



CMFRI newsletter

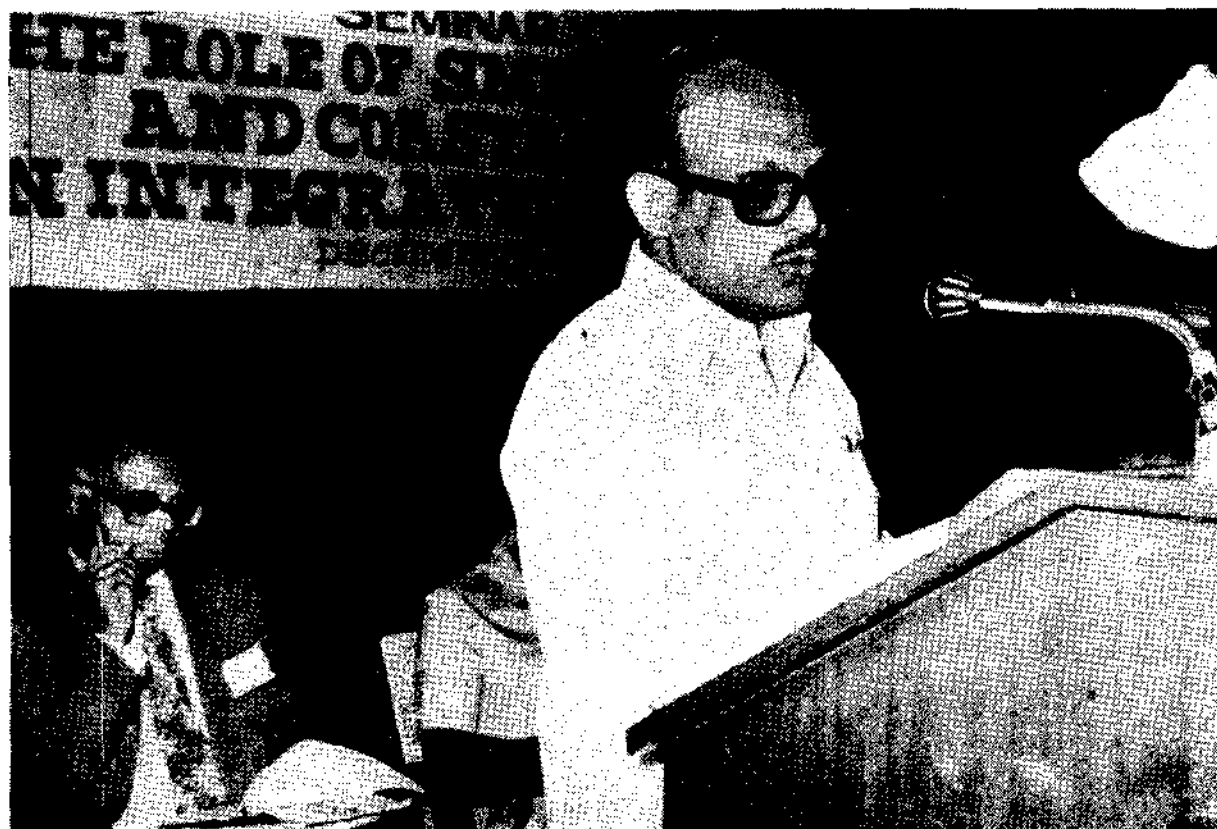
Number 9

Seminar Special

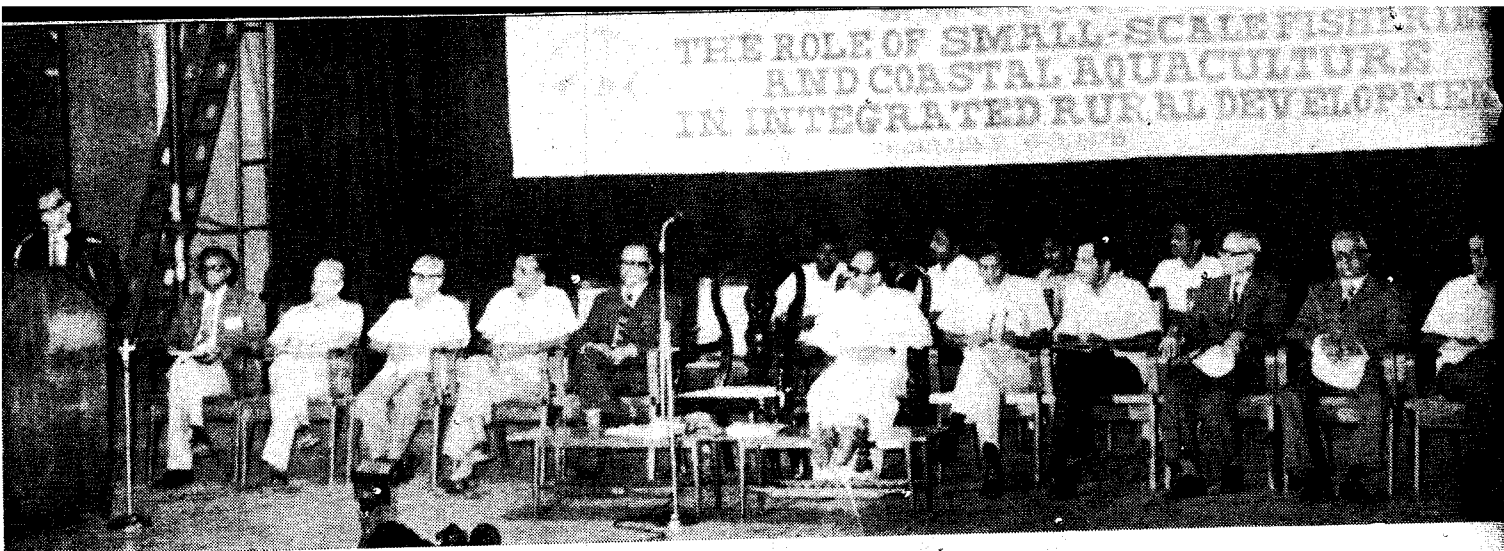
December 1978

Seminar on the Role of Small-scale Fisheries and Coastal Aquaculture in Integrated Rural Development

6—9 December 1978, Madras



*THIRU G.R. EDMUND, B.A., B.L., HONOURABLE MINISTER FOR FOOD, TAMILNADU,
INAUGURATING THE SEMINAR AT A PUBLIC FUNCTION HELD AT KALAIVANAR
ARANGAM, MADRAS, ON THE FORENOON OF WEDNESDAY, 6TH DECEMBER 1978.*



Dr. R. Raghu Prasad, Assistant Director General, Indian Council of Agricultural Research, New Delhi, giving the presidential address at the inaugural function. Seated on the dais are, from left to right: Shri. T. Tholasilingam, Officer-in-Charge, Madras Research Centre of the Institute; Shri. K. H. Alikunhi, Fisheries Adviser to the Government of Kerala; Dr. P. N. Ganapati, Retired Professor of Zoology, Andhra University, Waltair; Shri. G. K. Kuriyan, Director, Central Institute of Fisheries Technology, Cochin; Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute, Cochin; Thiru. G. R. Edmund, Minister for Food and Fisheries, Tamil Nadu; Thiru. Thirumal, Secretary Forest and Fisheries, Government of Tamil Nadu; Thiru. Ramakrishnan, Director of Fisheries, Government of Tamil Nadu; Dr. C. V. Kulkarni, Retired Director of Fisheries, Government of Maharashtra; Dr. S. Jones, Retired Director, Central Marine Fisheries Research Institute, Cochin; Dr. T. A. Mammen, Director, Marine Products Export Development Authority, Cochin.

SEMINAR

Why

Like beads on a necklace there are about 3000 fishing villages on our winding coast, inhabited by over a million fishermen who traditionally depend on the coastal fishery for their living. The entire length of this coast, essentially rural, received little benefit from our national rural development programmes, probably because of the very complex social and cultural pattern of our rather conservative fishermen communities. Impelled by the need to ameliorate the conditions of the fishermen, and weighed with by our sad state of nutrition, which could be got over to a great extent by the large-scale cheap yet nourishing protein that could still be produced from the sea, our development programmes are now intensified more and more in this region. But, for evolving proper policies

and programmes for the coastal development, one has to study in detail the syndrome of under development and the causes underlying it. Since it is a multiple problem involving social, economic, technical, and even ethnic factors, it takes experts from various walks of life like social workers, administrators, technologists, financiers, educationists, politicians, and above all, the fishermen themselves, to chalk out an effective programme. These experts have to sit around a common table and pool their experience and expertise in order to achieve this end. Realising this need the Institute gave a seminar—a production oriented seminar—where the different categories of these policy makers could freely exchange their knowledge and views and in the light of which critically examine a blue-print of action prepared by it for an integrated coastal fisheries development.

Why are the fishermen poor

The poverty of our fishermen, which has almost become proverbial, is diagnosed as the result, to a very good extent, of their tradition from time immemorial of totally depending on the natural resources of the sea for their livelihood. The sea of course is often kind, but as easily turns against with a whim and fancy of its own, and gives no assurance to the fisherman's sustained returns. The fisherman, accustomed for generations to this changing nature of the sea, takes when the sea gives and endures quietly when it doesn't. Since the sea, as he believes, is a treasure inexhaustible he bothers little for a morrow, spending as he is when he gets and borrows when he doesn't. But, two growing prongs of time which he is hardly aware of, the steep increase in population and steady decline on account of over exploitation of the resources he conventionally taps, ram into the fisherman's economy, with the result: the proverbial poverty is relentlessly on the rise.

