

40 YEARS
OF
RESEARCH AND DEVELOPMENT
IN
MARINE FISHERIES IN INDIA



**A Souvenir issued at the National Symposium on
Research and Development in Marine Fisheries
held at Mandapam Camp, 16 - 18 September 1987, to mark
the 40th Anniversary of
Central Marine Fisheries Research Institute, Cochin
(Indian Council of Agricultural Research)
P. B. No. 2704, E. R. G. Road, Cochin-682 031**

Central Marine Fisheries Research Institute

The Central Marine Fisheries Research Institute was established in February 1947 under the Union Ministry of Food and Agriculture. In October 1967 the administrative control of the Institute was transferred to the Indian Council of Agricultural Research.

OBJECTIVES

The main objectives of the Institute as redefined under the VII Plan are:

1. To conduct research for assessing and monitoring the exploited marine fisheries resources leading to rational exploitation and conservation
2. To assess the underexploited and unexploited marine fisheries resources of the Exclusive Economic Zone
3. To understand the fluctuations in abundance of marine fisheries resources in relation to changes in the environment by conducting vessel based programmes
4. To develop suitable mariculture technologies for finfish and shellfish in open sea to supplement marine fish production
5. To conduct transfer of technology and post-graduate and specialised short-term training programmes

RESEARCH FACILITIES

After shifting the headquarters from Mandapam Camp to Cochin, the Institute maintains a Regional Centre at Mandapam Camp, and 11 Research Centres: at Veraval, Bombay, Karwar, Mangalore, Calicut and Vizhinjam on the west coast,

Tuticorin, Madras, Kakinada and Waltair on the east coast and Minicoy in Lakshadweep. Besides the Research Centres, smaller establishments known as Field Centres function at 28 locations along the coasts of India.

The Institute's headquarters at Cochin have its own permanent four-storeyed laboratory-cum-administrative building with a plinth area of 8865 sq.m. In addition, the Institute has rented accommodation at the Fisheries Harbour premises for wet laboratory work and another on the Foreshore Road for ship-stores and Vessel Management Cell.

The headquarters at Cochin has well-equipped laboratories of different Divisions handling various research problems in capture fisheries, mariculture and related subjects. Common facilities include a 'Hitachi' H 600 Transmission-Electron Microscope with H. 6010 scanning system. This microscope, the only one of its kind in the country, is capable of magnifying objects 300,000 times in analytical system and 800,000 in ultra high resolution system. Atomic Absorption Spectro-photometer, Amino Acid Analyser, and a fully equipped Radio Isotope Laboratory are also available. The establishment of an ECIL micro-32 computer facility with a memory capacity of 512 Kilobytes expandable to 16 Megabytes and necessary periferal is underway.

The Regional Centre of the Institute at Mandapam Camp functions in the old headquarters campus with its laboratories and residential accommodation for the staff. The Centre has also a fish farm for experimental finfish culture, a guest house, vehicles and mechanised boats for inshore fisheries research work.

The Research Centres of the Institute at Calicut and Karwar are located in permanent buildings with essential laboratory and other infrastructure facilities. The Research Centre at Tuticorin has its own facilities for laboratories and hatcheries for edible oyster and pearl oyster. The Centre has also got transport and boat facilities in addition to a saltwater fish farm. The Research Centre at Madras, apart from the main laboratory, has two field laboratories at Muttukad and



Headquarters
at Cochin

Kovalam. The Centre maintains a 13.4 m boat for inshore work.

RESEARCH VESSELS

The Institute owns seven 13.4 m long R. V. CADALMIN series of vessels, equipped for inshore fishery work and they are based at headquarters and the different research centres. In addition, R.V. SKIPJACK (OAL: 32.6m) was acquired in 1982. This vessel is capable of bottom and midwater trawling and oceanographic work over the shelf and adjacent waters. In December, 1984, the Department of Ocean Development, Government of India, placed the FORV SAGAR SAMPADA (OAL: 71.5 m) at the disposal of Indian Council of Agricultural Research, as a national facility to be used by Institutions involved in marine sciences research work. The Central Marine Fisheries Research Institute has been identified as a nodal organisation by the ICAR to manage the scientific programme of the vessel. FORV SAGAR SAMPADA is equipped with sophisticated acoustic and analytical instruments for conducting fish resources survey, oceanographic work and meteorological studies.

MOBILE LABORATORY

A well equipped mobile laboratory installed in a Leyland bus carries out spot investigations as required from time to time in coastal areas for pollution and mariculture work.

LIBRARY

The headquarters library at Cochin and the library at the Regional Centre at Mandapam Camp have a large collection of reference books, periodicals, expedition reports, reprints etc. The current holding is of the order of 50,000 volumes and the Institute is receiving 350 titles of periodicals regularly.

MANPOWER

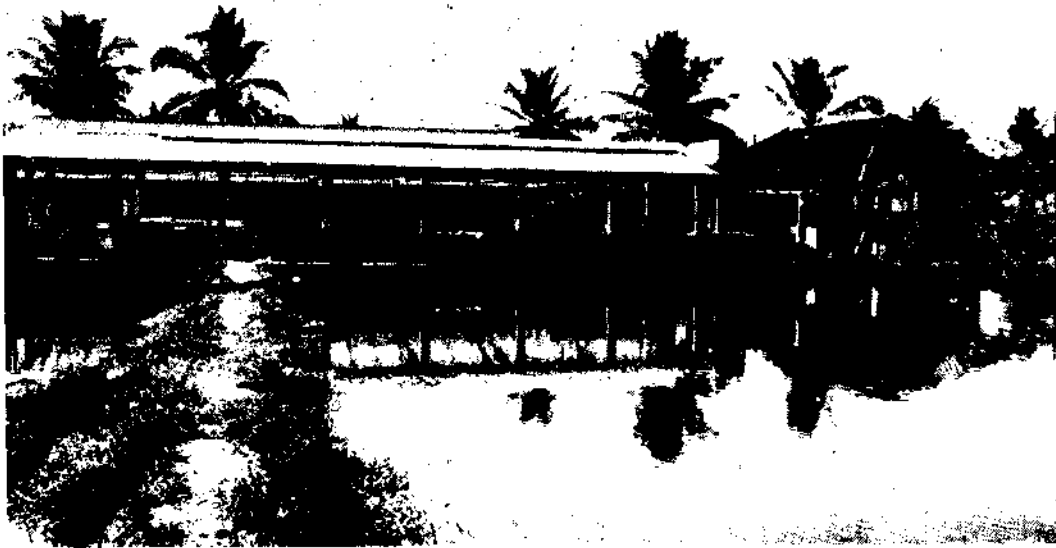
As at the end of VI Plan, the sanctioned staff strength of the Institute includes 238 Scientists, 458 Technical staff, 176 Ministerial staff, 291 Supporting staff, and 16 Auxilliary staff.

