

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

# College of Fisheries, University of Agricultural Sciences, Karnataka

## ESTABLISHMENT

The College of Fisheries, Mangalore, a constituent part of the University of Agricultural Sciences, Bangalore, was established in 1969. It has the honour of being the first College to be established to impart professional fisheries education at University level. The Japanese-equipped erstwhile Marine Products Processing Training Centre transferred to the College by the Government of Karnataka had formed the nucleus of the College.

## OBJECTIVES AND FACILITIES

The College was established with the primary aim of providing professional education in Fishery Science at undergraduate and post-graduate levels, for furthering knowledge in this field through systematic research and for transmission of knowledge gained from research results. The College has the necessary facilities for academic instruction, practical field experience and research, all at one place. The Main Campus of the College is located on a 15 ha plot, whereas its Technology wing, housing the Departments of Fish Processing Technology and Fishery Engineering, is situated on the meeting place of the Nethravathy, the Gurupur and the Arabian Sea, about 5 km away from the Main Campus. The College has well-equipped laboratories for student training and research and sophisticated Japanese machineries for fish processing. The College has three mechanised trawlers and one purse-seiner and also a fairly well-developed fish farm. The library of the College which has over 13,500 books on fishery science and related subjects and receives about 250 journals and periodicals from different parts of the world is considered one of the best in the country.

The instructional and research activities of the College are carried out through the Departments of Aquaculture,

Fishery Biology, Aquatic Biology, Oceanography, Fishery Microbiology, Fish Processing Technology, Fishery Engineering, Fishery Economics, Fishery Biochemistry and Fishery Statistics. The instructional programme consists of a 4-year B.F.Sc. degree course and a 2-year M.F.Sc. course in Fish Production and Management and Industrial Fishery Technology and 3-year Ph.D. programmes in Fishery Biology, Aquaculture, Aquatic Biology, Fishery Oceanography and Fish Processing Technology. The one-year post-graduate diploma course in fish processing technology (D.F.P.T.) which was being conducted till 1973 has since been discontinued.

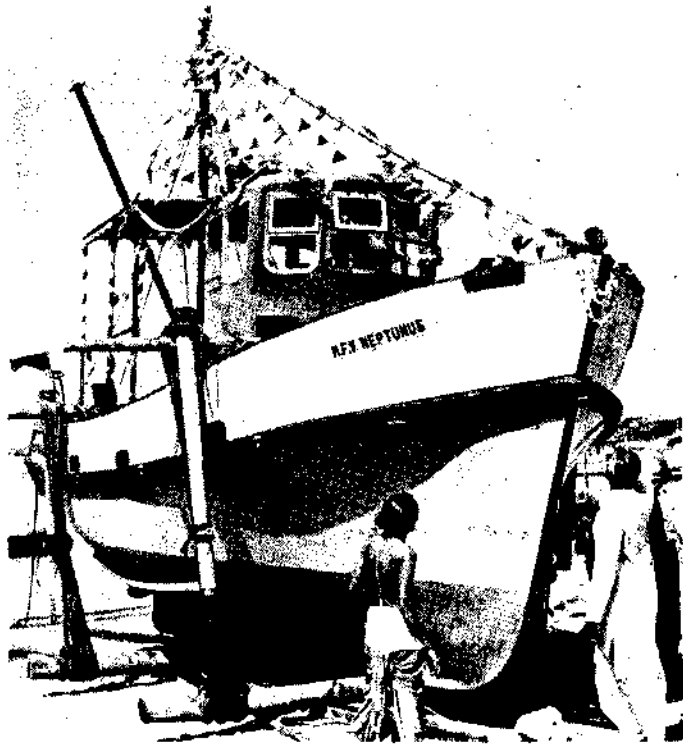
The College also conducts ad hoc short-term training programmes and refresher courses for the benefit of personnel from the Government Departments and the private sector.

## ACHIEVEMENTS

### TEACHING

The Institute has turned out 266 post-graduate diploma holders, who formed the backbone of the fish processing industry in the country, some of them occupying senior positions. To date, 399, 157 and 1 candidates, respectively, have completed B.F.Sc., M.F.Sc. and Ph.D. programmes at this College. These graduates have found employment in fish processing industry, fisheries departments, central research institutes, Export Inspection Agency, Marine Products Export Development Authority, universities and banks. Many of the graduates have prosecuted/are prosecuting higher studies in U.S.A., U.K., Canada, Australia and Japan.

The College has played host to a number of state, national and international level workshops, symposia, seminars, etc. It has also conducted a number of ICAR sponsored summer institutes.



