



# **SEMINAR ON FISHERIES EXTENSION**

**Cochin \* 8-10 December 1980**

## **STATUS REPORTS AND BACKGROUND PAPERS**

**JOINTLY ORGANISED BY**

**CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, COCHIN  
CENTRAL INLAND FISHERIES RESEARCH INSTITUTE, BARRACKPORE  
CENTRAL INSTITUTE OF FISHERIES TECHNOLOGY, COCHIN  
CENTRAL INSTITUTE OF FISHERIES EDUCATION, BOMBAY**

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## PREFACE

**E**XTENSION is a system which is used as an instrument to bring about change, be it socio-logical or technological. It is a multidimensional system with interrelationships, linkages and transactions between and among the internal and external domains and aims at causing planned change or progress in the target field as per the greater sociological and economic changes desired by the political will of the people. In view of this crucial role, any programme planning for development has to include the extension system as an integral component. Unfortunately this aspect has been lost sight of in our development plans on Fisheries and even the small beginning that was made in the fifties became dissipated. Today what we find in the form of extension service in the Fisheries Department of a few States is nothing but an apology for extension system proper. In the words of the National Commission on Agriculture "Absence of adequate work in fisheries extension has been one of the principal reasons for the slow pace of inland fisheries development". Extension service in marine fisheries sector is much less enviable.

The character of fisheries development has vastly changed today and we are in the threshold of a new era, armed with better knowledge of the fishery resources, the possession of an Exclusive Economic Zone in our seas, improved and new technologies for increasing production through culture, a well-established processing industry, greater research support and, above all, a realisation of its potential as one of Nation's major assets and we have the political will to assign priority to this sector. Ironically, this is counterpoised with a weak-kneed extension system which is totally inadequate and incompetent to meet the new challenges and opportunities.

Even after witnessing the sea-change brought about in agriculture and animal husbandry through extension service, we have kept cool on fisheries extension. If any sizable increase in fish production from the present level of about 2.2 million

tonnes were to be realised, it would need all our will to harness the technologies for intensive production in the capture as well as culture sectors and make extension system the corner-stone of development. The communication gap between technology system - extension system - finance system - client system - utilisation system, etc. is so vast that unless a serious effort is made to bridge the gaps and establish viable linkages and interrelationships among them it would not be possible to bring into fruition desired production levels and social goals, that is to usher in a "fisheries culture".

Deeply conscious of the above stated facts highlighting the important role extension has to play and the temporal appropriateness in relation to the current phase of development, the Central Marine Fisheries Research Institute (CMFRI), jointly with the Central Inland Fisheries Research Institute (CIFRI), Central Institute of Fisheries Technology (CIFT) and Central Institute of Fisheries Education (CIFE), decided to organise a SEMINAR ON FISHERIES EXTENSION. The Indian Council of Agricultural Research (ICAR), under whose administrative control the above Institutes function, is a body responsible for agricultural research, education and extension education in the country and is not directly engaged in extension. However, the initiative for organising the Seminar on Fisheries Extension was taken by CMFRI and, the ICAR, recognising the importance of the subject, immediately supported the proposal.

The objective of the Seminar is to provide a forum to those engaged in fisheries extension to meet and discuss the present state of art of extension, identify the lacunae and evolve an action plan for strengthening and streamlining fisheries extension in the country. Primarily, the Fisheries Departments of the States/Union Territories are responsible for fisheries extension. The Fisheries Division of the Department of Agriculture and Cooperation in the Ministry of Agriculture, Government of India is the planning and policy

making body for fisheries development in the country. The Extension Directorate of the above Ministry has the responsibility of extension programmes in the agriculture sector at the Centre. The Fisheries Faculties of Agricultural Universities, some with Fisheries College, have in the recent years taken up fisheries education at the graduate and post-graduate levels. The three ICAR Institutes, namely the CMFRI, CIFRI and CIFT, are the premier organisations responsible for fisheries research and the CIFE is in charge of fisheries education. While planning the Seminar, it was decided that all these organisations may be requested to send status reports and background papers on fisheries extension work done by them which would form the basic material to initiate the discussion at the Seminar. These reports/papers have been put together in the present publication to make it a document of the Seminar.