SCIENTIFIC DIVISIONS AND RESPONSIBILITIES

The Institute has 9 scientific Divisions functioning under respective Division heads. The main functions of the various divisions are as follows.

The major technical programmes of the FISHERY RESOURCES ASSESSMENT DIVISION are Survey and stock assessment of fishery resources and collection, analysis and dissemination of fishery statistics. Relevant economic aspects of marine

Narakkal

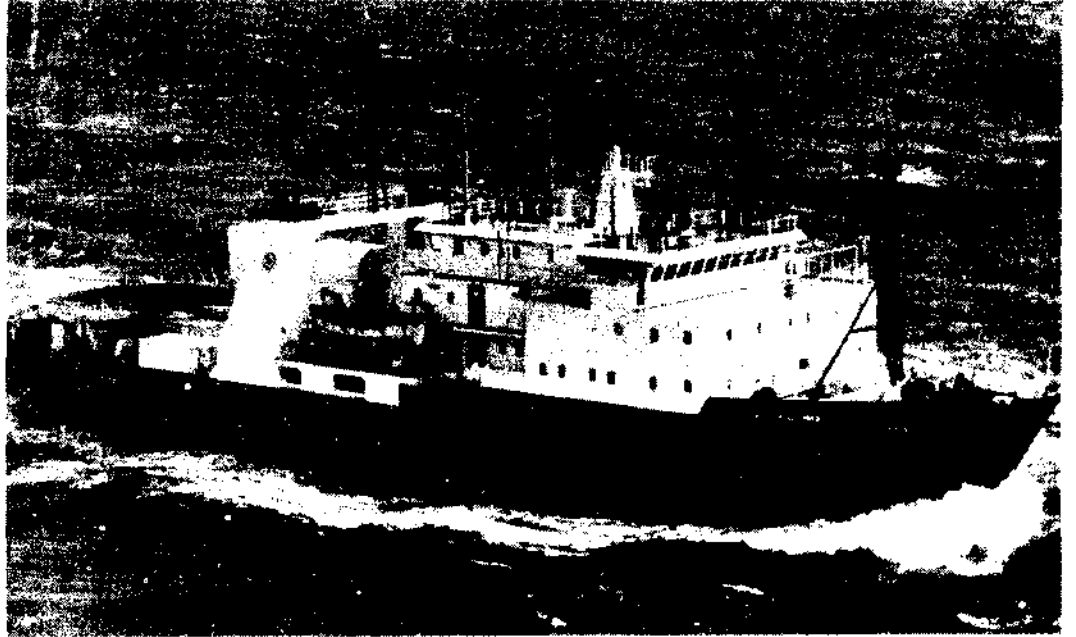


Muttukad



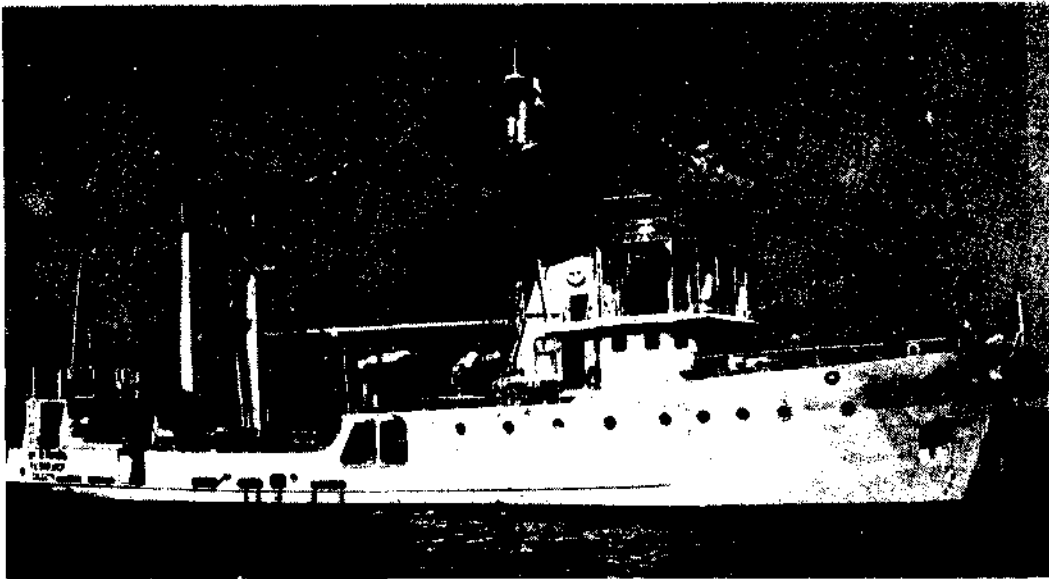
Field laboratories at Narakkal, Tuticorin, Kovalam and Muttukad, with new equipments and hatchery systems, have facilitated many breakthroughs in mariculture, including induced breeding and completion of lifecycles under controlled conditions, of prawns, pearl oyster and edible oyster, lobsters etc.