MFV Neptunus

The institution has to its credit a number of significant research results of great applied value in several areas of fishery science. However, the major findings relating only to the marine sector are detailed below.

#### RESEARCH

Research studies with emphasis on reproductive biology have shown that the Indian backwater oyster, *Crassostrea madrasensis*, spawns twice a year from March to May and October to December. Settlement of larvae occurs all through the breeding season. The response of adult oysters to variations in environmental stimuli was also studied.

The study of trawl catches has indicated the relative and seasonal abundance of various species in the inshore catches off Mangalore. Over 50 species of fishes, about 10 species of crustaceans and a few species of molluscs have been found to be of commercial importance in the region. Juveniles of a number of fish species were recorded, especi-

ally in summer months, suggesting that the trawling grounds off Mangalore form nursery grounds for some commercially important fishes. Stomatopods form a substantial portion of trawl catches, especially during February and March.

A detailed survey was carried out to assess the brackishwater fish seed resources of Dakshina Kannada. Juveniles of mullets, pearl-spot, the Indian sand whiting, a few species of prawns and the mud crab, *Scylla serrata*, are usually encountered in the estuaries of the district. The estuarine clam resources have also been estimated. *Meretrix meretrix*, *M. casta* and *Katylisia opima* are found to be dominant.

#### RESOURCE SURVEY.

#### FISHERY BIOLOGY

Investigations on grey mullets have revealed that the fishery is mainly supported by *Valamugil seheli*, *V. speigleri*, *Mugil cephalus*, *Liza macrolepis*, *L. tade* and *L. parsia*. Their seasonal abundance, sex ratios, size ranges and the gear employed have been studied.

Studies on resource characteristics of silverbellies have indicated the occurrence of 7 species, of which *Leiognathus bindus*, *L. splendens* and *Secutor insidiator* dominate. They are mainly captured by bottom trawls, the peak period of landing being September to December. The catch per unit of effort was found to vary from 18 to 27 kg. The biology of the three species have been studied in detail.

Observations have been made on size and age composition, recruitment, spawning season, fecundity, food habits and seasonal abundance of *Lactarius lactarius*, *Trichurus lepturus* and *Sillago sihama*.

Seasonal variations in milkfish landings along the Karnataka coast have been studied. The landings take place in significant quantities during monsoon at Kundapura and Karwar centres. The estuaries near Kundapura form ideal milkfish seed collection centres during March-May.

Correlation between total length and eye-diameter was worked out in mackerel, *Rostrelliger kanagurta*. The study

revealed significant correlation between the two, which indicates that eye diameter can be used to assess the age of fish.

#### OCEANOGRAPHY

Studies on vertical temperature and salinity distribution in the Arabian Sea off Mangalore have revealed isothermal conditions and near-isohaline conditions during the winter months. Upwelling is observed during the months April, May, September and October, and sinking is seen during December. The periods of upwelling and sinking have been found to coincide with good landings of pelagic fishes.

Studies carried out on the rate of sedimentation at fishing harbour sites at Mangalore, Malpe and Karwar have indicated Karwar to be the best, followed by Malpe and Mangalore.

Studies carried out near Ullal have served to earmark areas of rip current, which has been periodically taking a toll of human lives. This work of the College has enabled the Government to take necessary action to prevent further loss of human lives on account of rip current.

Temperature, salinity and current patterns have been found to be the prime factors determining the success or failure of the coastal fisheries off Mangalore.

#### AQUATIC BIOLOGY

An unusual "green water phenomenon" or "green tide" was observed in the coastal waters from Someshwara to Kundapura for the first time during the third week of January, 1987, and is still continuing at a lower magnitude. The phenomenon has been found to be due to very dense blooms of the dinoflagellate *Noctiluca miliaris*, in association with *Protoeuglena*, which imparts the green colour to the water. The areas affected by this phenomenon have been found to be almost bereft of fishes, evidently because of oxygen depletion on account of the death and decay of these organisms.

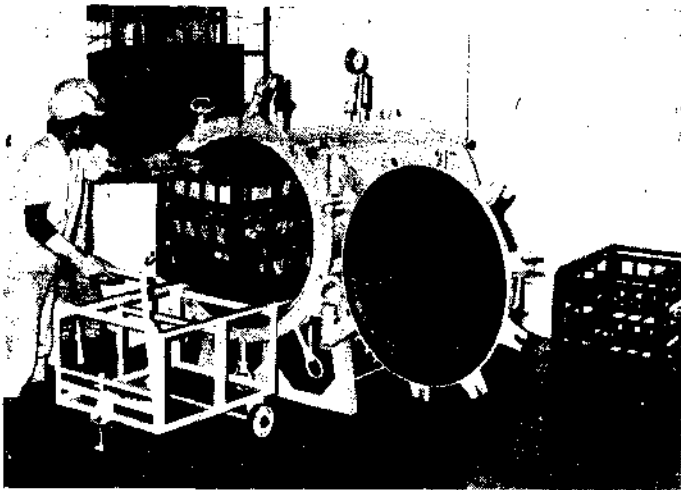
The biology of fouling communities in the Mangalore area has been studied. The extent of fouling on plates of



