



CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)

VIZHINJAM RESEARCH CENTRE

VIZHINJAM, THIRUVANANTHAPURAM, KERALA, INDIA





Vision

Sustainable marine fisheries through management interventions and enhanced coastal fish production through mariculture for improved coastal livelihood.

Mission

To develop information based management system for regulated regime in marine fisheries and mariculture and aquaculture technologies to improve fish production and enhance income and employment opportunities of coastal community.

The Vizhinjam Research Centre of Central Marine Fisheries Research Institute had its inception in 1951 as a survey centre as directed by Dr. N. K. Panikkar, the then Chief Research Officer of the Central Marine Fisheries Research Station at Mandapam Camp. This was later elevated to the status of a Research Unit in 1965 and subsequently to a sub-station in 1969. With the addition of more research programmes and personnel over the years, it has grown into the present full-fledged Research Centre. The Centre has been carrying out pioneering research, contributing substantially to the knowledge on the marine fisheries and mariculture of this region.

The Centre is located in the coastal village of Vizhinjam in Neyyattinkara Taluk of Thiruvananthapuram District of Kerala. It is about 15km south of Thiruvananthapuram city and famous for the fishing harbour with a lighthouse and a blue beach sheltered on the coast of Arabian Sea.

From the fisheries point of view, Vizhinjam has special significance on being one of the largest traditional fish landing centres in India. The protected Bay enclosed by rocky promontories protruding into the sea is a special feature of the inshore area of Vizhinjam, facilitating favourable conditions for year-round fishing activities. This facilitates launching and landing of fishing vessels during monsoon. Because of this, all the fishermen from nearby areas migrate to Vizhinjam during this season. The pristine sea water with almost stable salinity around the year, proximity to the Wadge bank, availability of more than 200 species of marine ornamental fishes, mussels, pearl oysters and cultivable food fishes like groupers, snappers, cobia and carangids are other added advantages offering high scope for potential fisheries - related research activities.

Realizing the importance of this centre which was housed in rented buildings, the Government of Kerala had allotted 1.7 acres of sea front land area for VRC of CMFRI to establish further and to construct permanent Office-cum-Laboratory building, Marine hatcheries and Marine Research Aquarium. On completion of the Office-cum-Laboratory building, the Centre was shifted to the new premises in April 2013 and the new Marine Research Aquarium was opened to the public since June 2014.



Image pearl (Produced at VRC of CMFRI) memento presented to : Hon'ble Prime Minister Shri Narendra Modi by Hon'ble Union Minister of Agriculture Shri Radha Mohan Singh



Foundation stone laying ceremony

INFRASTRUCTURE



Conference Hall



Library



Video conferencing facility



Instrumentation Room



Microbiology Laboratory



Marine Biotechnology Laboratory



Algal culture laboratory



Cage farm



Marine Research Aquarium



Major Activities and Achievements

The activities of the Centre include research projects in capture and culture fisheries. Studying the biology, monitoring the resource characteristics for stock assessment of major pelagic and demersal groups of fishes, molluscan and crustacean resources, pearl culture in sea-cages, survey of finfish and shellfish seed resources, fishery environmental studies, monitoring coral reef ecosystems, minor resources such as sponges gorgonids and micro-algal culture are covered in the past and present research projects. The notable achievements are the ornamental fish breeding and seed production; sea-cage farming of lobsters and sea bass, image-pearl production and mass culture of selected live feeds with special emphasis to marine copepods.

Capture Fisheries

For the last several decades this Research Centre has been engaged in studying the biology, fishery and resource characteristics of the major commercially important species of fish and shellfish. The complexity in the types of fishing gear used and the multiplicity of species landed, together with the additional facilities available on account of the fishing harbour, make this area all the more important in that a large variety of species with seasonal domination provide good fishery throughout the year. The traditional crafts mostly consisting of catamarans, FRP coated plywood boats and gear such as shore seine, boat seine, drift gill net ('chala vala', 'Echa Vala' 'netholi vala') bottom set gill net ('konchu vala', 'nandu vala' and 'ral vala') and hooks and line, to mention some, account for the fish catch landed at Vizhinjam.