FORV Sagar Sampada



MFV Cadalmin

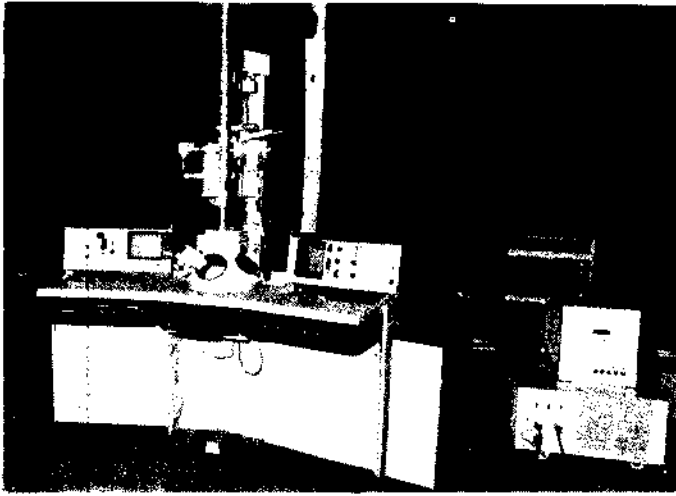




RV Skipjack



The well-equipped mobile laboratory carries out on-the-spot pollution studies in coastal mariculture



Electron microscope
with H 6010 scanning system

capture fisheries and mariculture, socio-economic impact studies and all aspects of marine fisheries extension are tackled by the FISHERY ECONOMICS AND EXTENSION DIVISION. The major functions of the Divisions of PELAGIC FISHERIES, DEMERSAL FISHERIES, CRUSTACEAN FISHERIES and MOLLUSCAN FISHERIES are to monitor the characteristics of the respective commercially exploited resources, their stock assessment, management and conservation measures and the mariculture of finfishes and shellfishes. The FISHERY ENVIRONMENT AND MANAGEMENT DIVISION is concerned with fishery oceanography, environment studies, remote sensing, marine pollution, seaweed resources and culture and farm engineering. Multidisciplinary researches on physiology, nutrition and pathology on finfishes and shellfishes are implemented by the PHYSIOLOGY, NUTRITION AND PATHOLOGY DIVISION. The LIBRARY AND DOCUMENTATION DIVISION is responsible for book and journal procurement, reference service, reprography and printing of Indian Journal of Fisheries and other publications.

OVERALL ACHIEVEMENTS

The major emphasis of the Institute's research effort is on capture fisheries, which account for the bulk of the marine fish production in the country. The significant achievements in capture fisheries are mentioned below.

ASSESSMENT OF FISHERY RESOURCES

The Institute has developed a multi-stage stratified random sampling design for the estimation of marine fish landings in the country at national and state levels. The design developed by the Institute has been recommended by the FAO for adoption by other developing countries. Resource-wise and region-wise production estimates are made available to national and international organisations. Dissemination of these data on the exploited resources is carried out through the National Marine Living Resources Data Centre (NMLRDC) which is recognised by the Planning Commission as the repository of all fishery resources data.

Information on fishermen population, gear, craft, employment details, educational standards and infrastructure facilities available in the marine fisheries sector have been collected periodically through frame surveys. This census data are widely used by the State and Central agencies for planning and development purposes.

For application of stock assessment models and proper interpretation of results, training courses for personnel engaged in fisheries research and teaching has been taken up periodically. A very recent significant achievement has been the development of management advice for each maritime state based on analysis of data collected on the exploited marine fisheries resource for the 10-year period (1975-1984).

PELAGIC FISHERIES

The rate and pattern of exploitation of pelagic fish resources of the west and east coasts of India have been studied by monitoring the landings from the artisanal, drift net and purse seine fisheries. Studies on the stocks of oil sardine (*Sardinella longiceps*) on the west coast of India indicated high potential (annual average stock size of 400,000 tonnes) and possibilities of increasing catches by stepping up fishing effort in the offshore grounds, employing efficient fishing methods like purse-seining.

The stock assessment studies on Indian mackerel (*Rastrelliger kanagurta*) have revealed an average annual stock

level of 265,000 tonnes off the south west coast of India (7°-17°N) and about one third of this stock is found beyond 25 m depth. Studies on the exploited resources indicate that any further increase in the catches should come from the off-shore stocks or by increasing the age at capture by increasing mesh size.

Studies on the stock assessment of bombayduck, *Harpodon nehereus*, revealed that at Nowabunder, Saurashtra coast, the present level of exploitation is close to the maximum sustainable yield and that any further expansion in the fishery would result in the over-exploitation of the stocks. However, higher sustainable yield is possible by increasing the size at capture.

Stock assessment studies on anchovies, tunas, seerfishes, horse-mackerel and ribbon fishes have indicated high potential and possibilities of increasing production from their stocks.

DEMERSAL FISHERIES

By frequently participating in the exploratory surveys conducted by the Government of India vessels, the Institute has charted out productive fishing grounds for sciaenids off Kutch, Dwaraka and Porbunder, for eels off Bombay and Cambay, for prawns, nemipterids and perches off the south west coast, for silverbellies off southeast coast and for catfishes off northeast coast. Similarly the resource characteristics of catfishes, nemipterids and their stocks have also been assessed.

Investigations on the presently exploited demersal resources have shown that with the rapid development of the mechanised trawling in recent years many of the inshore fisheries are under heavy pressure and damage to stock can be avoided only with a decrease in fishing effort or increasing the mesh size of gear used. This has great relevance to future development plans on marine fishery resources.

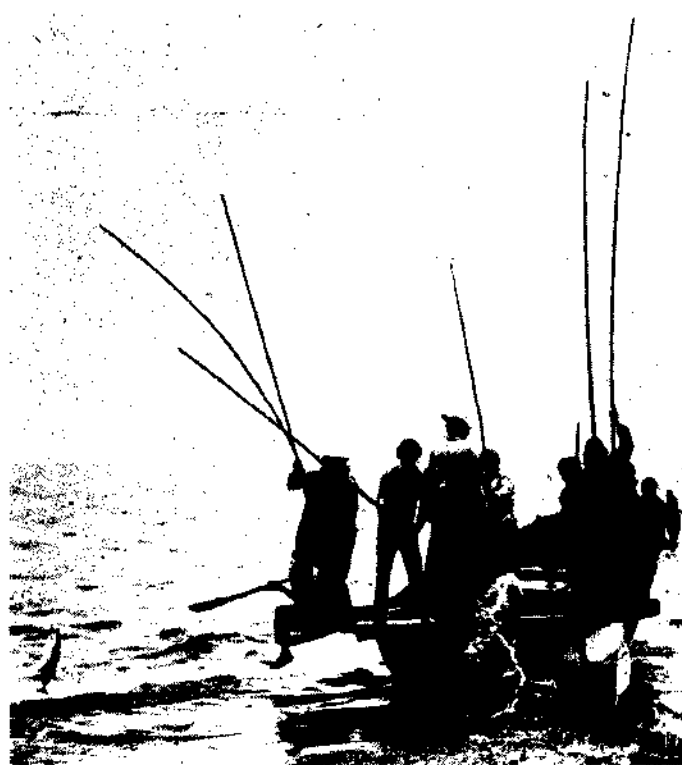
CRUSTACEAN FISHERIES

The rapid expansion of the export market for prawns and the consequent introduction of a large number of small



Periodical monitoring of coastal demersal resources using MFV Cadalmin

Pole-and-line fishing at Minicoy





Oceanic
Cuttlefish

mechanised boats for prawn fishing necessitated a concerted effort by the Institute to study the prawn fisheries on an all India basis. A wealth of information was collected on the distribution and abundance of the prawn species in space and time, growth, feeding habits, fecundity, sex ratio, and movements. Life cycles and juvenile phase of prawns in brackishwater environment have been studied in detail.