Fishery biology  
Laboratory



Practical training in  
fish canning



**Fish Canning**



**Models of boats  
designed at the  
College**

different materials such as wood, fibreglass, glass, asbestos, etc. was also studied.

Pollution monitoring work in respect of discharge of effluents by M/s. Mangalore Chemicals and Fertilizers Ltd. into the Arabian Sea has been successfully carried out over the last several years. Bioassay studies carried out in this connection have indicated the tolerance limits of fish and fish food organisms to various toxic substances present in the effluents.

Hydrobiological studies of Gurupur and Nethravathy estuaries have been successfully completed. High and low production areas in the two estuaries have been identified.

#### **FISHERY ENGINEERING**

An adapter for seaming quarter dingley cans has been successfully developed for use with the imported oval can seamer. This has enabled the use of the same seaming machine for seaming both the oval and quarter dingley cans.

A drum type meat picking machine developed at the College has proved to be a good import substitute. The machine, which has a capacity of deboning about 300 kg of fish/hour, was fabricated at a cost of only Rs. 18,000 in 1976.

Another gadget developed at the College is the 'line hauler', which can be fitted on board the fishing vessels for hauling long lines. This makes a considerable improvement over the present tedious and time consuming method of manual hauling. Another similar device developed is the net hauler, which can be used on fishing boats for hauling in gill nets.

An effective and speedy brailing equipment has been developed for use by the purse-seiners to facilitate the quick transfer of fish from the net on to the deck or the hold of the boat.

A hand operated stuffer has been developed which can be used in the preparation of several fish products, such as

fish sausage, fish spiral, fish sevu, etc. on a cottage industry basis.

#### FISH PROCESSING

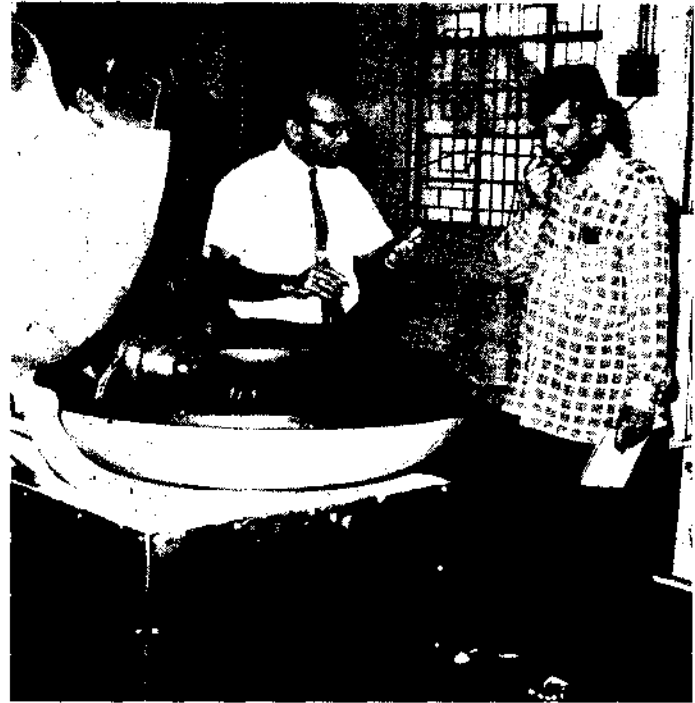
Microbiological evaluation of salted and pressed sardine was carried out during storage. It was found that pressed sardines with high fat content could be stored for 4 weeks as against 8 weeks in the case of low fat fish.

Apart from preparing the usual canned fish products, a number of new canned products have been developed. Among these may be mentioned, mackerel-in-curry, sardine-in-curry, tuna-in-curry, seer-in-curry, mackerel fillets in oil, canned clams and mussels in brine, oil and masala and canned fish sausage.