What can be done

Unless he is immediately guided to take up occupations to supplement the traditional fishing, our small-scale fisherman will not be able not only to buoy up his sinking boat but also to prevent its sinking further. The occupations designed for him should have certain essential qualities lest he should reject them as unsuitable, which might have been the reason for the failure to obtain the desired result for some of our C. D-Plans we tried to implement in various places. First and foremost is, of course, it should be labour intensive, to utilise the large amount of idle labour available in our traditional fishing communities, yet allowing the fishermen sufficient freedom at the time when he needs to go out for fishing. Secondly, the occupation must not be so alien that he cannot utilise his experience and expertise for better returns. It should also be that the new occupation is as close to his village as possible. The Central Marine Fisheries Research Institute has drawn out a programme, satisfying all these qualities, of an integrated coastal development involving aquaculture and other mutually beneficial activities, for immediate implementation along our coasts. This programme has been presented and studied analytically at the seminar.

Problems, problems

The seminar in its wake reviewed the hardships and constraints faced by the traditional fisheries and discussed at length the various problems that might spring forth in the event of integrating small-scale fisheries, coastal aquaculture and other such feasible activities for the coastal rural development, and recommended various solutions. Diversifying coastal fisheries, improving the design and providing alternate building material for crafts in the place of conventional wood which is fast getting scarce and costly, evolving cheaper and better preservation techniques, easier and more effective marketing systems, providing financial assistance and loans through simplified formalities from banks, providing adequate compensation in the case of injuries, loss of lives and properties due to natural causes, and protecting the environment from manly interference are a few of the recommendations burgeoned.

And still problems

While most of these problems for which solutions are suggested are more or less innate in nature and can be solved, given proper helps, by the fishermen themselves, there are problems which have stemmed from the nation's policies designed and implemented for the country's overall development, from which the traditional fisheries have come to suffer. Such alien problems when added to their own existing ones are likely to be viewed by the sufferer in larger dimensions. Two such major problems brought up at the seminar for discussion and stirred up considerable excitement were the problems of spreading industrial pollution and the impact of unbridled development of mechanised fisheries, felt by the traditional fishermen.

Does mechanised fishing affect traditional fisheries; how

Introduction of large-scale fishing by mechanised boats all over the country has been, since recently, the cause of bad blood between the traditional fishermen and mechanised fishermen in almost all parts, which has in many places erupted into violent clashes between the two sections resulting in loss of properties and even lives to both. Even now such furor exists in certain places that to prevent a calamitous outbreak police are stationed on round-the-clock

vigilance. The traditional fishermen, who are still the mainstay of the nation's fishing industry from the labour as well as production point of view, claim that from age-old times the coastal water has been their inheritance. Most of the pelagic resources they traditionally exploit are confined to this narrow belt beyond which they have no means to fish. But, it so happens that most of the prawns, which of late turned out to be a choice bit by dint of their gaining lucrative markets abroad, are also distributed in this region for the major part of the year. According to the mechanised boatmen the operation of their boats is rendered uneconomical if restricted to outside this area. Moreover, they argue, if they do not carry out fishing in this zone the prawn resource which has come to play a vital role in the nation's economy, goes awaste as the traditional fisheries have no means to fully exploit it. The traditional fishermen on the other hand resent with acrimony the intrusion in this area by the boats on the ground that they hamper the activities of the indigenous crafts by coming in their way of operation, and more so by scattering the shoals they so painfully stalk. Their returns which are

already meagre are further ebbd as the boatmen in many places fish the very resource on which they depend for their sustenance.

Can't they coexist

Some of the state governments have intervened in this tiff which grows into larger proportions day by day, to bring about an agreement amicable to both the parties, but without avail. Arbitrary lines have been fixed to limit the activities of the mechanised boats without interfering in the activities of the traditional fishermen. But this is said to be more often ignored and violated to the utter chagrin of the small fishermen. Ignored and violated it is because, to implement in the sea the laws and regulations that can easily be implemented on land is not an easy task. The sea and the seafarer both have a temperament different from we on land. The rules that are formulated for them, therefore, must be different too, and must essentially be the result of a closer and intimate study of their nature and needs. Only such rules can effectively govern them and help them to peacefully coexist.

Some Basic Figures

Length of India's coastline: 6100 km
Estimated number of fishermen: 1.4 million
Total fish production in the world: 70 million tonnes
No. of country crafts in operation in India: 100,000
Total fish production in India: 1.3 million tonnes
No. of mechanised boats in India: 16,000
Total span of the continental shelf in India: 40.1 million ha
Total area of brackish water available in India: 2 million ha
Total aquaculture production in the world: 6.2 million tonnes
Total aquaculture production in Asia: 5.2 million tonnes
Per capita consumption of fish in India: 1.7 kg/year
Number of scientists and technologists engaged in aquaculture research in India:
about 1000
Total manpower requirement for aquaculture in the next decade in India: 50,000

A Fishy Fact

Fish is an anomaly in the modern world by being the only remaining wild thing used by the civilized man as a major food-stuff. All other foods, animal and vegetable alike, have been domesticated. Fish alone feeds for itself without the benefit of farm pasture fertilizer or purposeful breeding. Many unhappy precedents suggest that, if this does not take place, the alternative may be extinction.

—*Magnus Pike in 'Townsmen's Food.'*



WELCOME ADDRESS

E. G. SILAS

Small-scale fisheries, coastal aquaculture and rural development each in its own right important enough to receive specialised attention are in totality closely linked up forming a 'trinity'

IN RECENT years, we have been witnessing an ever-increasing gulf in two major sectors of marine fisheries, the artisanal fishermen on the one hand and those fishing with mechanised boats and trawlers on the other, resulting in a widening social disparity and consequent imbalance and frictions. In order to critically analyse this pressing problem and examine the various additional inputs that would go to uplift the socio-economic status of the small-scale fishermen, it was felt that a seminar on the "Role of Small-scale Fisheries and Coastal Aquaculture in Integrated Rural Development" should be organised.

The city of Madras was chosen as the venue of this Seminar, as within its urban limits a major part of the fisheries activity is of artisanal nature. The theme of this Seminar includes three subjects—small-scale fisheries, coastal aquaculture, and rural development—each in its own right important enough to receive specialised attention, but in totality closely linked up forming a 'trinity.' For the first time in India we are going to discuss such an interlinked theme in the fisheries sector with the small fisherman in focus.

In this Seminar we are considering "small-scale fisheries to embrace all fisheries activities

carried out traditionally by artisanal fishermen employing indigenous crafts and gears."

The phrase "small-scale fisheries" may convey an impression that it contributes an insignificant fishery of little consequence. On the contrary, the major portion of the fish catches in almost all developing countries of Asia and the Far East comes from this source; it meets the greatest demand for fish consumed, it forms the livelihood of fishermen living along the coast, on the banks of estuaries, backwaters, rivers and reservoirs; it offers employment to a large number of processors, distributors, and supports a variety of ancillary industries.

Small-scale fisheries play a very significant role in Indian fisheries. Prior to the introduction of mechanised fishing vessels, the entire fish production of the country was realised by this sector. At present it contributes to above 60% of the marine fish landings of 1.3 million tonnes. All the inland fish production is by the small fishermen. Despite this impressive statistics, the sector remains, by and large, underdeveloped, and the men engaged in it are economically lean and socially backward. The sector is not organised and the operational and marketing aspects are individual-based beset with middle-man problems.

The situation poses a great challenge to us—a challenge to face and solve the technical, social and economic problems and issues of the small-scale fisheries; a challenge to meet its policy, strategy and planning requirements and a challenge to implement the projects and programmes formulated for its development.

Realising the value and the urgent need to develop this fisheries, not only to provide more food, but also to relieve the social and economic distress of millions of people, various measures are being taken by the Government and other development agencies. In this context the coastal aquaculture plays a vital role.

Aquaculture of fishes and shellfish in the coastal waters is known in this country for long. However, the state of art as practised in the traditional way has not undergone any appreciable change over the years. Consequently, the production as well as its value remains low. The problems confronting the development of coastal aquaculture are equally complex.

Our country is endowed with rich fishery resources in the seas around, in the estuaries and backwaters, in the rivers, reservoirs, tanks and ponds. Our coastal waters are highly productive and harbour several commercial fish stocks that can be harvested by simple crafts and gears. The ecosystems in the coastal zone are equally congenial to culture a variety of organisms. Valuable information on the resources of our inshore waters and on the culture of some cultivable organisms are available. The present juncture thus appears to be more opportune to take the best advantage of the resources available through a rational exploitation, increased adoption of aquaculture in the coastal sector and proper management to achieve greater fish production. national

economy and a new era of rural development of the coastal zone.

In fisheries development projects, human dimensions of development are invariably lost sight of. Frankly, fisheries development projects have hardly given any thought to built-in problems such as socio-economics, quality of environment, health care, family planning, literacy, training programmes aimed at self reliance and useful skills, role of women and so on. Massive efforts by way of developmental assistance, financial investment, use of modern techniques, provision of infrastructure facilities and training of personnel are necessary. This also calls for suitable measures to solve the economic, social and legal issues, and consideration of the hopes, needs and aspirations of fishermen and their community. An integrated action plan with active cooperation at different levels is needed. A co-ordinated approach by fishery and social scientists, administrators, economists, planners and policy makers and full involvement of fishermen and fish farmers and agriculturists are highly essential to an all-round development of the sector. It is in this context that the Seminar is organised to serve as forum to exchange views, to discuss various aspects of problems of small-scale fisheries and coastal aquaculture, to formulate views, approaches and indicate policies, and strategies and other requirements for an accelerated development of the sector. This subject matter of the Seminar has been arranged in eight sessions commencing from this afternoon. We shall look forward to the discussions at each of the sessions to be free, frank and fair so as to identify the problems and ways and means of solving them. We shall look forward for the guidelines that may emerge from the Seminar to go a long way to help accelerating rural development in an integrated manner for the betterment of the small fishermen.