The deep sea lobster (*Puerulus sewelli*) and the deep sea prawn resources of the southwest coast of India were studied in detail. Relatively high concentration of prawn exists on the "Quilon Bank" at 301-375 m depth zone and in slightly deeper areas off Ponnani, on the upper continental slope.

Realising the fact there has been some economic over-fishing for prawns in certain sectors of our coast, detailed stock assessment studies of important prawn species have been made. Using the data on catches and fishing effort collected over a period of ten years the magnitude of the prawn resources, the maximum sustainable yield and corresponding optimum fishing effort were estimated. The estimates showed that increasing the fishing effort beyond the present level is not likely to increase the prawn yield.

Intensive tagging programme coupled with drift bottle studies showed that the white prawns, *Penaeus indicus*, migrated from Cochin on the south-west coast to Tuticorin on the east coast following the coastal currents. Apart from the studies on the prawn resources of the country, the other crustacean resources such as rock lobsters, crabs and stomatopods have also been the subject of study.

MOLLUSCAN FISHERIES

An inventory of the molluscan resources such as clams, oysters and mussels has been made covering the entire mainland coast as well as the Andaman and Nicobar Islands.

The clam resources of the estuaries in Karnataka and Kerala have been investigated in detail in the context of the recent spurt in export of calms including baby calms. Such resource surveys have also been carried out on green mussel

and brown mussel along the west coast. Underwater surveys of the pearl banks of the Gulf of Mannar using SCUBA equipments and assessment of the population of pearl oysters and chanks in the natural beds were made. These surveys helped in predicting the pearl and chanks fisheries in the region.

Vast potential resources of oceanic squid *Symplectoteuthis oualaniensis* in EEZ of India have been indicated based on the exploratory survey results of FORV Sagar Sampada. Resources characteristics and stock assessment of most of the commercially important species of *Loligo* and *Sepia* have been made.



Baitfish fishing

FISHERY ENVIRONMENT MANAGEMENT

The study of fishery related environmental factors which received considerable attention were initially confined to the coastal belt. Since late fifties, facilities of the Indo-Norwegian Project's vessels have been availed to study the oceanographic features of the entire shelf and the Lakshadweep. Better understanding of the seasonal phenomenon of upwelling and dynamics of mudbank formation was obtained from these studies.

Estimates of the fish resources were made for the first time in the country on the basis of primary productivity studies using C14 technique.

Studies on marine mammals and turtles were taken up from a conservation angle with repeated seasonal observations on the 'Aribada', the mass nesting of turtles at Gahirmatha beach in Orissa. Surveys and ecological studies in connection with establishment of a marine national park in the Gulf of Mannar were completed. Studies on ancillary resources like corals, sponges, echinoderms and seaweeds contributed to development of resource data on these. Studies on marine pollution and bioactive agents in marine organisms received attention in the programmes of the Division.

Recently the Institute collaborated with Space Application Centre, Ahmedabad, and National Remote Sensing Agency, Hyderabad, in joint experiments for the utilisation



Lakshadweep corals



Pearl oyster
with cultured
pearl in situ

of satellite data to locate areas of high productivity in the EEZ.

FISHERY ECONOMICS AND EXTENSION

With increasing emphasis on the utilisation of the resources of Exclusive Economic Zone and the formulation of integrated rural development programmes in mariculture, a whole range of economics of operations of both capture and culture fisheries and also socio-economics of fisherfolk have gained considerable importance.

Through a number of case studies, the socio-economic aspects of fishermen families in Kerala, Maharashtra and Gujarat have been investigated and the attention of institutional agencies was drawn to play more dynamic role as credit agencies to the fishermen, so as to save them from the harassment of middlemen. The Institute has also conducted studies on the economics of different types of fishing units, especially the traditional craft fitted with outboard motor, marketing aspects such as price spread at various levels, and also the role of women in small-scale fisheries activities.

PHYSIOLOGY, NUTRITION AND PATHOLOGY

Since 1982, the Institute took up appropriate multi-disciplinary programmes on physiology, nutrition and pathology of fish and shellfish, which formed either complement-

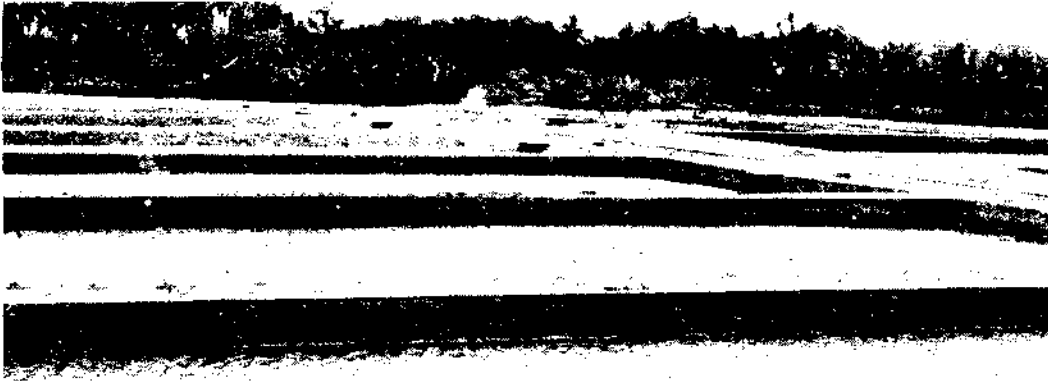
ary or supplementary effort to the major ongoing research programmes in mariculture. The current programmes concentrate on problem-oriented research such as ecophysiology and respiratory physiology of fishes and shellfishes, protein variation and nutritional requirements of prawns; reproductive physiology of grey mullets; nutritional needs of milkfish and survey of finfish and shellfish diseases and pathology of soft prawns.