It is intended that the three-day Seminar, to be held at Cochin during 8-10 December 1980, will devote its attention to deliberate all aspects of fisheries extension, draw parallels from the success of extension in agriculture and consider adopting a system suited to the fisheries sector, review the status of extension education and training and evolve specific action plans for strengthening fisheries extension system. It is realised that this first Seminar on the subject cannot fulfil all the tasks and find solutions to all the problems; nevertheless it would contribute to a better understanding of the magnitude of the problems and prospects at the National level and would form the basis for future discussions. We would acquire consciousness of this vital force

Cochin,  
1st December 1980.

and make extension an inalienable organic link of fisheries planning and development through a public policy.

I am grateful to Dr. O. P. Gautam, Director General, Indian Council of Agricultural Research for his guidance and advice in organising the present Seminar. I am also grateful to Shri S. P. Mukerji, Additional Secretary (ADF), Ministry of Agriculture, Government of India, for his spontaneous support to the Seminar. Late Shri G. K. Kuriyan, former Director, CIFT was a source of immense strength in planning the Seminar. I have drawn valuable support from Dr. S. N. Dwivedi, Director, CIFE, Dr. A. V. Natarajan, Director, CIFRI and Shri M. R. Nair, then Director-in-Charge, CIFT in organising the Seminar. Dr. C. P. Panduranga Rao, Director, CIFT has given support for the conduct of the Seminar. There has been a good response from the Departments of Fisheries of the States/Union Territories to provide the status reports on fisheries extension and I am thankful to the following Directors: Shri M. M. Mohanty (Orissa), Shri C. Chellappan (Tamilnadu), Shri A. G. Vasavan (Kerala), Shri K. Sripad Rao (Karnataka), Shri S. Banerjee (Andhra Pradesh), Shri S. S. Naik (Maharashtra), Shri A. K. Kawatra (Punjab), Dr. D. K. Kaushik (Haryana), Shri George Varghese (Lakshadweep), Shri E. Purushothaman (Pondicherry) and others. My thanks are due to all the Institutes / Departments / Agricultural Universities and the authors who have contributed papers for the Seminar. I wish to record my appreciation of the tireless efforts of Dr. K. Alagarwami, Senior Scientist, CMFRI, in assisting me throughout in organising the Seminar and bringing out this document.

DR. E. G. SILAS

*Director, CMFRI*

*Convener*

*Seminar on Fisheries Extension*

## C O N T E N T S

Preface

Committees of Seminar

### I. STATUS REPORTS ON FISHERIES EXTENSION

Editor's Note

#### A. COASTAL STATES

1. Department of Fisheries, Kerala, Trivandrum. (A.G. Vasavan)
2. Department of Fisheries, Maharashtra, Bombay. (S.S. Naik)
3. Department of Fisheries, Tamilnadu, Madras. (C.Chellappan)
4. Department of Fisheries, Gujarat, Ahmedabad. (U.L.Wadekar)
5. Department of Fisheries, Karnataka, Bangalore. (K.Sripad Rao)
6. Department of Fisheries, Andhra Pradesh, Hyderabad. (M.Venkateshwara Rao)
7. Department of Fisheries, Orissa, Cuttaok. (M.M.Mohanty)
8. Progress of Fisheries Extension Service in Orissa. (J.C.Roy)
9. The Saga of Fisheries Extension in Western Orissa (M.K.Ahmed)
10. Role of FFDA Balasore in extension of intensive pisciculture. (R.K.Das)
11. Department of Fisheries, Pondicherry. (S.Purushothaman)
12. Department of Fisheries, U.T. of Lakshadweep, Kavaratti. (George Varghese)

B. NON-COASTAL STATES

13. Department of Fisheries, Arunachal Pradesh, New Itahnagar.  
(A.K. Das).
14. Department of Fisheries, Haryana, Chandigarh,  
(D.K.Kaushik).
15. Department of Fisheries, Punjab, Chandigarh.  
(A.K. Kawatra).
16. Fish & Wildlife Department, Sikkim, Gangtok.  
(Fisheries Development Officer)