Taiwan's Lesson to Us

In Taiwan, an island with an overall area of 13,000 square miles and a population of over 18 million, the production from mariculture is about 1.5 lakh tonnes, which is over 16.4% of their total fish production. While in India, with a much longer coastline and a thirty-time more population, the total mariculture production is hardly 1.5% of its total fish yield.

Essential improvements and adequate support to
the existing practices alone can encourage
the small-scale fisheries development



PRESIDENTIAL ADDRESS

R. RAGHU PRASAD

THIS SEMINAR is intended to review the present status of the small-scale fisheries in the context of technologies which are being developed in the field of fisheries, both for capture and culture, to consider measures for effective integrated operations in order to help in improving the socio-economic conditions of the primary producers and to accelerate the tempo of development in coastal fishery activities. The Indian Council of Agricultural Research, which has always been endeavouring to give adequate research support to the development of the broad spectrum of agriculture, including animal husbandry and fisheries, has thus fully supported the proposal from the Central Marine Fisheries Research Institute to organise this seminar, also in view of the extreme importance given by the Government of India in furthering the cause of the traditionally weaker sections of the society. We cannot ignore the fact that the present affluence we see in the fisheries industrial sector is largely as a result of the untiring labour of a very large number of artisanal fishermen. In a recent regional conference of the FAO, the Prime Minister of Malaysia rightly emphasised that it is not fair that those who produce food are the ones who suffer poverty most. This is perhaps true in all

sectors of agriculture, and much more so in fisheries. Any effort to improve the lot of the fishing community, either through direct assistance or by the introduction of the improved technologies, should be a welcome step. This Seminar, I am sure, would be discussing more about the recent developments in coastal-aquaculture technologies and their transfer to the field for adoption at the grass root level.

While I do not wish to go into the various details at this stage, I think it is my duty, as one who has been handling research management for some time, to mention a few general aspects that occurred to me in this context. The foremost is a request to my scientist colleagues to bear in mind the imperative need to evolve technologies that are applicable to our conditions and not to be carried away blindly by the high-input and capital-intensive technologies of the developed countries. Taking coastal aquaculture itself as an example, this is a field in which many other countries have been making rapid progress in recent times, while we here have just started our work. We certainly have made a good beginning, too. However, we must always remember that the methodologies developed elsewhere may not

be directly relevant to our conditions where the socio-economic level of the people is somewhat different from that prevailing in the affluent countries. The highly successful prawn culture methods of Japan or the various high-input, high-energy and capital-intensive technologies being followed in other regions cannot be followed in toto by us. Mechanisation of capture fisheries is another area which requires increasing input of energy material for which there is global shortage and where large capital investments are required. Locally available resources involving low costs and waste-recycling process might contribute more appropriate technologies for our conditions.

As far as capture fisheries are concerned, we have a fairly well-established traditional system for the entire coast, with indigenous craft and gear suited for the local conditions. With the fishermen community sometimes adversely involved with unscrupulous middlemen for their finance, and with an increasing trend in mechanisation in coastal fishing operations, the traditional fishing has not developed significantly in the country. While mechanisation should be welcomed, it should not be at the expense of the traditional methods. Essential improvements and adequate support to the existing practices alone can encourage the small-scale fisheries development.

We have also been fortunate in having a traditional and age-old system of fish culture being practiced even now in many regions, in fresh, brackish and salt water. With the realisation of the great potentials for developments in this field, what is perhaps required is to extend the area under culture, increase productivity through the use of existing technology and increase productivity through the use of new technology. In this effort, the scientists should not lose sight of the main objectives which lie in the economic uplift of the rural population through effective utilisation of available resources and generation of self-employment. For achieving this goal, I feel that there is urgent need for establishing effective linkage amongst the various components into a sort of science-technology-production system. It is necessary to bring about proper operational collaboration and coordination of all concerned agencies like research institutions, government development departments and agricultural institutions, which would work out the technologies

based on scientific research and undertake limited extension and training. The agricultural universities should be in a better position to render effective technology transfer and spread the technologies through proper extension, demonstration and training. What has been sometimes called the "open-door" policy on research|extension has achieved remarkable success in China through the 'three-in-one' combination. Leaders or administrators, research and extension workers and the farmers jointly identify production problems and work together to solve these. For example, artificial fish propagation methods which are even now a specialised field generally adopted only by research scientists or technicians in our country, is being widely used by ordinary fish farmers in China. This is one of the practical effects of this open-door policy referred to by me.

In any development process we have to surmount a series of constraints like technical, legal and socio-economic problems. Water pollution, for example, is threatening the existence of aquatic organisms in many regions, often rendering the organisms unfit for human consumption. Nursery and feeding grounds of juveniles are fast disappearing due to land reclamation and water pollution. Oyster and mussel beds in coastal and estuarine areas are perhaps the worst affected by this. Similar are the culture activities in paddy fields. The concept of aquaculture should take into account within its frame work a unified planning in land and water use. Aquaculture if properly planned and developed can be an effective means for rural upliftment.

If aquaculture has to take proper root in the country, better development strategies will have to be adopted, particularly by the state governments concerned. A pragmatic review of the present land leasing policies is called for as has been pointed out by many others in different forums. Most of the culturable waters are presently under the control of the governments. In order to promote cultural work, water areas will have to be leased out for sufficiently long periods of time and on easy terms so that the fish farmer develops a feeling of security for making any investments. Similarly, in many cases it may even be necessary to extend some financial support to the farmer in the form of loans or subsidies at least in the initial stage. This will prevent individuals from getting indebted to greedy financi-

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INAUGURAL ADDRESS

THIRU G. R. EDMUND

The Seminar should have deliberations on how best the improvements of the rural population can be achieved through the twin tools of small-scale fisheries and coastal aquaculture



IT IS indeed a great pleasure for me to take part in this Seminar, organised by the Central Marine Fisheries Research Institute.

Fish and other aquatic organisms form a cheap source of protein food, essential to meet the nutritional requirements of our population, and they are being exploited from very ancient times. Small-scale fisheries, which denotes all traditional fishery activities carried out by the artisanal fishermen, is contributing to a major portion of the fish catch, amounting to 70% of the marine fish production in Tamil Nadu and about 60% in our country. About 25 million fishermen, processors and distributors all over the world and about 55 lakh in our country depend on this fisheries. This emphasises the importance of this sector in production and economy.

The marine small-scale fisheries, carried out from about 1800 fishing villages scattered all along the coast, is rural-based. Three lakh active fishermen employing about one lakh traditional craft and 7 lakh gear are engaged in this sector. Although the mechanisation programme started about three decades ago and witnessed the introduction of 14 000 mechanised boats in our country and 2200 in Tamil Nadu, the traditional crafts still form the prin-

cipal production means of our fisheries. In Tamil Nadu the traditional crafts have increased from 28 500 in 1972 to 42 000 in 1977.

In spite of this impressive statistics, I regret to say that there has not been much progress in this sector over the years. Owing to the unsophisticated methods of fishing the production continues to be low. Added to this, the problems of middle-men and inadequate marketing opportunities have denied the economic benefits to the fishermen. Thus they belong to an economically and socially backward sector and lead a life of poverty and privation.

Tamil Nadu Government are taking keen interest in improving the economic conditions of the small fishermen through improved catches of fish. Till 1973-74 we distributed 1.24 lakh kg of nylon, costing Rs. 25 lakhs as subsidy alone. In addition, loans were disbursed to the tune of Rs. 73 lakhs. All these were mainly to the traditional sector. In the VIth Plan this Government have drawn up ambitious programmes to assist the small-scale fisheries. 3400 of the catamarans and vallams will be motorised with a subsidy of 50% on engines. It is also proposed to mechanise 800 vallams with inboard engines giving 50% subsidy. In addition, 2000 fibreglass boats of 18-20' size are proposed to

be distributed to replace the country craft, with a subsidy of 33½%. The traditional sector will be given 25% subsidy for nylon gear. For this a sum of Rs. 20 lakhs has been allotted. In order to enable the fish caught by small-scale fishermen to be brought ashore in prime condition, 3300 insulated boxes will be supplied on 50% subsidy basis. To facilitate rapid movement of fish from the landing centres to marketing places, the Government have allotted Rs. 200 lakhs in the VIth Plan for link roads. This will enable us to increase the consumption of fresh fish from 60% to a higher level.

With the increasing fishing effort the demand for 180 tonnes of fish nets produced at present in our State may go up and this gives vast scope for developing the large number of net-making organisations in the cottage industry, small-scale industry or cooperative sectors. This will provide plenty of employment opportunities for womenfolk.

Tamil Nadu Government will be embarking on a small-scale fisheries project with the assistance of FAO. Initially the project is likely to be located in Thanjavoor District.

I would request the delegates assembled here to thoroughly discuss the various aspects of the problems of the small-scale fisheries and the artisanal fishermen, introduction of powered boats, and their impact on coastal rural development. Thought may also be bestowed on the elimination of conflicts between the traditional sector and mechanised sector.

I am told by the scientists that the resources of the sea are limited and we have to have

recourse to coastal aquaculture to augment fish production. Further, it is job-oriented and labour-intensive. All over India we have shallow coastal belts, backwaters, lagoons, estuaries and mangrove swamps which could be put to good use to raise fish, prawns, mussels and oysters, and seaweeds. It is reported that mussel culture would yield a production of over 200 tonnes per ha per year. Prawns and lobsters which are high-value species will bring us much needed foreign exchange. Recent work done by our fisheries department had indicated that culturing of tiger prawns and the prawns is highly profitable. This Seminar can throw more light on the important aspect of coastal aquaculture. It is also essential to transfer the technologies developed to fishermen and fish farmers for their adoption in the field.