MARICULTURE

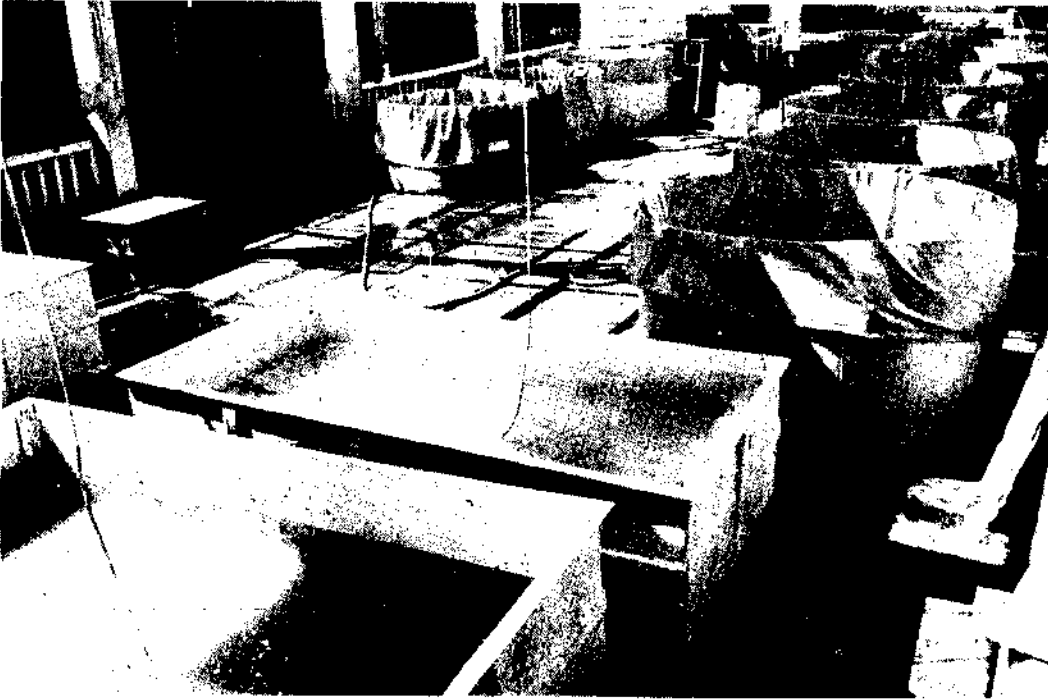
PRAWN CULTURE

The Institute took up experimental studies on various aspects of prawn culture since 1975 and all the commercially important species of penaeid prawns such as *Penaeus indicus*, *P. monodon*, *Metapenaeus dobsoni*, *M. monoceros*, *M. affinis* and *Parapenaeopsis styliifera* have been made to spawn in the laboratory and their larvae reared up to the post-larval stage under controlled conditions. To feed the prawn larvae, indigenous methods for culturing live feed organisms such as diatoms, rotifers and cladocerans on a large scale were developed. The larval rearing technique was improved and simplified. The Institute has by now evolved a totally indigenous, low cost technology for the hatchery production of penaeid prawn seed specially suited to the Indian conditions. The Institute provides technical assistance to prawn farmers and development agencies for accelerating the programmes in prawn culture. At present the Institute is assisting technically various State Governments and MPEDA to establish hatcheries for production of seed.

A technique of artificial insemination of *Penaeus indicus* and *P. monodon* has been developed. This is a significant achievement that is basic to all future work on selective breeding of prawns for improving production in culture systems.



**Fish farm
at Mandapam**



A hatchery system

CULTURE OF OTHER SHELLFISHES

A significant breakthrough was achieved in developing indigenously the technique of pearl culture, which led to the establishment of a commercial pearl culture project in India for the first time. Cultural pearls are produced through raft culture with a production rate of 60-70% in nucleus-implanted oysters in 3 to 24 months.

Another major achievement has been the development of techniques for oyster seed production in hatcheries. Following the initial breakthrough in technology for pearl oyster seed production, the edible oyster seed are also produced on large scale in experimental hatchery. Similarly, mussel has been brought under the hatchery technology development programmes.

Open-sea mussel farming techniques developed at the Institute have given high production rate (10-15 kg of mussel per metre length of rope, equal to 60-70 tonnes/ha). Edible oyster farming technology has been established to produce 150 tonnes/ha/annum.

FINFISH CULTURE

Experimental finfish culture had been part of the Institute's programme from the early years at Mandapam. The culture programme was intensified and extended to other centres like Tuticorin, Madras, Calicut and Narakkal by mono- and poly-culture-techniques in ponds, cages and pens. Milkfish and mullet have been reared successfully in ponds and pens. Induced breeding experiments conducted on *Mugil cephalus* with H.C.G. hormone along with pituitary-gland extract have yielded encouraging results.

SEAWEED CULTURE

Experimental field cultivation of the agarophytes, *Gracilaria edulis* and *Gelidiella acerosa*, in the Gulf of Mannar showed that *Gracilaria edulis* grow to harvestable size within 60 days yielding 3 kg/sq.m. *Gelidiella acerosa* attained the same rate of production in 75 days. This yield is about 3 times the rate of natural production.

SPECIAL SURVEYS IN LAKSHADWEEP GROUP OF ISLANDS

A series of special surveys were planned and implemented since January 1987, aimed at an overall assessment

of various types of fishery and ancillary living resources and their potentials. During the surveys, it was found that considerable damage had taken place to the coral reefs around Minicoy and certain other islands owing to dredging, silting and sand mining.

Skipjack (*Katsunonus pelamis*) and young yellowfin tuna (*Thunnus albacares*) constitute the major tuna resources exploited by the islanders by live-bait pole and line fishery. There seemed to be no scarcity for live baits in the islands surveyed except in Amini and Kiltan. Over 45 species of live baits were observed during the survey. *Spatelloides delicatulus* and *S. japonicus* dominated among them.