II. FISHERIES EXTENSION IN AGRICULTURAL UNIVERSITIES

17. Fisheries extension and related activities in the  
University of Agricultural Sciences, Karnataka.  
- College of Fisheries, Mangalore (H.P.C.Shetty).
18. Fisheries extension activities at the Fisheries College  
(TNAU), Tuticorin. (K.C. Joseph).
19. Fisheries extension programmes of the Faculty of Fisheries  
in Kerala Agricultural University  
- College of Fisheries, Mannuthy. (M.J.Sebastian).
20. Fisheries research and extension programmes of the Faculty  
of Fisheries of Konkan Krishi Vidyapeeth.(G.A.Shirgur).
21. Agricultural Universities - an aid to fisheries extension.  
(L.M.Joshi, Punjabrao Krishi  
Vidyapeeth).
22. Fisheries extension programmes of Faculty of Fisheries  
of Andhra Pradesh Agricultural University.  
(T.Rajyalakshmi).

23. Achievement and extension of fisheries research at G.B. Pant University of Agriculture and Technology. (C.S. Singh).
24. Utilisation of information sources in the adoption of recommended species of fish in composite fish culture. (G.L. Ray and M.A. Haque).

III. BACKGROUND PAPERS FROM MINISTRY OF AGRICULTURE FISHERIES DIVISION AND MPEDA

25. Approach to Fisheries Extension in India.  
(T.A. Mammen, Fish.Div., Min. Agri.)
26. Introduction of fisheries extension service for development of inland fish farming.  
(V.D. Singh and V. Sampath,  
Fish. Div., Min. Agri.)
27. Fishery extension in production for export.  
(M.Sakthivel, P.V. Verghese and  
R. Ganapathy, MPEDA).
28. Improved techniques on fisheries production and processing come to life through super 8 mm movies. (C.S.S. Rao, Directorate of Extension)

IV. FISHERIES EXTENSION IN ICAR FISHERIES INSTITUTES

29. Technology generation and transfer for marine fisheries development - CMFRI, Cochin.
30. Technology generation and transfer for fisheries development - CIFT, Cochin.
31. Fisheries education and extension training - CIFE, Bombay.  
(H.G. Hingorani, CFETC, Hyderabad).
32. Role of mass media in fisheries extension.  
(Devesh Kishore, NAARM, Hyderabad).

SPECIAL LECTURE

4. The Fisheries Cooperatives in India - performance, problems and prospects. (G.S. Kamat, V.M. National Inst. Coop. Management, Poona).

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Jointly Organised by

Central Marine Fisheries Research Institute, Cochin  
Central Inland Fisheries Research Institute, Barrackpore  
Central Institute of Fisheries Technology, Cochin  
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### EDITOR'S NOTE

The organisers of the Seminar had requested the different States/Union Territories to prepare the Status Reports on Fisheries Extension in an uniform manner and have provided certain guidelines on the coverage of the report. The subject areas in which information was solicited were given code numbers and also titles/sub-titles etc. Most of the States have prepared their Reports as per the suggested coverage, whereas a few have provided information in a simplified manner. Some of the Reports contain only the code numbers and not the titles/sub-titles.

In order to enable the reader to relate the information provided under the code numbers to the subject areas, it has been considered necessary to give here the code numbers, titles etc. The reader is requested to refer to these whenever the subject areas are found wanting against the code numbers in the Status Reports presented by the Departments of Fisheries of the States/Union Territories.

#### GUIDELINES FOR PREPARATION OF STATUS REPORT ON FISHERIES EXTENSION BY STATES/UNION TERRITORIES

Note: The report may include all the extension programmes on marine, brackishwater and freshwater fisheries. Please give information keeping the code number and title as given here.