Our ultimate aim is to improve the status and economy of the rural population and the Seminar should have deliberations on how best this can be achieved through the twin tools of small-scale fisheries and coastal aquaculture.

To develop an industry, Government assistance alone is not enough. An integrated approach involving the planners, administrators, sociologists, scientists, economists and financial agencies is essential for harmonized growth of the sector. Finance is available for large-scale fishing enterprises but the small-scale fisheries does not get the benefit of financial support. I therefore suggest that the nationalised banks must come in a big way to finance viable small-scale fisheries enterprises as well as coastal aquaculture efforts. That will remove the major bottleneck in development of fisheries in these areas.

Long-distance transportation of frozen fin-fish

Oilsardine, mackerel, threadfin bream, catfish and ribbonfish, frozen in blocks along with glazing water packed in containers with 2.5cm thick expanded polystyrene slabs sealed in 200 gauge polythene sheets and transported by ordinary parcel vans of express trains reached Calcutta in frozen condition without any icing or other care en route.

—M.R. Nair & T.K. Govindan

**'AQUAPLOSION' WILL BE
A DOWN-TO-EARTH REALITY
IF WE HELP THE FISHERMAN REALIZE IT**

M. S. SWAMINATHAN



In his very enlightening speech on the concluding day of the Seminar, Dr M. S. Swaminathan, Director General of the Indian Council of Agricultural Research, covered almost every aspect that has relevance to aquaculture and integrated coastal development

Pooling the knowledge is right approach

I am glad that there is a broad spectrum of expertise available here today. I heard views expressed by several fishermen representatives, scientists and government officials. Unless we get together and pool our knowledge, as you have rightly done at this seminar, it is very difficult to approach problems in an integrated manner, as it is so in the case of human body which consists of several parts and is healthy only when all the parts work in a coordinated manner. The seminars like this, unlike symposia which are aimed at enlarging the frontiers of knowledge, are intended to advance frontiers of production—in this case fish production. I am happy to see here the eminent doyens of fisheries science, fisheries administrators, fishermen representatives, scientists, social workers and also people involved in developmental journalism. With this enlightened group it should be possible for you to come to action-oriented conclusions, so that

this seminar would serve as a milestone in our progress to improve fish production.

Small-scale and large-scale fisheries

I heard somebody raising a question this morning as to why the name small-scale fisheries. To me a distinction appears wrong, for all fishermen must be treated alike. Of course, there are four major points of distinction between what is generally termed as small-scale fisheries and large-scale fisheries. First is that the human beings play a much more important role in small-scale fisheries than in large-scale fisheries. Second is capital input: while small-scale fisheries are labour-intensive the large-scale enterprises are capital-intensive. The third distinction is an ecological one. The large-scale industries have got problems of pollution and many other repercussions which are associated with it. The last, but not the least, is in the kind of energy used. The small-scale industries use the recycling or renewable type of energy. In large-scale

industries more and more energy of non-renewable type is used. Here we have Mahatma Gandhi's concept, or what is now called Small is Beautiful concept, by which the dignity of human labour is respected, and, by conservative use, the non-renewable type of energy is not exhausted. As far as scientists are concerned, this last distinction is all the more important because any technology which can be adopted by a person with small means can be adopted by a person of large means, and the reverse is not true. This is an important parameter in the development of scientific strategy. The scientists must see that everyone, whether a small fisherman or a big fisherman, must have a role to play in the exploitation of the technologies developed. The fishery scientist must also take into account the cost-benefit effects.

Ecological assets should be preserved

Aquaculture, whether it is coastal or inland, has a very high potential for increasing fish production. Fish is a most efficient converter of energy, converting plant food into nutritious animal food, and therefore has a number of advantages in terms of productivity. But if you want to develop the aquaculture industry on a sound basis you must first attend to the ecological aspects of aquaculture because it is very basic. In other words, we must protect the assets upon which aquaculture is based. If we start damaging the numerous large rivers, backwaters and estuaries, and the vast ocean, then we will sooner or later be exhausting them.

Genetic material should be preserved too

The preservation of the genetic material is equally important. One of the immediate steps we have taken for this purpose is to establish a National Bureau of Fish Genetic Resources. In our country, starting from the very-cold-water fisheries in the Himalayas in the north to the warm water fisheries both in inland and seas in the south, we have a tremendous amount of fish resources. The Bureau will be involved in cataloguing, classifying, preserving, and helping in the proper utilisation of all our valuable fish genetic resources. The preservation of the genetic material may be in situ preservation in the form of marine parks and sanctuaries, as we have sanctuaries for the wild life.

We have the classical example of depletion of a wonderful asset of marine fauna in Krusadi

Island. The island was once a biologists' paradise. But since we have not taken care to preserve it we have lost some of the valuable strains. My appeal to the Government of Tamil Nadu will be to ensure that this island is soon developed into a very fine national park. The scientists on their part must identify similar assets as the pearl-oyster beds, and the governments take steps to preserve them so that we do not deny to posterity thousands of years' work of Nature.

Immediate need for technologies for tackling nutrition and disease

You have discussed at length the technologies for production and also for post-harvest utilisation both for culture and capture fisheries. But, I must tell you that fish is only a secondary converter of energy and not a primary producer. It requires food and, therefore, a lot of research effort must go into aspects of fish nutrition. Another important thing is fish disease. We must remember that when we change the micro-environment in any production system there are bound to be reactions which may not be favourable. When the ecology of a pond is changed with a very high stock of fishes new fish diseases will develop, which has happened in every high-production system. The poultry people are faced with new kinds of diseases which were not there before. Similarly, the rice people are faced with brown plant-hopper disease. The fishery scientists may also face such problems when they go in for high production systems. They must do impact analysis and see what are the repercussions favourable or unfavourable. The analysis must include also the technological, ecological and social consequences.

Pool the scientific resources for improvement of fisheries

Our research base will have to be strengthened to deal with all these problems. Besides the research programmes under the Indian Council of Agricultural Research, we have the Department of Science and Technology concerned with our ocean resources. The National Remote Sensing Agency is concerned with thermal mapping of the oceans and also mapping of fish shoals. Our Agricultural Universities too have programmes concerning fisheries. Thus we are strengthening our efforts in terms of capabilities in research field. We must pool all these resources for the benefit of improving our fisheries.

Adaptive research is key to success

Any country which has tried to launch big developmental projects based on foreign technology has not succeeded. Each technology has to be adapted to the conditions of the country which adopts it. We have Japan as a classical example in adaptive research. They made tremendous progress by getting some technologies, innovating them and adapting them to their own conditions. Of course, unless a country has its own strong research and training base it will not be able to sustain a dynamic production programme.

Let us have a curriculum with the unique in marriage with universal

We have fisheries colleges now in Karnataka, Tamil Nadu and Kerala, and practically every other state is planning to develop such colleges. These colleges in our country will have scope only if the curricula are intended to promote self employment, and not merely to train people to take up jobs in fisheries departments. The curricula must be reoriented in such a way that the fisheries graduates will know something about horticulture, agriculture, silviculture and so on, so that they will be prepared for developing integrated farming systems. Again, the curriculum must not be standardised one. It will be successful only when the unique is in marriage with the universal. There are certain universal principles of science or the ground rules which everyone should know. But there are some unique possibilities in each area which will have to be included in the curriculum of that area. The graduates coming out of the fisheries colleges with such curricula will thus be equipped for self employment. If we can achieve this, coastal aquaculture can make great progress in our country.

People should themselves involve in exploitation of technology

Indian Council of Agricultural Research is not a developmental agency. But, as an agency in charge of research and education it is very important for us that we are able to convince the field extension workers the economic viability of the projects we are advocating. We have developed three mechanisms for this. One of them is the Operational Research Project. This is intended to involve the people themselves in the exploitation of the technology and to assess the operational problems in the transfer of techno-

logy. You have seen one project, on the blending of capture fisheries with sea farming, at Kovalam, which is being run by the Central Marine Fisheries Research Institute. Similarly, the Central Inland Fisheries Research Institute have rural aquaculture projects in Orissa and West Bengal. We would be starting a few more operational research projects in the next few years.

Seeing is believing

The next important device is the National Demonstration Programme. This concept was devised by the Indian Council of Agricultural Research in 65-66 on the experience that for a farmer seeing is believing, at a time when the high yielding varieties were introduced. This programme was an immediate success. In fisheries, too, we must develop a series of such programmes.

Teachers should be selected with utmost care; they must practice what they preach

The third mechanism is the Krishi Vigyan Kendra. This morning the fishermen's representative from Gujarat mentioned that there must be more Krishi Vigyan Kendras. Certainly there is more need for this, but we must see that the principle of the institution does not get diluted. The kendra is based on two things. One is that there must be some new technology we impart to the fishermen, such as aquaculture, induced breeding or fish-seed bank. The second principle is learning by doing. This is very important and must be related to local requirements. Utmost care has to be taken in the selection of teachers because they must practice what they preach. They themselves must work in the farms and make the farmers learn the technology by doing what the teacher himself does. The Krishi Vigyan Kendra must be a radiating Centre and be able to reach the farmers in their fields. It must be a mobile training institution. Therefore, those who are interested in setting up Krishi Vigyan Kendras should bear in mind these ground rules which should be adhered to.