Mechanisation of catamarans and FRP coated plywood boats by fitting out-board motors has already made the craft more efficient. The average annual landings at Vizhinjam for the decade is around 20,000 t and nearly the major share of this is landed -during June to September. This peak fishing season coinciding with the south-west monsoon is yet another peculiarity of this area. The percentage contribution of fishes is 90%, cephalopods 5%, mussel 4% and crustaceans 1%. Important pelagic resources (90% of fin fishes) at Vizhinjam include tunas (33%), clupeids(27 %), carangids (15 %), mackerel (9%), ribbon fishes (8%), bill fishes (3%) and important demersal fish groups (10% of fin fish landings) include perches (27%), elasmobranch (21%), flat fishes (11%), balistids (9%), lizard fishes (8%), silver bellies (7%) and croakers (6%).



Fish landing centre at Vizhinjam

AVERAGE CATCH OF VIZHINJAM FISH LANDING CENTRE (2004-2013)

Fish	18319.80t	90%
Cephalopods	1024.76t	5%
Mussel	862.87t	4%
Crustaceans	121.41t	1%
Total	20,000t	-



Fishery Environment Management

Plankton studies conducted in the Bay waters and open sea showed that the maximum standing crop of zooplankton coincides with the peak seasons of pelagic fisheries. Blooms and swarms of certain plankton groups are almost regular during the monsoon periods. Ichthyoplankton studies indicate that the near shore waters of Vizhinjam provide good spawning and nursery ground for many commercially important fishes. It is also observed that the peak period of primary production corresponds to the monsoon months.

Marine Biodiversity

Database on distribution, morphometric characteristics, meristic data, biological characteristics and taxonomic details of the marine fin fish diversity along the coast, especially for 35 species coming under 16 genera belonging to Carangidae and 20 species coming under four genera of Lutjanidae collected from southwest coast of India were utilized for the preparation of monographs. Data base on hard coral cover, health and diversity in the patchy reefs of Enayam to Quilon and Goa in the west coast including four islands of Lakshadweep and GOMBR in the east coast was developed using Line Intercept Transect Method. Database on reef fishes of southwest coast of India was developed based on underwater Visual Census Method. Database on 24 species of sponges belonging to 20 genera, 13 families and 6 orders based on underwater surveys conducted in the shallow coastal waters extending from Enayam to Kollam, southern India was developed. Assessment of fishing impacted biodiversity loss revealed that some of the gears like different types of bottom set gill nets cause damage to biodiversity of the coastal area especially threatened species of Elasmobranchs, sponges and gorgonids.



Acropora formosa



Heliopora coerulea

Mariculture

1. Mussel Culture: This Research Centre has shown for the first time in the country that mussels could be grown successfully on ropes hung from floating rafts. During these experimental studies this method of mussel culture yielded a maximum of 150 tonnes/ha from the Bay and 180 tonnes/ha from the open sea. Many aspects of mussel farming such as spat settlement, seed transportation, fouling, predation and related environmental factors were studied in detail at this research centre.

2. Spherical Pearl Culture: The pearl culture experiments conducted here developed new designs of spat collectors and oyster stocking cages to economise on operational cost, and could perfect the indigenous know-how for producing quality spherical pearls.

3. Technology for Production of Image pearl/Designer pearl.

Technology for the production of quality image pearl nucleus , techniques of implantation, harvesting and processing of Image Pearl were standardised at this Centre.



Image nuclei



Image pearl

4. Sea-cage farming technology for commercial farming of spiny lobster *Panulirus homarus* in open sea cages was developed at Vizhinjam RC of CMFRI for the first time in India.

Technology for the cage farming include site selection, seed transportation and acclimatization, nursery rearing of seed, grading, design and fabrication of the frame, outer and inner net cages, feeding, net exchange, other daily maintenance activities, assessment of water quality parameters, disease management and harvesting.



