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DEVELOPMENT OF A SMALL-SCALE ARTIFICIAL FISH HABITAT MODULE FOR IMPROVING FISH CATCH AND INCOME FOR THE FISHERMEN OF COASTAL REGION

Technology developed by :Dr. Sreekanth G. B., Scientist (Fisheries Resource Management)
Dr. Manju Lekshmi N, Scientist (Fisheries Resource Management)

PROBLEM AND RESEARCH GAP

An artificial fish habitat (AFH) is a fabricated, underwater structure, typically built for promoting aquatic life in areas of generally featureless bottom. AFH is also defined as one or more objects of natural or human origin deployed purposefully onto the seafloor to trigger physical, biological or socio-economic processes related to living marine resources. It is constructed or deployed on the seabed to emulate some functions of a natural habitats such as protecting, regenerating, concentrating, and/or enhancing populations of living marine resources and their habitats, which includes the promotion of research, recreational and educational opportunities of the area. Besides, they are also used as fisheries management and regulation tool in coastal waters to regulate fishing operations. In this context, a small-scale AFH module made of RCC was designed and developed in order to provide substratum for biotic communities and habitats and hide outs for the fish communities. The AFH can also aid in improving the fish catch and income for the fishermen in the coastal region.

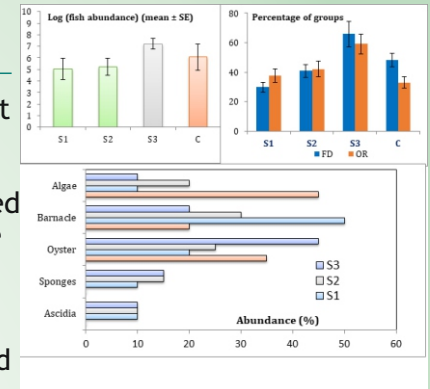## PARTICULARS AND SALIENT FINDINGS

The AFH is used to provide refuges and natural habitats for fish in the coastal region. An oval shaped AFH module was designed and constructed and deployed in the coastal region of Goa (Shape: Oval, 0.5 m diameter and 0.65 m height, hole size: 8-10 cm, Make: RCC) at three different depths (S1: 3 m, S2: 6 m and S3: 9 m). The major biotic communities recorded on the surface were algae, barnacles, oysters, sponges and ascidians. The fish community aggregations were recorded in eight months. A total of 35 fish species were recorded with a biomass of 150 g m^{-2} when compared to the natural rocky out crops (Control site, C: 80 g m^{-2}). Moreover, the AFHs deployed in the deeper waters (S3) showed higher

The aquatic life developed near the small-scale artificial fish habitat

substrate biomass and fish aggregations, and diversity when compared to the shallow zones (S1 and S2). The most abundant species on deeper AFH (S3) were *Pomadasys furcatus, P. guoraca, Epinephelus coioides, Lutjanus indicus, Pempheris multiradiata, Heniochus acuminatus, L. fulvus* and *O. compressus*. The most abundant families on this site were Haemulidae (36%), Lutjanidae (24%) and Chaetodontidae (17%). The most abundant families on the control site were Siganidae (22%), Tetraodontidae (24%) and Haemulidae (12%) and Carangidae (12%). Carnivores and omnivores were the major feeding guilds observed on the deeper AFH site, S3. Herbivores were abundant at shallow AFH sites (S1 and S2) and control site (C). The food fish and ornamental fish species were contributed to the species abundance at all the sites. While comparing the fish communities on the basis of ecological vulnerability, the high and very highly vulnerable fish species were abundant at the deeper AFH site (S3) compared to other sites.

IMPACT

The AFH has great scope in improving the fish habitats along the coastal region and thereby augmenting the fish catch and fishermen income. There were 30-40% increase in fish aggregations compared to rocky outcrops. The fishing near AFHs yielded Rs. 100-150 additional income per fishing for the coastal fishermen. Therefore, the technology can be adopted and established in about 10 km^2 in the coastal region of Goa, which can generate an additional fish biomass of 50 tonnes and an additional income for about 2000 fishermen to the tune of 10 crores. In addition, it can create a new aquatic ecosystem for the fish communities, which will generate an ecosystem service value of 100 crores (calculations based on the value of patchy reef ecosystems (10 crores km^{-2})).

REFERENCES

Research paper: Sreekanth GB, Manju Lekshmi N. and Ajey Patil. 2020. Fish assemblages on artificial fish habitats in estuaries: A comparison with natural rocky habitats. National Academy Science Letters, 43: 125-131. DOI: 10.1007/s40009-019-00825-x.