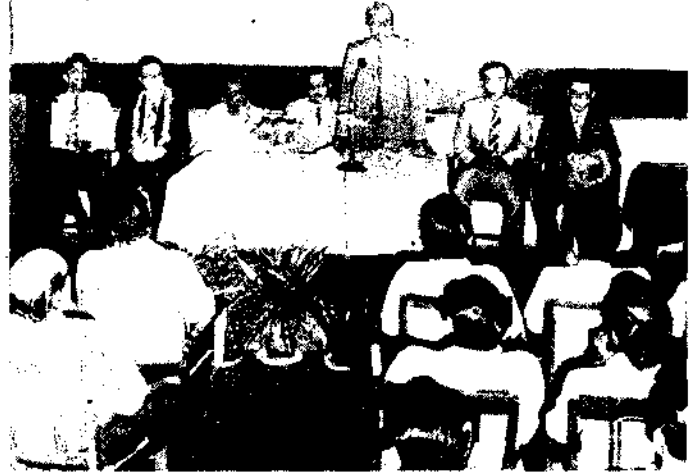
The College of Fisheries is the only institution in the country manufacturing fish sausages. Initially, the Japanese type of fish sausage packed in synthetic casing and fortified with a preservative was only manufactured. However, due to a couple of constraints in preparing this type of sausage, a new type of sausage in natural casing was developed, which could be kept in good condition for about a week in cooler storage and about a month under frozen storage.

The College has also developed a number of fish paste products, such as fish balls, fish cakes with vegetables, shrimps with fish paste, etc. These are required to be preserved under frozen storage.

By treating with acid or enzyme, fish meat could be partially hydrolysed and deodorised (PHD meat), which renders its easy incorporation into any of the common Indian snacks. A large number of fish products have been successfully prepared out of PHD meat, like fish sevu, fish sandige (fish wafers), fish jam, fish chakkuli, fish sauce, fish diamond cuts, fish noodles, etc. The PHD meat can be preserved at room temperature with edible acetic acid or could be kept for a fairly long time in frozen condition without any spoilage.



Fish processing equipment



Prof. HPL Shetty, Director inaugurating a training on processing squids and cuttle fishes conducted by MPEDA with Japanese expertise.

Fish protein concentrate or partially hydrolysed and deodorised fish flour was prepared by a simple, new method without involving the usual solvent extraction. Since no solvent is used, this has overcome the serious drawback of the earlier methods, namely the fear of carcinogenic effect from the solvent residue. This new product keeps in good condition for more than a year. Its protein content varies from 87 to 93 per cent. This powder can easily substitute for PHD meat in the preparation of a number of fish paste products.

By the use of a combination of anti-oxidants and wrapping of the frozen blocks in polythelene pouches, it has been possible to extend the shelf-life of mackerel up to 12 months and that of oil sardine up to 8 months. Against the normal shelf-life of only 3 months for the ordinarily frozen seer fillets, it was possible to achieve a shelf-life up to 10 months by treating the fillets with a mixture of sodium chloride, ascorbic acid monosodium glutamate and sodium tripolyphosphate.

Studies carried out on the frozen storage of minced meat of croaker have shown that the minced meat denatures faster than the fillets or the whole fish. It is, therefore, advisable to freeze fishes, such as croaker in whole condition or as fillets and not in minced meat form.

A simple process of converting trash fishes and fish offal into liquid fish or ensilage has been developed, wherein the enzymes already present in the fish are only made use of for autolysis. The product can be preserved by the addition of an acid for well over a year. This liquid fish was found to be an excellent pig feed as well as a fish feed component.

Prevention of enzymatic blackening known as 'melanosis' in frozen prawns was studied. Survey of conditions leading to black spots and treatments for inhibiting such occurrence were conducted. Proper handling, quick icing, separation on boat from other fishes, clean decks and fish boxes, use of chilled water, etc. were found to be effective in preventing melanosis.

## FUTURE PROGRAMME

It is proposed to initiate detailed studies on coastal aquaculture along the Karnataka coast, in addition to taking up detailed investigations on the population dynamics of some of the commercially important finfishes and shellfishes. Hydrographical studies to understand and correlate the factors responsible for fluctuations in fish abundance will be undertaken.

A USDA funded research project on the incidence and characterisation of paralytic toxins from shellfishes of Karnataka is about to be initiated. Two more projects in fishery microbiology, viz. development of tissue culture systems from cultivable fishes and role of bacteriophage in transfer of genetic material between *Vibrio* spp. have been submitted for USDA funding, and it is hoped to initiate investigations on these projects later this year. Work has just been initiated on two research projects funded by Department of Ocean Development of Government of India. They are - 1) Studies on circulation and sedimentation process near the entrances of a few important ports along Karnataka coast and 2) part of the National survey on the occurrence and distribution of pollutants in the Arabian Sea and Bay of Bengal.

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*Communicated by the Director, College of Fisheries, Mangalore 575002.*