef material.

2. Even after one year of their laying these materials were found to be in tact. This shows the suitability of the site (Trivandrum-Enayam Coast) for reef construction.

3. The low productivity of some of the ARs was attributed to the wrong lay-out of the reef and inadequate reef materials.

4. *Sepia pharaonis* used to dominate the catch from the reefs during February and March months and the cuttlefish caught from the reef area during December-March period were mostly in their spawning condition. Fishing experiments conducted in the vicinity of the ARs during the above period brought large quantities of cuttlefish egg masses. Hence, it may be presumed that the cuttlefish congregate around the reef area for attaching their egg masses.

5. Underwater studies revealed the congregation of large shoals of small fishes such as *Apogon novemfaciatus, Amphiprion* spp., *Chaetodon* spp. and *Dascyllus* spp. Big fishes like *Epinephelus corallicola, Lutjanus argentimaculatus, L. lineolatus, Pterois antennata, Spilotichthys pictus* and *Heniochus acuminiatus* were found in small numbers.

6. Fishes like *Carangoides plagiotaenia, Lethrinus harak, Selar kalla, Carangoides malabaricus* and *Selaroides leptolepis* were found only in the reef region at a point of time. It is interesting to note that these forms live normally in reef areas.

7. A slight increase was noticed in the fish landings of the Valiathura landing centre after the construction of artificial reefs in this area. From 669.0 tonnes in the year 1988 it rose to 857.5 tonnes during 1989 and to 1442.8 tonnes during 1990.

8. Out of two types, tubular and well-type, arrangements of the concrete rings for the construction of ARs the first one seems to be more efficient.

9. Three types of modules were used as FADs in this area. They are the hut-type structure made of bamboo, the three-dimensional-chamber-type module and semi-circular module made of concrete. Out of these, the first two types were found to be effective.

10. The age of the reef also has a bearing on the productivity of the artificial reef. In the first year of its construction there is always good production. If the reef is not renovated at the end of the first year a decline in the catch is noticed normally.

11. Hooks and line units are found to be the suitable gear for the exploitation of fish from the ARs in this area. But, at the sametime, light fishing in the vicinity of ARs by large number of hooks and line units affecting the congregation of fish in the ARs was also noticed.

12. Intensive fishing was done during the sunny days of November-April months in the reef environment.

13. Good encrustation was found on the reef modules within a short period of their launching. They include barnacles (*Balanus* spp.), pearl oyster (*Pinctada fucata*), edible oyster (*Crossostrea* spp.), gartropods (*Turitella* spp.), bivalves (*Cardia* spp.), button crabs and solitary corals. The reef building polychaetes *Sabellaria spinulosa* Leuckart and *S. spinulosa* var *gravieri* Fauval, were found in plenty in the reef site.

Conclusion

A gradual increase in the annual fish landings has been noticed at Valiathura after the establishment of artificial reefs in this area. The cuttlefish *Sepia pharaonis*, was one of the major components in the catches from ARs and because

of its good export market the artisanal fishermen were showing keen interest to put up more and more reef structures in this area. With the limited fund which they get from voluntary organisations they were able to put up small reef structures only. The small size of the reef necessitates renovation every year so as to keep them productive. If steps were taken to avoid this problem by putting up bigger reefs on a larger scale, the ARs will play an important role in this area for the development of artisanal sector. So far, no attempt has been made on floating reefs. Floating reefs are known to attract pelagic shoaling fishes like the tunas. So it is better to start some studies on floating FADs in this region so as to transfer the technology to the local fishermen.

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