1. Present status of fisheries extension.
  - 1.1: Fisheries extension schemes undertaken

- 1.1.1. Title and scope of each scheme
- 1.1.2. Period of implementation
- 1.1.3. Technology-based schemes
- ~~1.1.4. Services-based schemes~~
- 1.1.5. Fishermen welfare programmes
- 1.1.6. Brief description of 1.1.3, 1.1.4 and 1.1.5.
- 1.1.7. Source of technology for 1.1.3.
- 1.1.8. Physical targets and achievements of schemes
- 1.1.9. Financial targets and achievements of schemes
- 1.1.10. Impact of schemes on development
  - 1.1.10.1. On production means (craft/gear)
  - 1.1.10.2. On production
  - 1.1.10.3. Socio-economic conditions
  - 1.1.10.4. Services to society
  - 1.1.10.5. Infrastructure facilities
  - 1.1.10.6. Marketing facilities
  - 1.1.10.7. Fishermen Welfare.
- 1.2. Schemes for fishermen community taken up by departments other than fisheries department (Applied Nutrition, Adult Education, Integrated Rural Development etc.)
  - 1.2.1. Implementing agencies
  - 1.2.2. Programmes
  - 1.2.3. Impact
- 1.3. Fisheries Cooperatives
  - 1.3.1. Structure of Fisheries Cooperatives  
(Apex body, District Federation, Primary Societies etc.)
  - 1.3.2. No. of Fisheries Cooperatives as per 1.3.1.
  - 1.3.3. Financial outlay in Coop. sector
  - 1.3.4. Functions
  - 1.3.5. Performance

- 1.3.6. Management
- 1.3.7. Programme for revitalisation
- 1.4. Education and Training
  - 1.4.1. Educational programmes and facilities (Fisheries Schools etc.)
  - 1.4.2. Training programmes and facilities
    - 1.4.2.1. General in-service training
    - 1.4.2.2. Extension staff training
    - 1.4.2.3. Cooperative staff training
    - 1.4.2.4. Fishermen training (Fishermen Training Centre etc.)
    - 1.4.2.5. Non-formal education
- 1.5. Information and communication services
  - 1.5.1. Type of information regularly provided to fishermen
  - 1.5.2. Modes of communication
  - 1.5.3. Impact of the services on fishermen
- 1.6. Linkages with other organisations on fisheries extension
  - 1.6.1. Linkages with Centre (Dept. of Agriculture, Fisheries Division; Extension Directorate of Union Ministry etc.)
  - 1.6.2. Linkages with fisheries research organisations for technology/training
  - 1.6.3. Linkages with fisheries educational organisations for education/training
  - 1.6.4. Linkages with fisheries training organisations
  - 1.6.5. Linkages with public financing institutions
  - 1.6.6. Linkages with Fisheries Cooperatives
  - 1.6.7. Linkages with any other organisations relating to fisheries matters.



1.7. Organisational set-up for fisheries extension

- 1.7.1. Organisational set-up (Preferably in the chart form) up to grassroot level
- 1.7.2. No. of extension personnel in each cadre
- 1.7.3. Location of extension centres and their jurisdiction

1.8. Constraints and problems in fisheries extension

- 1.8.1. Technological
- 1.8.2. Inadequacy of personnel at different levels
- 1.8.3. Lack of training facilities
- 1.8.4. Technological gaps
- 1.8.5. Financial constraints
- 1.8.6. Performance gaps
- 1.8.7. Social
- 1.8.8. Economic
- 1.8.9. Policies and priorities

2. Fisheries development programmes envisaged in the VI Plan

(Please give brief notes on all the fisheries schemes envisaged for the VI Five-Year Plan)

3. Fisheries Extension needs for effective implementation of the VI Plan Schemes.

3.1. Realistic organisational set up for fisheries extension at different levels and coordination

3.2. Technological needs

3.3. ~~Linkages desired with various organisations~~

(Please see 1.6)

3.4. Fisheries educational needs

3.5. Training of extension personnel & type of training

3.5.1. State-level officers

- 3.5.2. District/Regional-level officers
- 3.5.3. Block-level officers
- 3.5.4. Village-level workers
  