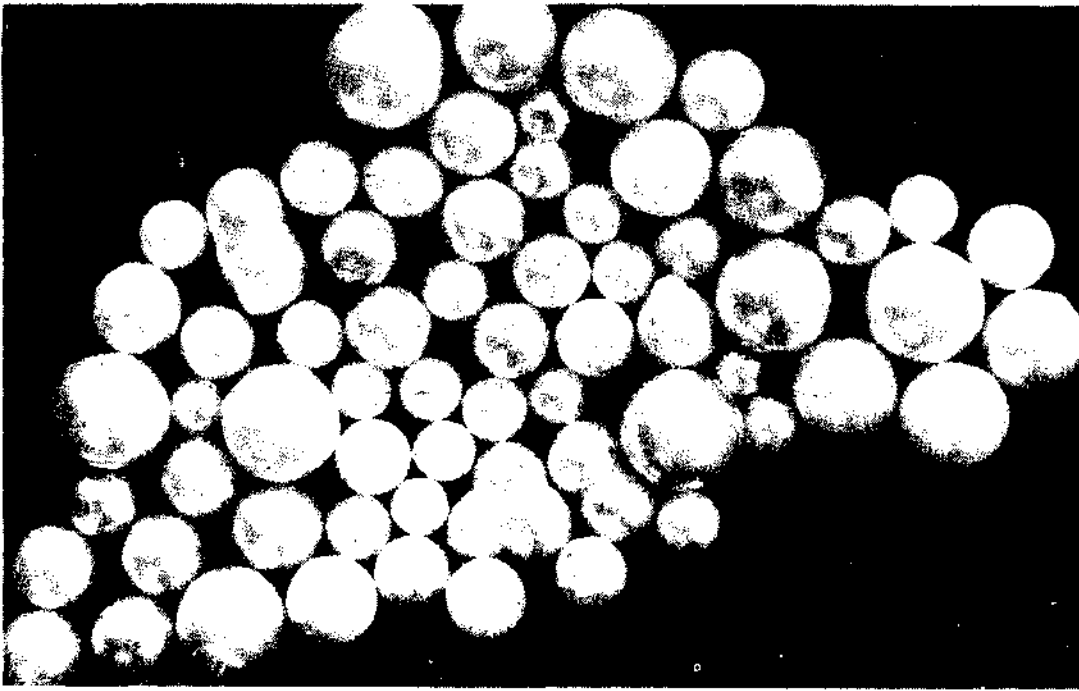
The survey results also indicate that over 70 species of ornamental fishes occur in these islands, of which 30 are exportable. The survey teams collected information on seaweeds, sponges, echinoderms, crustacean resources, and other invertebrates and gathered interesting data on marine mammals and sea birds and locations which could be developed as marine parks.

FORV SAGAR SAMPADA

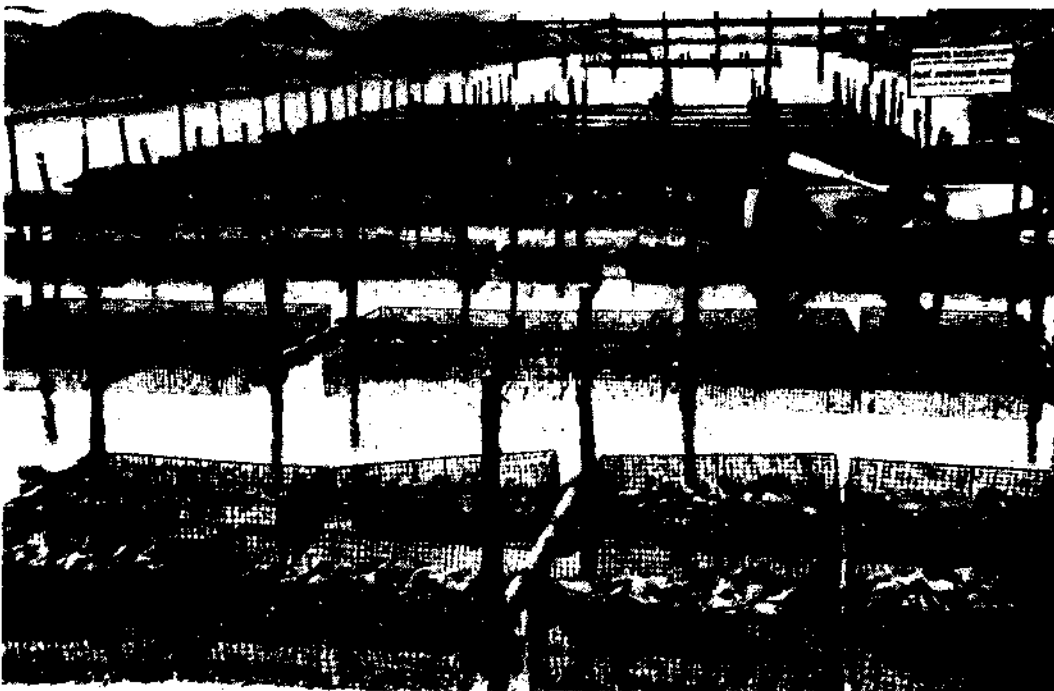
The vessel commenced its regular cruises from January 1985 and completed 29 cruises up to May 1987 spending 533 days at sea and covering a track distance of 1,49,580 line km. The EEZ of the country including Laccadive archipelago and Andaman sea have been surveyed by the vessel. The equatorial waters were surveyed for the oceanic resources.