Lobster in cage



Spiny lobster harvest

A viable technology for commercial farming of sea bass *Lates calcarifer* in floating sea cage was developed and demonstrated in a large HDPE floating cages moored at Vizhinjam Bay.



Harvest of seabass at Vizhinjam

Another technology developed for sea farming is multipurpose wooden floating cage. Technology includes designing, construction, mooring, feeding, harvesting and cage maintenance



Multipurpose wooden floating cage

5. Technology for breeding and seed production of marine ornamental fishes. Several ornamental fishes viz., sebae clownfish, *Amphiprion sebae*, blackfinned anemonefish– *A. nigripes*, pink skunk clownfish *A. perideraion*, clarkii clownfish, *A. clarkii*, blue damsel *Pomacentrus caeruleus*, sapphire damsel *P.pavo* were bred for the first time in India. About 12 species of marine ornamental fishes were regularly mass produces and distributed to the farmers and aquarists.

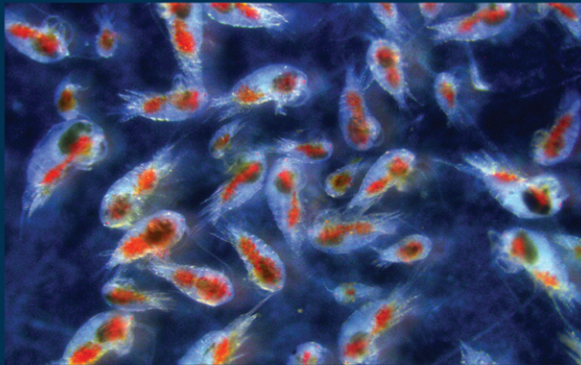


Amphiprion nigripes brood stock

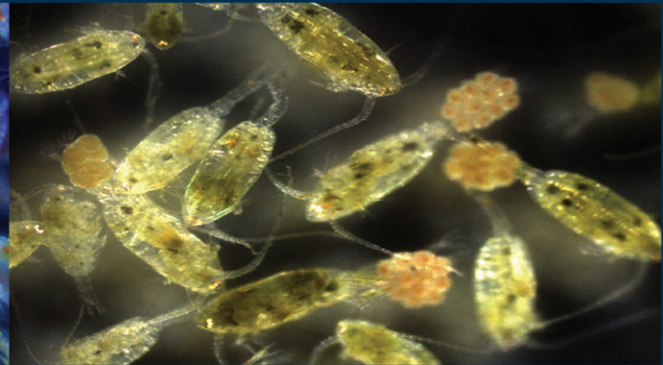


A. nigripes seed

6. Technology for large scale production of copepods *Temora turbinata* and *Pseudodiaptomus serricaudatus* suitable as live feed for marine/brackishwater fish hatcheries was developed.



Temora turbinata culture



Pseudodiaptomus serricaudatus culture

Marine Biotechnology

Fish health management: Research work was focused on bio-prospecting and identifying potential marine natural products (MNPs) from macro algae (sea weeds) and sponges. These MNPs were used to manage diseases among shellfishes and fin fishes. The activities and salient findings in Marine Biotechnology and fish disease management are given below:

- Potential antibacterial drug leads such as: labdane diterpenoids and Guaiane sesquiterpenes were isolated from marine macro alga, *Ulva fasciata*.
- Detected glucosidase-inhibition potential of the extracts of macroalgae, *Hypnea musciformis* and *Ulva fasciata*.
- Rapid bioassay tests using microbial, microalgal and brine shrimp assay were developed and standardized to test bioactivity profile of macro algal and sponge extracts.
- A cost-effective and rapid 'foot adherence assay' was developed using the common limpet, *Patella vulgata* to reduce the test period and to detect antifouling properties of MNPs from marine macro algae, sponges and holothuria.
- Bacteriocin - producing bacteria with biopreservative potential were isolated from marine organisms. Immobilization techniques standardized for new bacteriocins.
- Developed a Marine Natural Product (MNP) incorporated feed for shrimp to boost the non-specific immune defense system and demonstrated its potential in field conditions. Administration of MNP feed had enhanced the survival of *P. monodon* in the farmer's field conditions with a production of 5790 kg/ha/150 days.