- 3.6. Training of fishermen
  - 3.6.1. Diversification course in Fishermen Training Centres
  - 3.6.2. Training in additional vocations
  - 3.6.3. Training of fish farmers
  - 3.6.4. Training in cooperative management
  - 3.6.5. Non-formal education
  
- 3.7. Improvements in extension methods
  - 3.7.1. Demonstrations of technologies
  - 3.7.2. Fisheries Information Service
  - 3.7.3. Audio-visual aids
  - 3.7.4. Proper utilisation of Mass Media
  - 3.7.5. Collection, transmission and utilisation of feed-back information
  - 3.7.6. Creation of Fishermen Forum
  - 3.7.7. Monitoring and evaluation

Explanatory Note on Status Report on Fisheries Extension from  
the States and Union Territories

In the guidelines for the preparation of the paper an attempt has been made to deal with the Fisheries Extension programmes of the States and Union Territories under the following three major sections:

1. Present status of Fisheries Extension
2. Fisheries development programmes envisaged in the Sixth Plan
3. Fisheries Extension needs for effective implementation of the Sixth Plan schemes.

The first section on present status is again divided into 8 subject areas. The titles of these subjects are self-explanatory. The coverage to be attempted under these eight sections will give a complete picture of the present status of fisheries extension in each state.

Each subject area is again divided into sub-areas and some of the sub-areas have further been divided in some cases. This elaborate system for obtaining information has been made so that all aspects of the Fisheries Extension are covered and not any one of them is overlooked. Even a paragraph under each of the code numbers will make the paper a comprehensive one.

Some of the titles which are not self-explanatory are explained below so that the expected information is provided.

Item 1.1.3: Technology-based schemes - would relate to crafts, gear materials and design, fish preservation, processing, inland aquaculture, coastal aquaculture etc. where some technology forms the basis of extension programmes.

Item 1.1.4: Services-based schemes - will deal with the programmes relating to provision of common infrastructure services such as landing facilities, roads, electricity, water supply, ice and cold storage, marketing etc.

Item 1.1.5: Fishermen welfare programmes would relate to housing schemes, medical facilities, hygiene, education etc.

Item 1.8.7 & 1.8.8: will deal with the socio-economic problems of the fishermen community which act as constraints in fisheries extension.

Under item 3.2 the technologies/information required for implementing the Sixth Plan schemes may be identified. The source from which the technologies are sought may also be indicated so that the organisations concerned with the technology could consider it.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980

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STATUS REPORT OF FISHERIES EXTENSION IN KERALA

BY DEPARTMENT OF FISHERIES, KERALA, TRIVANDRUM

Kerala with its long coast line of 590 km and with its vast inland water areas is the leading maritime State in the country from the point of view of fisheries development. Past development efforts in the field of fisheries in the State, however, have touched only the fringe of the vast potential for development of this crucial sector of the economy of the State. The inland water areas remain practically virgin and unexploited. The inshore sea offers large scope for exploitation. The development programmes in the past have more or less neglected the traditional fishermen of the State who contributed to about 80 per cent of the catches and 60 per cent of the fish value.

Extension is the vital link connecting technological development with production. This is clearly demonstrated by the fact that the agricultural sector has made immense progress by the transfer of technology during the period of planned development. On the other hand, in the field of fisheries, extension has been one of the weakest links right from the beginning of the planned development of this sector. This is mainly because there has been no proper extension system for the transfer of technology. The research wings of the Fisheries Departments have been carrying out very useful work in the development of fisheries technology relating to capture and culture fisheries in marine, brackishwater and fresh water systems. However, all the information and technologies have not percolated to the field and it is open to question what fraction of the technologies has found wider

practical application and benefited the fishermen and fish farmers. If the technological developments in the past have been transferred to the field for the use of the mass, the production would have increased manifold.