The highlights of the results are as follows:

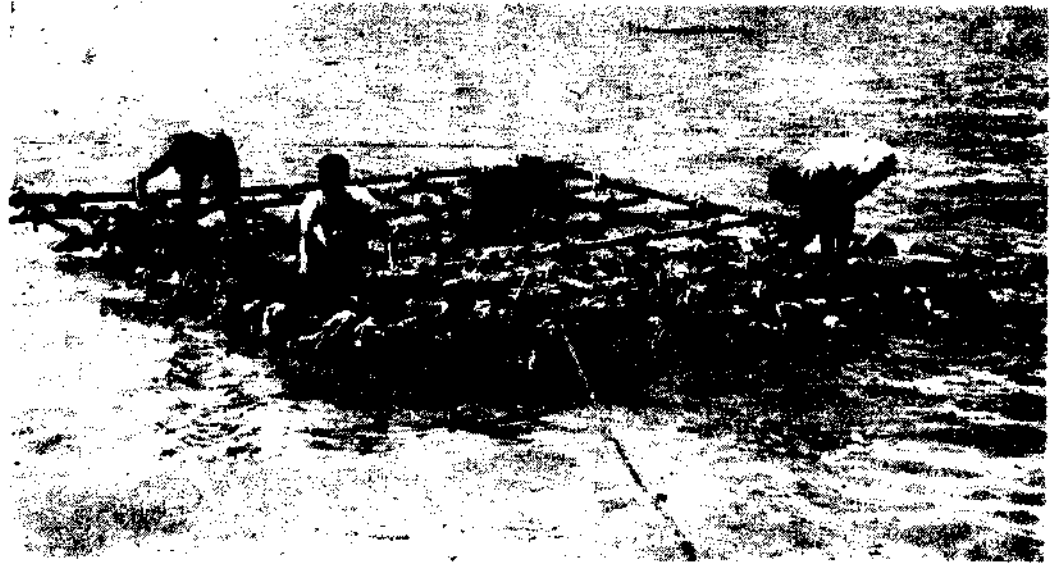
For the first time an authentic record of the occurrence of the large deep sea prawn, *Plesiopenaeus edwardsianus*, in 870 m depth grounds off Trivandrum was made. The vessel has located the spawning grounds of several species of fishes over the Angria Bank. Extensive swarms of oceanic crabs along the southwest coast during the southwest monsoon period have been observed and large tuna shoals have been



Cultured pearls



Cage culture of
edible oyster



**Raft for culture
of pearl oyster**



**Opensea
rope culture
of mussels**

located during post-monsoon time off central west coast. A variety of juvenile fishes, especially tunas, in the Lakshadweep area were observed in December-January and July-August periods and dominant oceanic squid component in July-August periods. The vessel has been able to locate large concentration of threadfin-bream, cuttlefish and squids in the Wadge Bank in August-September period.

EDUCATION, TRAINING, TRANSFER OF TECHNOLOGY

POST-GRADUATE AND PH.D. COURSES

A Centre of Advanced Studies in Mariculture (presently named Post-Graduate Education and Research Programme in Mariculture) was established at the Institute as a project sponsored by the ICAR/FAO/UNDP in June 1979. The Centre has regular semester courses for M.Sc. in Mariculture and Ph.D. programmes on many specialised aspects relating to mariculture. In the M.Sc. mariculture programme 48 candidates have been conferred the degree between 1980 and 1987. Eighteen candidates are now undergoing semester courses. In the Ph.D. programme 22 scholars have completed the research work and 5 have been awarded Ph.D. degree of the Cochin University of Science and Technology.

SUMMER INSTITUTES

Between 1974 and June 1987, the Institute conducted 5 Summer Institutes on different subjects such as coastal aquaculture, breeding and rearing of marine prawns, culture of edible molluscs, hatchery production of prawn seed and culture of marine prawns and finfish and shellfish nutrition.

TRANSFER OF TECHNOLOGY

One of the objectives of the Institute is to effect transfer of technology through various practical training programmes organised regularly at the Institute. Under this programme training is imparted in marine prawn culture, pearl culture, edible oyster culture, fishery resources assessment, under-

water diving and use of acoustics in fishery exploratory surveys. During the past five years more than 200 personnel from Universities, State Government Departments, MPEDA and from abroad have been trained under the different programmes.

KRISHI VIGYAN KENDRA

The Krishi Vigyan Kendra of CMFRI was established at Narakkal in 1976 and has since been engaged in giving intensive short term practical training in prawn and fish farming and related aspects. The KVK disseminates technologies developed at the Institute on the culture of marine prawns, fishes and molluscs, ensuring a steady flow of scientific and technical knowledge from the laboratory to the farms. The Kendra has trained so far 5143 persons consisted of 2498 men and 2645 women.

TRAINERS' TRAINING CENTRE

The Trainer's Training Centre was sanctioned for the Institute in October 1983. The TTC organised training courses on hatchery production of penaeid prawn seed, prawn farming, hatchery production of edible oyster seed, farming of edible oysters and seaweed culture for senior level officers of the maritime States.