The 'aquaplosion' is at hand's length

In our country there is a lot of discussion on technology vis a vis social conditions. Technology can be an instrument of social change and vice versa social change can also trigger technological change. Our farmers on the land have shown that a green revolution is possible. In a recent article in London Economist it is stated

Contd. on page 30

RECOMMENDATIONS

After deep discussions on a very wide range of allied topics, the Seminar have come out with the following recommendations to the Governments and to other concerned bodies:

1. "More attention be paid to the development of small-scale fisheries by diversification of fishing effort through evolving appropriate technologies and a critical evaluation of the impact of the recent introduction of new gears such as purse seine, midwater trawl and pelagic trawl on the resources exploited by traditional crafts be made for formulating regulatory measures, if necessary, to ensure rational fisheries development through diversification.
2. "The resources assessment and monitoring systems may be strengthened so as to provide the data required for the regulation/conservation of the fisheries.
3. "Improvements be effected, keeping operational efficiency and cost in view, to the existing craft types and gears using local material, expertise and skills with the full involvement of all concerned including the fishermen, and besides the conventional timber used at present, suitable alternate material for the construction of traditional fishing crafts may be identified, tested and made available.
4. "Proper systems be developed on a regional basis for the quick collection and dissemination of fisheries information including forecasts, through All India Radio, Doordarshan, and other media.
5. "A survey of the coastal and contiguous water areas be carried out in all maritime states and Union Territories to locate and map out suitable areas and to evaluate the cultivable species resources for coastal aquaculture.
6. "Intensive research be taken up to develop economically viable low-cost technologies for the farming of all cultivable species of economic importance in the coastal and contiguous waters and emphasis be given to adopt the technology of hatchery production of seed leading to establishment of commercial seed-production centres for supply of quality seed to the farmers.
7. "Efforts be made to collect reliable data on the economics of operations of different culture systems in different areas and, after proper evaluation, these data be made available to the aquaculturists and others interested in their use.
8. "Priority should be given to formulate and implement integrated systems of fisheries utilising the available technology, skills and materials throughout the coast and programmes for productive utilisation of coastal land area with suitable plantation crops and livestock.
9. "The State Governments accelerate their fishermen-welfare programmes to provide adequate facilities, aid and concessions to the fishermen community for simultaneous development of the community along with others, and encourage and provide necessary technical and infrastructure facilities for taking up employment-and-income-generating additional avocations in the coastal areas.
10. "Effective beach-landing facilities be established at all important landing centres and approach roads and other infrastructure facilities be provided.
11. "Simple but effective preservation and processing techniques within technical ability and economic capacity of fishermen should be evolved; particular attention be paid

- to the use of solar energy; fish curing yards with required facilities be established/re-established; canning of fish in suitable cheap containers be evolved; and steps be undertaken to minimise the loss of protein quantity and vitamin contents during processing of fish products.
12. "Effective systems be established in all maritime States and Union Territories to take up distribution and marketing of fish catches landed by small-scale fisheries and immediate steps be taken to carry out indicative surveys to collect market intelligence and to promote internal marketing.
 13. "An assessment of requirements of technical, managerial and operative personnel for a phased development of small-scale fisheries and coastal aquaculture for the next 25 years be made and, on this basis, adequate training facilities at different levels be established; need-based training be imparted to fishermen and fish farmers through Fishermen Training Centres and Krishi Vigyan Kendras; and besides these training facilities, the fishermen be educated through other means of non-formal educations on the self-efforts needed for improving their saving habits, nutritional and hygienic standards and socio-economic conditions, and the fishermen leaders themselves should endeavour to give the necessary guidance and assistance in this.
 14. "The existing extension activities may be strengthened to meet the growing demands of technology-transfer and developmental programmes and new extension facilities be created wherever they are not available at present so that each State and Union Territory will have full-fledged fisheries extension service
 15. "Functional cooperatives to serve all the activities and needs of the fishermen be established.
 16. "Seperate provisions and guidelines be made by the commercial banks for providing financial assistance and loans through simplified procedural formalities and with minimum delay to help the quick development of the fisheries sector, eventually leading to the establishment of Fisheries Banks.
 17. "High priority be assigned for the development of the small-scale fisheries, and coastal aquaculture be recognised as an industry to facilitate its quicker growth.
 18. "A viable policy for the distribution of water areas under the control of the State Governments to the coastal fishermen and fish farmers for aquaculture purposes be formulated and implemented.
 19. "Suitable subsidy and incentive schemes be instituted for the quicker establishment and proper growth of the coastal aquaculture industry and constraints in respect of taxes, high cost of material etc. be removed.
 20. "Fishermen be provided with adequate compensation promptly at the occurrence of natural calamities such as cyclones and tidal waves and appropriate accident reliefs be instituted, and the function of compensation in cases of injuries, loss of life, and equipments be taken over by the Government of India as a package measure.
 21. "The State Governments take immediate steps to develop necessary action plan for the protection of coastal zone against environmental damages and effective steps be undertaken to protect the living resources therein from destructive human interference and pollution based on criteria and guidelines that may be framed by expert committees constituted in all the maritime States and Union Territories."

Excerpts from Papers and Speeches

Feasibility reports must be unambiguous

Aquaculture, coconut plantation on the bunds of the culture pond, and annual cropping of cowpeas in the vacant space in between the coconuts is a real life situation in Kerala, in which the farmer is helped to maximise his returns by putting his resource to the most intensive and comprehensive use The farmer will require capital assistance for preparation of culture pond and planting coconuts and working capital finance for the actual aquaculture, application of fertilisers to coconuts and annual cropping of cowpeas. Any programme of financial assistance in the case of this farmer should meet all these requirements Standard costs of this combination of technically feasible activities will have to be worked out after actual field work The feasibility report should also spell out in clear terms, for the assistance of the financing institutions, the periods and the manner in which the assistance given for various activities would be refunded by the farmer.

— *Keynote address by S. Gopalan,
Chairman, MPEDA.*

The customs law may be repealed

In 1967, the government has enacted a new law requiring the boat owners to obtain passes from customs department to carry out fishing operations. These passes have to be kept on the boat at all times to facilitate checking by customs officials. The passes have to be renewed once in every week by the mechanised boats and once in three weeks by the country crafts. The circumstances in which the rule was enacted radically changed in the past decade. The boats which used to return after fishing every 48 hours in those days take much longer time out in the sea now as they sail a much longer distance for fishing. As the delays possible on account of natural causes like storms and currents also increase proportionately to the distance of voyage, it is now difficult to present in time the passes for renewal. The non-renewal in time becomes a crime and in order to avoid this the boat-owners resort to illegal methods like bribing. It is our suggestion that this act be repealed.

— *Working paper by Bhai Bandarkar, General Secretary, Maharashtra Machimar Kriti Samiti, Bombay.*

Small-scale fishermen vexed

In Madras, a huge fleet of mechanised vessels literally converge on the areas within the 5-km zone, rendering the operations of catamaran fishermen almost impossible. These mechanised vessels while fishing for prawns are on and off reported to have caused destruction to nets of catamaran fishermen who eke out a paltry living from fishing. In Goa, the problem has its own dimension. The Union Territory has about 400 mechanised boats regularly operating in areas traditionally the zone for 'Ramponkars', those who operate rampani. *Metapenaeus dobsoni*, a profusely shoaling prawn, widely exploited by the ramponkars during August-October is the item sought after by the boats. These prawns generally come up at night through dawn when the rampanis are payed out to catch them. But, at day break the boats swarm the area scattering the shoals beyond the reach of rampani. The Government of the Union Territory has of course rules since 1974 restricting the activity of the boats away from the 5-fathom line, which the boats hardly take notice of. Consequently there is a tense situation capable of taking a violent turn any time. Govt. of Goa, later demarkated the five-fathom line to segregate the activities of the two sections. In Karnataka too, such rivalry exists between the two sections and has been the cause of destruction to many local indigenous gears.

Another threat recently posed in the Karnataka area to the traditional fishermen is the sudden increase in the number of purse-seiners. While the purse-seiners are proved to be efficacious in taking sardine and mackerels, they do so at the expense of the returns of rampan fishermen. But, this situation can more or less be redeemed and the overall catches can be increased if the purse-seiners are made to fish in more offshore areas, well outside the rampan zone, where the stock is found to exist in sufficient intensities according to the aerial surveys conducted for the purpose. Another possibly effective way of solving the crisis is to restrict the activities of the seiners to a period when the shoals are without the reach of the rampan and the latter are not in operation.

— *Working paper by P. M. Tandel, Binaga Ice & Cold Storage Private Ltd., Binaga, Karwar.*

The idle capacity of freezing plants can be put to use with profit

In spite of phenomenal increase in the export of marine products, which touched an all-time record of 48,000 tonnes in 1976, the freezing industry has a vast surplus of installed capacity. Recent developments like freezing of fish fillets, diversified products like frozen minced meat and other fish products are designed towards making use of at least a portion of this idle capacity. Such products can have, besides export potential, good reception from the urban population within the country. This would, in turn, have an overall impact in influencing the socio-economic status of fishermen and others engaged in the fishing profession in rural areas.