1. Present status of fisheries extension

1.1. Fisheries Extension schemes undertaken

The extension wing of the Fisheries Department was started only in 1976. It was organised as a very small unit with limited resources. The extension personnel for carrying out the work were exclusively drawn from the cadres of the Department, and also they were very few in number. They could not be given any special extension-oriented training to discharge their functions effectively. Moreover, their work was confined to the use of mass media like cinema, participation in exhibitions which had little relevance to the large needs of the fisheries sector. Thus the extension wing of the Fisheries Department has been professionally and technically weak and ill-equipped. It could not keep the fishermen and industry apprised of the technological developments and results of applied research in the field of capture and culture fisheries. The extension wing was also incapable of helping the fisherfolk to avail themselves of the welfare programmes envisaged for them by the Government in a meaningful way. However, it should also be stated that with all the limitations, extension wing was conducting film shows in the coastal villages in order to educate the fishermen in the modern methods of fishing, sanitation, cultural practices etc. besides participating in the exhibitions.

1.1.1 Title and scope of each schemes

It is intended to create a fullfledged extension machinery in the Directorate of Fisheries for taking up intensive extension work in the field of inland fisheries in addition to participating in the exhibitions conducted from time to time.

1.1.2. Period of implementation

The work is being continued.

1.1.3. Technology-based schemes

Small boat mechanisation programme was started during the middle of the Second Five-Year Plan with a view to increasing fish production and thereby improving the income of the traditional fishermen by enabling them to adopt mechanised fishing methods. It has achieved the desired progress and the private sector has come forward in the field of mechanised fishing.

Mariculture: The Department is running a pilot project on pearl culture and another pilot project on mussel culture at Vizhinjam. It is proposed to rephase the pearl culture project at Vizhinjam and continue as a pilot project while the mussel culture programme will be extended and developed into a co-operative venture. The fishermen will be given the required knowhow to organise mussel culture. Two more projects will be opened at Tellichery and Calicut.

Composite fish culture: The objective of the scheme is to popularise private fish culture in the State and thereby increasing the inland fish production and to improve the income of pisciculturists. Different species of fresh water fish like Rohu, Mrigal etc. will be cultured in the same pond in order to maximise the production of fish from a limited area. The species selected will be such that the fishes should not compete among themselves for biological needs. Demonstrations on composite fish culture are being organised throughout the State.

Reservoir fisheries: Fingerlings are being produced at the nurseries available at the reservoir heads by induced breeding for stocking in the reservoirs, besides for distribution among fish culturists.

#### 1.1.4. Service based scheme

Regional Fisheries Technical High Schools: The fishermen children being economically very poor and living under unhygienic conditions were very backward in studies. Hence three Regional Fisheries Technical High Schools were started in 1968-69 and fisher children were given free boarding and lodging facilities so as to change the environment and to induce them to study well. The schools are located in Trivandrum, Ernakulam and Cannanore Districts. The aim of the Department is to start at least one school in every revenue district.

Fishermen Training Centres: The Department is running 5 Fishermen Training Centres at Vizhinjam, Neendakara, Ernakulam, Beypore and Cannanore where 40 fishermen per course are given training in each centre in the operation of mechanised fishing boats and modern methods of fishing. They are given a stipend of Rs. 125/- per mensem.

Inservice course for Technical Personnel: A comprehensive programme for imparting specialised re-orientation course for the benefit of the technical personnel is being drawn up by the Department. These personnel after receiving the training can undertake useful extension work.

#### 1.1.5 Fishermen Welfare Programmes

Housing and colonisation: The fishermen in the State are living along the coast in thatched unhygienic and congested dwellings. In order to provide better housing facilities to the fishermen the colonisation scheme was started from 1961.

Supply of fishing implements: It is proposed to issue catamarans, dug-out canoes and plank built canoes to the traditional fishermen on a subsidised basis, availing institutional finance.

Infrastructure facilities: Necessary infrastructure facilities like roads, water supply, community halls, ice plants and workshops in selected villages will be provided. Ambalapuzha and Cheruvathoor have already been selected for the purpose.

Fishermen welfare fund: Provision has already been made in the budget to constitute a fishermen welfare fund. The welfare fund is meant for the payment of old age benefits, and expenses connected with death and marriage ceremony. Medical facilities are inadequate in the fishing villages. So Government has decided to start dispensaries as required, on a priority basis.

Rehabilitation of fishermen: 2000 fishermen families who will be evicted from the Vizhinjam fishing harbour site will be rehabilitated in two modern fishermen colonies.