- Probiotic bacterial isolates for bioremediation, managing detritus and increasing specific growth rate in shrimp farms and increased survival in pearl oyster hatchery were isolated and successful field trials were accomplished.
- Marine sponge culture techniques (grow out techniques in aquaria and in open sea conditions) were developed for consistent supply of bioactive metabolites from sponge explants.
- Developed captive husbandry and nursery strategies for mass rearing of the threatened species of sea horse (*Hippocampus kuda*). New tagging techniques for sea horse were developed and tested.
- Deposited several gene sequences of importance as 'Gen Bank' accessions (28 accessions).



Limpet foot assay Infected ornamental fish and lobsters

Transfer of Technology

A technology for spherical pearl production was developed at this centre of CMFRI in 1970s. The technology developed at this Research Centre for the rope culture of brown mussel and for the indigenous method of pearl culture was approved by the National Research Development Corporation (NRDC) and were transferred to the Department of Fisheries, Government of Kerala in 1979, who took up two Pilot Projects at Vizhinjam.

Lobster culture technology was transferred to the fishermen groups at Kanyakumari district and several successful harvest were made by the groups and now the same is being practised in nearby areas with innovative modifications .



Harvesting of lobsters at Kanyakumari

Harvested lobsters

Training programs

Centre organises training programs at regular intervals for officials and farmers on marine ornamental fish breeding and keeping, sea cage farming and designer pearl production.



Training Manuals



Exhibitions



Staff strength and research facilities

The present complement of staff is as follows: Scientist 6, technical officers 9, Technical Assistants 2, administrative Staff 3 and Skilled Support Staff 4. There are 14 ongoing research projects handled by the scientific and technical staff. The Laboratory is equipped with research microscopes, spectrophotometers, water quality analysers, hot-air ovens, centrifuge, pH meter, autoclave, microtome, electronic

balances, air compressors, water-lifting pumps, refrigerators, deep freezer, LCD projectors, culture tanks and under water cameras, SCUBA diving sets. There is a library with the holding of over 2000 books and periodicals. The University of Kerala has recognised this as a centre for doctoral research.

Consultancy services

VRC of CMFRI provides consultancy services as per ICAR guidelines; in impact assessment studies (of port, man-made structures in sea, sea life parks, factories and thermal plants), feasibility studies, biodiversity, disease investigations, designing of marine aquariums and mariculture projects for state governments. Consultancy projects were taken up for various clients and completed projects include:

1. Impact assessment of multi-purpose reef at Howa Beach, Kovalam, Thiruvananthapuram on fishery resources of the area. For DOT, Govt. of Kerala.



2. Baseline data collection and monitoring on environment and social impact assessment for the development of Vizhinjam port. For Asian Consultant Engineers/Govt. of Kerala



WAY FORWARD

1. Development of strategies for ensuring sustainability in the exploitation of major marine bio-resources such as tunas, clupeids, carangids, perches, cephalopods, mussels and lobsters distributed along the south-west coast of India.
2. Development/refinement of existing technology for captive breeding and seed production of marine ornamental fishes such as pomacentrids, acanthurids, labrids, and food fishes like carangids, lutjanids and lethrins.
3. Refinement of pearl culture techniques and farming of lobsters.
4. Pathogen profiling, diagnostics and health management practices of maricultured finfish and ornamental fishes.
5. Development of live feed culture techniques for selected microplankters such as copepods and rotifers.
6. Development of advanced technologies for marine ornamental fish keeping.
7. Development of knowledge base of marine biodiversity of south-west coast of India and Lakshadweep Archipelago to formulate conservation measures.

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