— *Keynote address by G. K. Kuriyan, Director, CIFT.*

With other conditions satisfied funds are no problem

With the advent of social control, the nationalised banks stepped into the development programmes initiated by the government for the benefit of the fishermen community. Till then the fisheries cooperative societies, formed by the governments primarily to draw the fish marketing away from rapacious middlemen, have been functioning as credit societies. The financial assistance given by the banks to the fishermen are mainly in the form of loans for replacement of their old crafts and gears. While granting loans, the infrastructural facilities like road, marketing, cold storage etc. are taken into consideration. The estimated daily catch and average daily income, capital expenses for craft and gear will all be considered, too. It is also ensured that marketing is done in an organised manner, either through cooperatives or reputed exporters. To facilitate transportation of catch, assistance is also extended to marketing agencies. In Kerala, social service organisations where the fishermen enroll themselves, assist the banks in supervising lending operations. In other areas, community development block officials help the banks. The loans are granted to the experienced fishermen groups, and payments towards purchase of boats etc. are made direct to the supplier after obtaining a written consent from the borrower. A very nominal rate of interest of 11% p.a. is charged. In eligible cases, who come under the purview

of differential interest scheme, 4% p.a. is only charged. In areas where the Small Farmers Development Agencies are functioning, the fishermen are eligible for a subsidy of not less than 25% of the cost of the items purchased. The repayment of loan is in 20 monthly instalments. Owing to lack of organised marketing and the perennial indebtedness of the fishermen to the middlemen who then control the marketing, repayments become irregular if not totally stopped. The fish farmers development agencies which are doing useful work in inland areas may be extended to coastal areas also for proper marketing. Like in a few states, the state fishery development corporations may be constituted in all maritime places to open up procurement depots.

In the event of an integrated rural development along our coasts involving large-scale coastal aquaculture and other activities, banks have to play a more vital role. In this context it is to be ensured that proper training is given to the interested fish farmers, and adequate staff are to be posted in the project areas for technical supervision. The need for supply of seed and marketing the harvest can hardly be overemphasised if the industry is to be developed taking advantage of modern technology. In addition, supply of organic and inorganic manures and artificial feed is to be ensured. Above all, a lot of extension work is necessary before the new techniques are adopted by the fishermen. When all these schemes are taken up the commercial banks will come forward without any reservation to extend funds for the successful implementation of the schemes.

— *Working paper by R. Sundaresan, Superintendent (Agri.), Agricultural Finance Cell, Indian Bank, Madras-1.*

Collective ownership suggested as a help to small-scale fisheries

Even though the traditional sector is more decentralised and labour-intensive, resulting in much less economic concentration and basically serving the rural economy better, (a purpose hitherto not served by the mechanised sector in spite of its excelling in the gross out-put and foreign-exchange earnings, because the mechanised sector is concentrated in a few centres and economic control of their operation rests in the hands of a few rich men who are often not fishermen), it is left to fend itself without any tech-

nical guidance, a condition under which there is little scope for increase in its productivity.

The prevailing ownership pattern has been the main factor preventing this sector from an organised progress. The ownership pattern is mainly in the form of individual ownership or owner-worker pattern. This is especially true in the case of catamarans and some canoes. In the case of big canoes collective ownership has however played a role. Apart from these, there are labourers working in these crafts who are not owners. Since mechanisation programme was started by the government, the ownership pattern to be evolved has been much debated. State ownership was found impracticable. In fact, even under the state-owned corporation, ownership and management of small boats was proved to be a miserable failure. The formation of cooperatives, encouraged by the government, for collective ownership or on the basis of owner-worker pattern, where all those who worked were also sharing profits, has also failed for want of proper leadership. Local politicians and other persons of questionable motives became presidents and members of board of directors. The fishermen who actually toiled were at the mercy of these leaders, and the experience in the past 30 years has convinced that this method is not feasible and productive of results.

What is needed therefore, is the evolution of a proper collective ownership pattern with adequate managerial expertise. The ownership must be of and by the genuine fishermen. These organisations should have with them the operational and economic control not only of the indigenous crafts, but also the mechanised boats. If a genuine fishermen's organisation operate canoes, catamarans and mechanised boats they can be used to evolve their most optimal functions without any conflicting interests and legislations.

— *Working paper by S. N. Rao,*
Director of fisheries, Kerala.

Aquaculture an urgent need

Poonthura, a fishing village near Trivandrum, is an epitome of poverty with all its dire consequences. The stunningly overcrowded village—with an average density of population of 13,000 per sq. km—has hardly standing ground for all its inhabitants who almost entirely depend

on the sea for their livelihood. The living condition of the people is so pathetic as to make any civilised man flinch. A survey showed that 70% of the families have only one man each to earn the living for the rest of the family, and nearly 15% of the families have more than 8 members each to feed. If inability to meet the basic needs of food, shelter and clothing be the yardstick for measuring poverty of people, fishermen of Poonthura are a lot than which only beggars are poorer.

The magnitude of idle labour in Poonthura, as revealed by the statistics, is staggering. With fishing a strictly seasonal occupation, the majority (of those minority active fishermen) are employed for a period of six months only. It is estimated that 90% of the people remain idle for a substantial part of the year. The problem of underemployment and supplementing the woefully inadequate return from their meagre occupation can be solved only by a judicious use of modernising techniques and diversification of employment. The development of internal market, preservation techniques and adequate financial support through easily accessible financial institutions are necessary components of a practicable development programme. Land-based industries especially for women of the community should be a great contribution to the solution of unemployment. Scientific research in aquaculture with its employment potential and modernising of fishing gear are urgently called for.

— *Working paper by Rev. Paul Valiakandathil S.J., FIDES Centre, Poonthura.*

The immobility of labour the prime cause of poverty

When any labour becomes immobile, i.e., does not move from one industry to another, or from one occupation to another and fail to acquire enough knowledge and experience in other kinds of trades and occupations, the earning capacity of that labour becomes limited. This has been one of the major causes for the proverbial poverty of the fishermen along our coasts. Enough attention has not been paid by the governments to afford alternate employment to the fisherman in his offseason or during the failure of a fishery, or to make the fishery a full-time job as they have done in Japan. The community development block-plans operated in many coastal areas

through the various five-year plans for integrating agriculture and animal husbandry along with fisheries have not brought about the desired benefit of improving the fisherman because here the animal husbandry and agriculture received the main attention and fisheries only a second-class treatment. If exclusive development blocks were designed for developing fisheries along our coasts, at a rate of one block per 20,000 fisherman population, perhaps far-reaching results would have been achieved to improve the fisherman.

— *Working paper by Ambrose Fernando.*

Fishermen are not poor, the social system makes them poor

.....in one year (since the introduction of outboard motors), the gross income was 3 times higher than the non-mechanised ones, and the net income nearly double.....
(But) The outboard motorisation lasted only three years.

Experiment was sound. Maintenance of motors and training of technicians were good. Spare parts were in regular supply.....
But the Project would not take into account the social structure of the village.....
Fishermen operating nonmechanised crafts work less during "peak season," cover their needs and enjoy life (most of their festivals falling in this season). During the "lean season" they work hard to earn a few rupees needed for their maintenance.....
Mechanisation requires a different attitude. One has to work hard during "peak season" to have good returns for the capital invested, but all activities may be stopped during the "lean season" due to recurring expenditure on fuel etc. (Only) A few fishermen adapted to this condition and they now are really doing well.

— *Working paper by P. Gillet, Kottar Social Service Society Fisheries Projects, Muttom, Kanyakumari District.*

One man's food is another man's poison

One of the important problems which speeds-up the indigenous fishermen's rush to famine is pollution. Countless new industries are pouring continuously huge quantities of their

effluents in the sea and rivers with possibility of exterminating the fish in these waters and sending a large number of fishermen to the vast brigade of unemployment. While all the highly industrialised countries have taken adequate measures to prevent the growing evil of pollution accompanying large-scale industrialisation, India seems to be ignorant of the devastating hazards of pollution on the health of man. It is absolutely necessary that all the new industries as well as the established ones are compelled by statute to adopt suitable antipollution measures. No industry should be permitted to start in the vicinity of coastal areas unless the firm gives an assurance to implement such measures.

— *Working paper by Bhai Bandarkar, General Secretary, Maharashtra Machimar Kriti Samiti, Bombay.*

Crab fishery must be restored

In former days crabs were available in plenty and formed a remunerative fishery along the coast of Maharashtra. In those days shrubs were growing in large numbers in the mucky coastal waters, among the roots of which the crabs used to feed and grow. During the British rule these shrubs were not allowed to be destroyed as they are capable of preventing erosion. But, now people living on the coast unjudiciously cut down these trees for firewood and as a result, the crab fishery has virtually disappeared. It would be a great help to the small-scale fisherman if strict restrictions were brought about against such indiscreet destruction of shrubs, which would in turn revive the once-lost crab fishery of the region.

— *Working paper by N. K. Bhagat, Chairman, Kulaba Jilla Machimar Madhyawarti Shakari Sangh Ltd., Alibag, Maharashtra.*

Fresh fish consumption increases, thanks to the post harvest technology

A spurt has been recorded in the utilisation of fish in the fresh or unprocessed condition, from 45.3% of the total catch to 66.7%, in the past decade. This is a very healthy trend which deserves all encouragement as none of the nutri-

ents in this protein rich food is lost in this mode of utilisation. This progress has been made possible by several developmental activities like introduction of more and more mechanised boats, laying of approach roads to fish landings, making available large quantities of ice, effectuating quick means of motorised transportation, facilitating movements of fish over long distance by employing refrigerated rail wagons and above all by applying modern norms of scientific and hygienic handling of fish recommended as a result of recent researches. There is vast scope for further improving and popularising consumption of fresh fish, by educating the fishermen and fish dealers in the fundamentals of post-harvesting technology, which will go a long way in expanding the consumer sector in our country.

— Working paper by M. R. Nair and T. K. Govindan, Central Institute of Fisheries Technology, Cochin.

Chitin from squilla and prawn wastes

Large quantities of squilla, called 'Chelly' in Malayalam, are caught along with prawns from the trawling grounds, the disposal of which poses a big problem in many places. Most of it is thrown overboard immediately after catching and a relatively small quantity, that which is admixed with fish and prawns perhaps in the last couple of hauls each day, are brought to shore to be sorted out and thrown away in the landing places. It is estimated that the annual catch of squilla in India amounts to 50,000 tonnes. If the boats were to fish for this, this figure may shot up considerably. Another waste which poses the same problem of disposal is the prawn peal. These squilla and prawn wastes can be converted by a none too difficult process into chitin which finds an extensive use in a number of industries.