1.1.6. A brief description is given under code numbers 1.1.3, 1.1.4 and 1.1.5.

1.1.7. The required technology for 1.1.3 is being developed and transferred by the Central Marine Fisheries Research Institute and Central Institute of Fisheries Technology and the Kerala Agricultural University.

1.1.8. This will be dealt with under 1.1.10.

1.1.9. This will be dealt with under 1.1.10.

1.1.10. Impact of schemes on development

1.1.10.1. Technologies in craft and gear developed by the research institutes in the country were adopted.

1.1.10.2. Between 1951 and 1978, the total fish production in Kerala registered a threefold increase from 1.31 lakh tonnes to 3.78 lakh tonnes and the share of mechanised sector from 0 to 20% during the period.

1.1.10.3. The major programme undertaken in socio-economic uplift is the creation of dwelling facilities to the fishermen. Under the housing and colonisation scheme, 1611 houses have been completed and allotted to fishermen. The Department also constructed 452 houses



for the victims of sea erosion and fire havoc. Construction of 2000 houses for the rehabilitation of those evicted from Vizhinjam harbour site is also planned. The Kerala Fishermen's Welfare Corporation is also constructing 10,000 houses out of the 25,000 houses proposed to be constructed.

Fishery oriented education was imparted to the fishermen children of the Regional Fisheries Technical High Schools and their standard of education has highly improved. There are instances where several fishermen children came out from those schools with flying colours.

Nearly 2000 fishermen were trained in the different aspects of modern fishing techniques during the last decade. This has helped the spread of technical knowledge to the grass-root level. In fact the increase of shrimp production in Kerala is partly due to the transfer of technology brought about by these trainees in fishing methods.

To provide medical facilities in fishing villages, 19 fisheries dispensaries were started and the work of 8 other dispensaries is in progress. Besides, 10 new dispensaries are also sanctioned by the Government.

1.1.10.4 Brief description is given under 1.1.10.1 to 1.1.10.3.

1.1.10.5 Construction of fishery roads from the landing centres to arterial roads, construction of curing yards and other modern amenities for processing and curing of fish etc. are the important works undertaken in this area. 49 roads have been completed during the last 10 years and the work in respect of 60 roads is in progress. 254 ice plants/freezing plants/cold storages are in operation in the private sector and 26 in the public sector.

1.1.10.6. Marketing facilities are being organised. Organisation of large fish markets in all the Corporations and regulated markets throughout the State are proposed to be set up under Sixth Plan.

1.1.10.7. Brief description is given under Code No. 1.1.10.3 and 1.1.10.4

1.2. Schemes for fishermen community taken up by the Department other than Fisheries Department

1.2.1. Nationalised banks are providing loans for the purchase of fishing implements.

1.2.2. Large number of fishermen were provided with fishing implements under integrated rural development programme.

1.2.3. No proper assessment has been made regarding the impact of these programmes.

1.3. Fisheries Cooperatives

1.3.1. Fisheries cooperatives in Kerala may be divided into four types (1) Credit societies (2) Production societies (3) Marketing societies (4) Federation.

These are registered under the Kerala Co-operative Societies Act, 1969.

1.3.2. No. of societies as on 31-3-1976.

Credit Societies -	153
Production societies-	728
Marketing societies -	17
Federation	- 1
	<hr/>
	899
	<hr/>

1.3.3. An amount of Rs. 16.37 lakhs was advanced as different types of loans during 1975-76. In addition Government extended financial support in the form of managerial assistance to meet contingent and other establishment expenses.

1.3.4. The function of the credit society is to provide credit facilities to weaken the influence of the money-lenders, whereas production society supplied modern fishing implements to increase fish production. The marketing societies functioned to replace the middlemen in fish marketing to improve the income of the fishermen. The federation aimed at research on foreign consumer preferences and encouragement of exports.

1.3.5. The credit societies could not function effectively in the absence of a suitable agency to meet the credit requirements of the members. Again the fishermen being extremely poor, the co-operatives organised by them could not raise sufficient funds among themselves to meet the needs of the members.