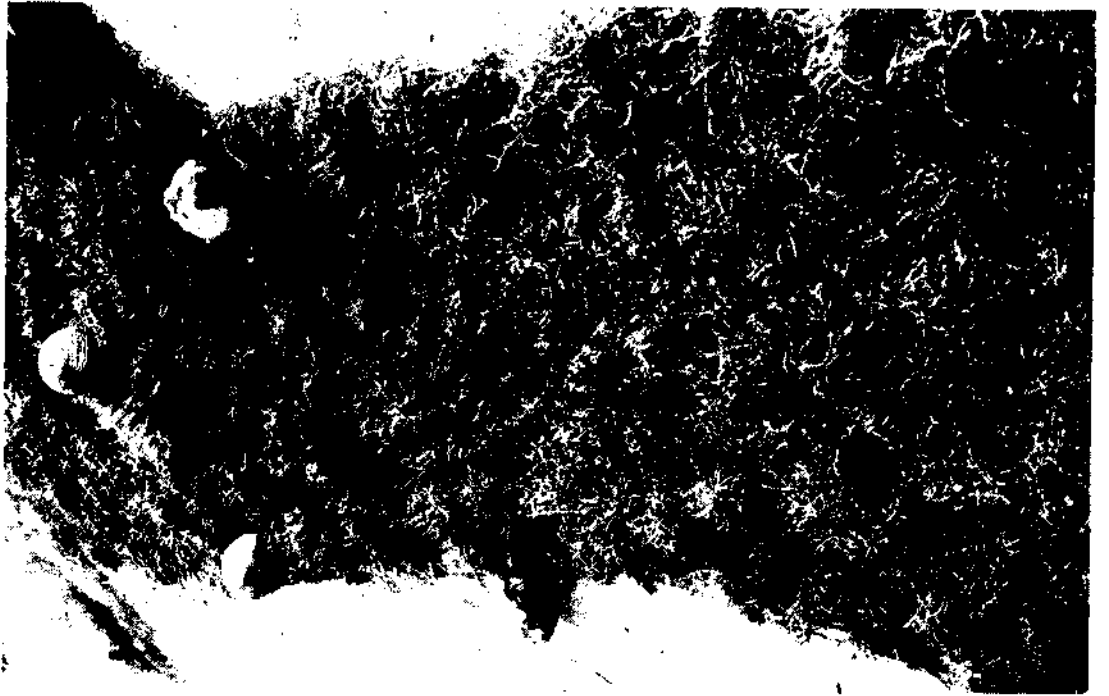
LAB-TO-LAND PROGRAMMES

As part of the Golden Jubilee Celebrations of the ICAR, Lab-to-Land Programmes were organised by the Institute during 1979-80. Under this programme the proven technologies developed at the Institute on various aspects of mariculture were transferred to fishermen and small farmers in the coastal areas. About 300 families distributed in the coastal districts of Kerala, Karnataka and Tamil Nadu were benefited by the Scheme.

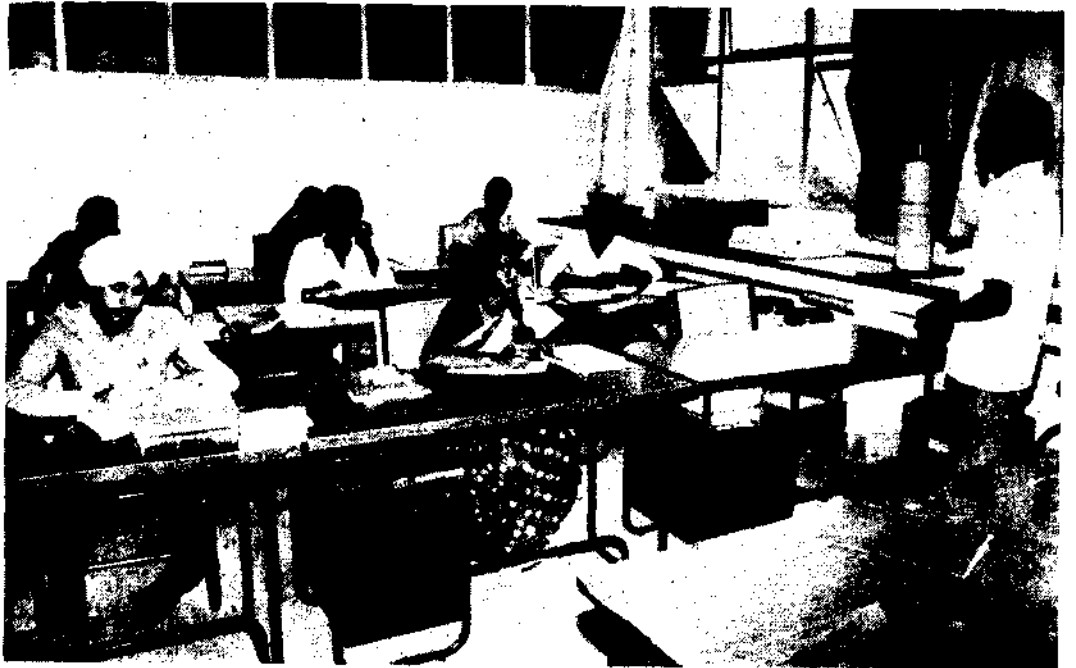
BLENDING OF SEA FARMING

WITH TRADITIONAL CAPTURE FISHERIES

In order to benefit fishermen and their family members, whose labour potential has not been fully utilised, an Opera-



Cultured
agarophyte
Gracilaria



M.Sc, Class

tional Research Project on blending sea farming with capture fisheries was undertaken since 1979 at Kovalam near Madras. Under this project 975 families were trained in the methods of mariculture of fishes, prawns and molluscs.

LIBRARY, DOCUMENTATION AND PUBLICATION

The Institute has built up steadily one of the excellent library facilities with a holding of more than 50,000 books and 350 titles of periodicals.

The sustained research and development activities of the Institute over the past 3 decades have resulted in building up a strong information base at the Institute through various publications as detailed below:

1. Indian Journal of Fisheries (quarterly) (34 volumes)
2. CMFRI Bulletins (occasional) (40 Numbers)
3. CMFRI Special Publications (occasional) (39 Numbers)
4. CMFRI Newsletters (monthly) (34)
5. Marine Fisheries Information Service (monthly) (70)
6. R & D Series for Marine Fisheries Management (Handouts) (Nos. 1 to 10)
7. Annual Scientific Reports (up to 1985-86)
8. Research Highlights (up to 1985-86)

BUDGET OF THE INSTITUTE

During the VI Five Year Plan period (1980-85) the actual expenditure was Rs. 680.6 lakhs under the Non-

Plan and Rs. 722.5 lakhs under the Plan. The total outlay for the VII Plan period is Rs. 443.25 lakhs, and in the first two years (1985-87) an expenditure of Rs. 569.44 lakhs under Non-Plan and Rs. 284.2 lakhs under Plan has been made.

FUTURE PROGRAMMES

The immediate objectives of the Institute would be to utilise fully the infrastructural facilities available with the Institute at Headquarters and other research centres for collecting, monitoring and analysis of information on exploited inshore marine fisheries resources and environmental parameters leading to their rational exploitation and conservation. Assessment of the resources of underexploited and unexploited marine fisheries resources of the EEZ by vessel-borne programmes will receive high priority. Efforts in upgrading mariculture technologies for finfish and shellfish production in open sea and transfer of technology programmes and the post-graduate education, research and training programmes will continue.

The Institute is planning to implement mission-oriented projects with the help of funding agencies such as MPEDA, Department of Environment, Department of Science and Technology and the ICAR on specific subjects such as fish/prawn genetic resources, seaweed resources, edible oyster production, beche-de-mer resources, ornamental fish resources survey, establishment of marine parks etc. From the conservation point of view, the Institute proposed to have schemes for the conservation of the marine mammals, turtles, dugongs, corals and coral reef resources. The Institute will be rendering advice to maritime States on management of marine fishery resources, and setting up of prawn hatcheries.

Communicated by Dr. P. S. B. R. James, Director, CMFR Institute, E.R.G. Road, Cochin 682031.