— Working paper by M. N. Moorjani, Central Food Technological Research Institute, Mysore.

Participation by all concerned is indicative of the enormity of problem

(Presidential address, contd. from page 8)

ers. Fortunately there are some credit facilities available through financial institutions, but even these may require some liberalisation. Therefore, suitable financial packages designed to be responsive to the needs of the small-scale fishermen will have to be worked out and implemented. When once a system gets a foot hold and the small farmers or fishermen gain confidence in the viability of the technologies developed the income of the artisanal fishermen could be increased considerably.

Another area which requires attention is the development of appropriate post-harvest technology covering the entire gamut of preservation, processing, packaging and transportation, so that spoilage and wastage can be reduced to the minimum and the produce could fetch higher price. Similarly, there is much to be desired in our marketing system. Lucrative markets should be developed so that the primary producers should be able to get reasonably gainful prices. While prices are basically ruled by the market forces, these should be influenced decisively by well-aimed policies.

In the organisation of this Seminar, participants have been drawn from active fishermen, agriculture, animal husbandry and fishery scien-

tists, administrators, representatives from cooperatives, corporations, financial institutions and voluntary social organisations, social scientists and economists. This is indicative to the enormity and condition of the small-scale fishermen or fish farmers. In the national policy, this has given a very high priority. FAO/UNDP have initiated projects for the development of the small-scale fisheries in this region. With the available resources and the potentials it should be possible to achieve some positive results provided we do not go about doing things in a perfunctory manner, but feel an emotional involvement in the endeavour to fulfil the task before us. Only when science helps the poor to obtain the basic needs of their life and thereby improve the quality of their life can it claim that it is discharging its social functions. I am hopeful that the deliberations of this Seminar would result in leading to some positive action for the betterment of one of the weaker sections of our society. As Swami Vivekananda said "let us give up jealousy and conceit and learn to work unitedly for others." Let us, therefore, make a better use of our human capital and abundant aquatic resources especially for the betterment of the small-scale fishermen.

CAMERA — EYE VIEW

Session I



Dr Silas addressing the opening session

Present status of small-scale fisheries and coastal aquaculture



Shri K.H. Alikunhi, Chairman, speaking

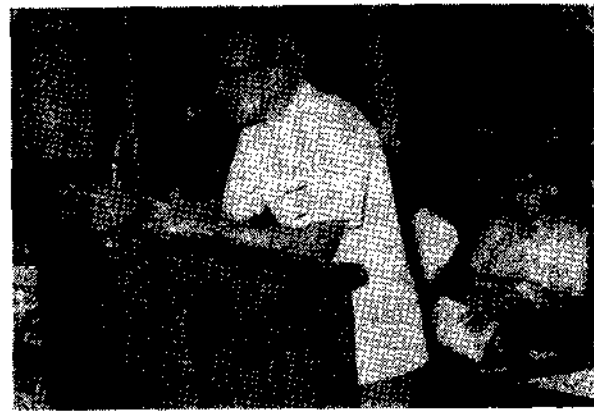


Dr T.A. Mammen delivering the keynote address

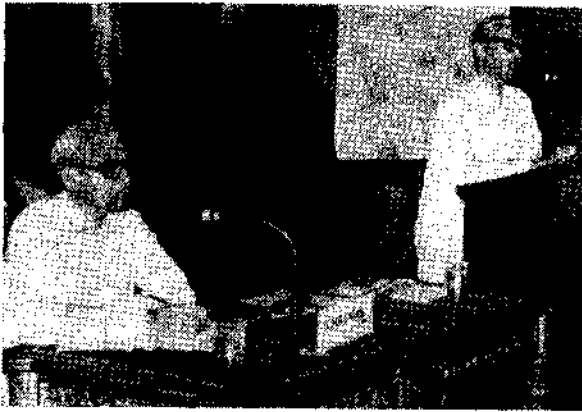
Session II: Socio-economic conditions of the coastal rural sector



Dr S. Jones, Chairman, addressing



Keynote address by Shri A.G. Kalawar



Session III: Resource potential for capture and culture fisheries in the coastal region. Dr Raghu Prasad giving keynote address. Seen on the left is Dr C. V. Kulkarni, Chairman.



Session IV: Technical base for integrated rural development. Dr P.N. Ganapati, Chairman, addressing



Dr. Silas delivering keynote address



Session VI: Manpower requirements and training. Dr A. Venkataraman, Chairman, speaking. Seen on his right is Dr V.G. Jhingran, who gave the keynote.



Session VII: Financing of integrated Projects. Shri R. Sundaresan speaking. Looking on his right is Shri S. Gopalan, who took the chair.



Session VIII: Public policies and planning of rural fisheries. Prof. A. Abraham, Chairman, speaking.



Concluding session. Dr M.S. Swaminathan speaking. Seen on his right is Dr Silas who took the Chair.



Dr K. Alagarwami giving the vote of thanks.

EXHIBITION



Thiru G.R. Edmund arrives to inaugurate the exhibition on the recent development of mariculture, conducted at the premises of the seminar auditorium at Rajaji Hall



The Minister is being received.



The Minister is garlanded



Inauguration of the exhibition



The Minister seeing the Institute's publications



Going round the exhibits

SIDELIGHTS



A view of the audience at Kalaivanar Arangam.



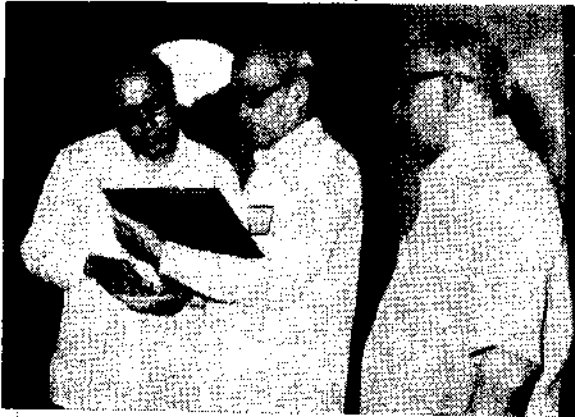
A view of the participants of the seminar at Rajaji Hall



Some of the distinguished delegates.



Dr Swaminathan having a tea-time chat with some of the participants.



Dr Swaminathan, Dr Kulkarni and Dr Jones, having some absorbing topic between them.



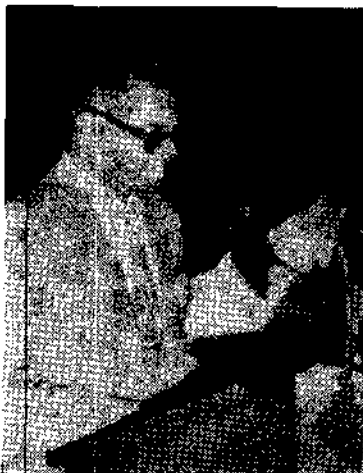
Dr B.K. Soni in conversation with a participant.



Dr Silas, and Dr Vedavyasa Rao discussing with a delegate—about prawn culture?



Dr B.K. Soni and Dr Silas at the exhibition



Shri T. Tholasilingam giving vote of thanks at the inaugural function.

Corrigendum

THE NEWS ON THE SUBFOSSIL DEPOSIT OF ATHANKARAI, APPEARED ON PAGE 3 IN NEWSLETTER NO. 8, WAS REPORTED BY P.S.B.R. JAMES, AND NOT D.B. JAMES AS WRONGLY PRINTED.

—Editor

Delegates visiting the Kovalam mariculture laboratory of the Madras Centre



Glimpses of a variety entertainment given by children of the fishermen of Kovalam
in honour of the visiting delegates



TITBITS

The catamaran (of which we have 50,000 in India—50% of all the country crafts put together), despite its very primitive design, is the most versatile craft: unsinkable, capable of operating from any type of shore, possible to be dismantled and assembled without any difficulty, and of which repairs and replacements do not present any problem. For these, like bullock cart, a suitable substitute is hard to find.

(from keynote address by T. A. Mammen)

* * * *

Seventy percent of income of the average fisherman is spent for carbohydrate food, like cereal and roots, whereas only 15% is spent on protective foods like pulses, milk and fish. Fruits and green-leafy vegetables are not popular among them.

(from working paper by Rajammal et al)

* * * *

Although Maharashtra is considered as the most industrial state in India, the economic development is practically confined to the Bombay division and even in that division, it is limited to a small area called the Bombay Metropolitan region. The rest of the division, as also the rest of Maharashtra, is as backward as any other part of the country. The coastal region, Except Greater Bombay District and part of Thana District, has remained untouched by the major progress in the major sector of state economy over 100 years.

(from keynote address by A. G. Kalawar)

* * * *

Our traditional fishermen has such intricate frasp of the totality of his ecosystem that he can

fish for three or four days at a stretch beyond land visibility at depths of 100 and 150 metres and return at night exactly to his village landing merely with the aid of stars. He also knows the influence of currents, winds and lunar forces on the occurrence and movements of fish shoals.

(from working paper by John Kurien)

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Oilsardine forms the most important single-species fishery contributing to about one-third of the total marine fish production in India, and on which depends the largest number of traditional fishermen for their sustenance. The species is distributed along the southwest coast, only between Quilon and Ratnagiri. The fishery which extends from August to March is constituted of fish less than a year old.

(from working paper by P. S. B. R. James)

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Marine species are unable to acquire resistance to pesticides and are subject to heavy mortality when exposed to relatively low concentrations of pesticides which are not sufficient to control most of the insect pests.

(from working paper by P. V. R. Nair)

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Asia is the cradle of aquaculture, originating and practicing the art since historical past. Aquaculture in the continent is at present estimated to produce 5.2 million, the lion share of the world's production of 6.2 millions.

(from keynote address by V. G. Jhingran)

Presses Thanked

Dr. K. Alagarwamy, Scientist S-3, who was the Convener of the Seminar, has in his Thanksgiving expressed thanks to M/s Mathrubhumi and Thilakam Press for their excellent printing of the pamphlets which he said, added considerably to the success of the Seminar.

FISHERIES TRAINING COURSES IN INDIA

Details of the various training courses available in India are briefly described below:

1. *Fishermen Training Centres*

A number of Fishermen Training Centres are available in most of our maritime states, where training is given for operating small mechanised vessels which do not come under the Merchant Shipping Act. The training is for 6 months to 1 year in the techniques of fishing in the coastal waters with mechanised boats, fabrication of nets, boats etc. The academic qualification for eligibility: pass in V Std. with at least 5 years of fishing experience.

2. *Central Institute of Fisheries Nautical and Engineering Training, Cochin*

The Institute has also a unit at Madras. The institute is intended to prepare operatives for the medium-sized and large vessels coming under the manning regulations of Merchant Shipping Act. The courses offered range from 6 to 15 months duration. The categories of operatives trained are Skippers, Fishing Second Hands, Engine Drivers, Engineers, Shore Mechanics, Radio Telephone Operators, Gear Technicians, Boat Building Foremen, Fishery Electronic Technicians and Teachers for fishermen training centres. Academic qualification for candidates: Pass in Matriculation or equivalent examination.

3. *State Fisheries Staff Training Centres*

These are in-service training centres functioning in many maritime states for training their lower grade technical staff.

4. *Central Polytechnic, Madras*

A 3-year professional diploma course is offered in Fisheries Technology and Navigation.

5. *Integrated Fisheries Project, Cochin*

The Project, working under the Government of India offers short-term course in refrigeration (freezing-plant operation), fish processing, purse-seining, fishing-boat designing and servicing of electronic equipments and engines. It also provides "sea-time" to

candidates for Fishing Secondhand's examination and Engine Driver's ticket.

6. *Central Food Technological Research Institute, Mysore*

This CSIR institute conducts a short-term course in refrigeration techniques involved in food preservation, including fish and meat.

7. *College of Fisheries, Mangalore*

The college under the University of Agricultural Sciences, Bangalore, offers different courses including undergraduate and post-graduate courses:

Periodical/Short-term courses as orientation and refresher training courses on different aspects of fisheries, for junior technical personnel.

A Fish Processing Technician's Course of 3 months duration for the benefit of processing technicians employed in governmental and private sector fish processing establishments.

A 4-year professional degree course in Fishery Science (B.F.Sc.). The minimum qualification for admission is pass in the 2-year Pre University course or equivalent. 40 seats for candidates all over India.

Professional Masters Degree course (M.F.Sc.) in Industrial Fishery Technology, and Fish Production and Management, each of two years duration. Only holders of B.F.Sc. degree are eligible.

Besides, the University has already approved the starting of Ph.D. programmes in the College.

8. *Fisheries College, Tamil Nadu Agricultural University, Tamil Nadu*

Offers B.F.Sc. Course for 20 students annually.

9. *Cochin University, Cochin*

The University offers M.Sc. degree in Industrial Fisheries. The course covers 5 semesters each of about 6 months duration. The course is open to science graduates. The intake yearly is 15.

10. *Central Institute of Fisheries Education, Bombay*
This well-equipped major in-service training centre offers 2-year postgraduate diploma course in Fishery Science (D.F.Sc.), mainly to district level officers deputed by various states. Up to 60 candidates are admitted every year, including a few private candidates. The institute has recently been transferred from Government of India to Indian Council of Agricultural Research.
11. *Inland Fisheries Training Unit, Barrackpore*
This unit under the administrative control of the Central Inland Fisheries Research Institute, Barrackpore, offers a one-year certificate course in Inland Fisheries Development and Administration to the junior fishery officers deputed by various states.
12. *Regional Training Centre for Inland Fisheries Operatives, Agra*
A 9-month certificate course in fish breeding and culture technique to matriculate deputees from various states. The Centre functions under CIFE, Bombay.
13. *Central Fisheries Extension Training Centre*
Also a unit of Central Institute of Fisheries Education, Bombay, offers a 10-month course in extension techniques relating to fish culture at post graduate level mainly for in-service personnel.
14. *Krishi Vigyan Kendra, Narakkal, CMFRI*
The Kendra attached to Central Marine Fisheries Research Institute, Cochin, offers training (short-term course of 4-week duration) specific to coastal aquaculture to fishermen/farm owners.
15. *Krishi Vigyan Kendra, Pondicherry*
Also offers short-term courses to fishermen on fish culture.
16. *ICAR|UNDP Centre of Advanced Study in Mariculture, CMFRI*
The Centre, recently organised with the backing of UNDP, is to offer advanced study to selected candidates with postgraduate qualification, on mariculture.
- (Courtesy: Working papers by
H. P. C. Shetty and M. N. Kutty)

(Aquaplosion contd. from page 13)

that it is not green yet everywhere, but it can be green. It can be because the Indian farmer is capable of progress, if he is properly helped by the scientists, administrators, and above all, by the political leadership by formulating proper

policies. I am confident that this is *in toto* applicable to the fisherman. I am pretty sure that if our fisherman is given proper back-up he will bring about an era of aquaplosion in the near future.

‘Cheap’ fish is not cheap

Man considered fish always as a cheap source of protein. In many of the developed countries cheese and eggs became cheap protein food, because of the highly productive intensive farming systems evolved on scientific basis. But, fish were cheaper still. Now this condition is reversed. In all developed and even in developing countries fish is a costly protein which the poorer section of the people can hardly afford. The reason for this unhappy trend of cost of this one-time common man's food is mainly because of the cost of production mounting day by day due to the increasing cost of fuel and labour. Added to this is the inevitable thinning of the natural resources, particularly marine. The only hope to keep the cost of this delectable protein within the reach of man is to raise it, wherever it can be raised. True, people have been raising for centuries the freshwater fishes like carps and trouts in ponds and pools. But this is only a minute fraction of what we really can do. For large-scale production of fish protein we have to turn to mariculture. Now that we know that these marine creatures tend to domestication as much as freshwater forms we have to marshal all our scientific resource for achieving this goal.

MAKING USE OF NATURE'S GIFT

Most of our cultivable fishes, and also many of the crustaceans, a group under which the prawns come, produce tens of thousands of eggs each time as a means to the survival of the species. A fish likewise spawns many times in its life. In fact the greatest part of its life span, unlike the animals on the higher rungs of evolution, which have a much longer immature stage, is spent in reproduction. The vast numbers of minute eggs are left to the mercy of nature without any kind of parental care to grow into adults. As their enemies, particularly in their early stages of development, are legion, only a few are destined to reach the adult stage to continue the chain of life.

These animals though spawn profusely thus in nature are generally shy to do so under captivity. The reason may be that the environment under captivity does not ensure for all they know a successful larval growth (in fact it is known that the right environment—consisting of the optimum physical, chemical and biological factors—actually triggers the spawning in many of these animals). A mature female fish, or crustacean, or mollusc, ready for spawning is seen to hold its eggs for a very long time, till the right environmental condition is attained, or even resorb the eggs without spawning if the condition is not attained. This is perhaps as the best Nature could do in the absence of parental care.

This habit of not producing the eggs under captivity, prevalent among many of the marine and estuarine species—and also many riverine forms—acts as a major constraint in aquaculture. In such cases the young ones will have to be obtained from wild each time for culturing. This method of stocking the seed from the wild makes the culture practice dependent and inferior. But now it has been made possible in many marine species, and most riverine, to induce the spawning by hormonal treatment. A fish treated with the proper hormone spawns its eggs irrespective of the external conditions. And the eggs can be fertilized with the germplasm obtained likewise from the male.

With this break through the aquaculture takes to a footing not very different from the domestication of our farm animals. Not only hatcheries of the cultivable species can be raised to ensure a steady supply of seed at all times and in all places, but also it is possible to improve the strains by genetic combinations. In making the development of hatcheries successful, the Nature's gift to these animals, namely, the prolific fecundity—potentiality to produce countless eggs—is the wildcard. The eggs that are produced by a couple of fish are sufficient to stock a moderate farm. The breeding stocks, therefore, need not be large ones, nor expensive. With the establishment of hatcheries it will not be long before the dream of domesticating our nutritious marine and estuarine fish comes true.

Aquaculture is superior to land culture

Keeping fish is relatively a less nuisance than raising poultry or cattle. There is no objectionable smell, and fish themselves can make no noise. There is no cleaning out to do. Fish food, if at all is necessary, is cheap to make. Fish can be fed with scraps. The vegetation which grows profusely in the excreta laden water medium can itself support a large number of species. Therefore, aquaculture poses no serious holiday problem like other forms of culture. The family can go on their usual holiday, if they so wish, without the fear that the sources of food would get dry up, because most culture ponds provide enough vegetable and animal matter to keep the fish happy for some time. Another and perhaps most important feature of aquaculture which makes it undoubtedly superior to land culture is the space potentiality. While the land culture takes up quite a lot of space which could otherwise be used, the fish farming takes water areas otherwise wasted. Also, area to area, fish can be stocked in much larger intensity as the fish utilise all the three dimensions of space. The atmospheric pollution which is incidental to cattle farming or poultry is also not in fish farming.

au revoir



The participants with Dr M. S. Swaminathan, Director General, ICAR,
at the end of the Seminar