The production societies could not achieve their objective due to the lack of proper departmental control and economic non-viability. There was no proper marketing facilities for the fish produced by these societies.

The marketing societies have generally failed because the production societies could not supply the fish to meet their marketing needs.

The federation also could not function properly owing to the lack of cooperation from other societies and handicaps in management.

1.3.6. The managerial personnel of the cooperative societies were drawn from among the fishermen. They do not have any knowledge or training on the working of the cooperatives. The Departmental control over them was also weak.

1.3.7 Despite the fact that a number of fishermen cooperative societies were organised in the past for the benefit of the fishermen, these societies have not been able to bring out any substantial improvement in the socio-economic conditions of the fishermen. This suggests the need for setting up a new organisational structure at the village level for promoting the interests of fishermen in a comprehensive manner. Hence fishermen village societies are proposed to be organised. A new legislation will be enacted for this purpose under the new strategy envisaged in the action programme. The village society will function as a nodule of all development and welfare activities in the fishing village. It will also be instrumental in organising a system of regulated marketing of the fish catches for the benefit of the fishermen.

#### 1.4. Education and training

1.4.1. Brief description given under code No. 1.1.4 and 1.1.10.3.

1.4.2.1. For imparting inservice training, a departmental staff training centre is functioning at Ernakulam and regular training is given to the inservice personnel.

1.4.2.2. The above institution also gives training for extension staff as part of the syllabus.

1.4.2.3. Twelve persons of the Department are sent to cooperative training centres in Trivandrum, Trichur and Kozhikode to undergo training in cooperation. The name of the course is Junior Diploma in Co-operation.

1.4.2.4. Non-formal education is imparted by many voluntary organisations.

1.5. Information and communication service

1.5.1. There is arrangement with the All India Radio to broadcast special weather bulletin and cyclonic forecasts extensively for seagoing fishermen.

1.5.2. Broadcasting through radio stations.

1.5.3. Sufficient precaution can be taken by the fishermen against natural calamities.

1.6. Linkages with other organisations on fisheries extension

1.6.1. No direct linkage pertaining to extension is in operation at present. However, Kerala Agricultural University is given financial assistance for carrying out applied research in inland culture fisheries during VI Plan.

1.6.2. The technologies developed by the Central Institute of Fisheries Technology, Central Institute of Fisheries Nautical and Engineering Training, Central Marine Fisheries Research Institute are being applied.

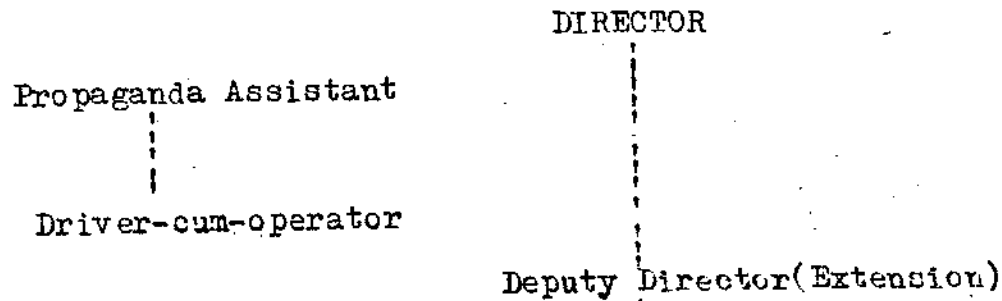
1.6.3 & 1.6.4. Government have been addressed for sanction to depute 5 officers for training in the Central Institute of Fisheries Education, Bombay, Two officers are already undergoing training in the Kerala Institute of Public Administration.

1.6.5, 1.6.6 and 1.6.7 - No such arrangement is made at present.

1.7. Organisational set up of Fisheries Extension

1.7.1. Organisational chart attached.

1.7.1. Organisational set-up for fisheries extension



A.E.O.	A.E.O.	E.O.	E.O.	A.E.O.	A.E.O.	E.O.	A.E.O.	E.O.
Calicut	Ponnani	Trichur	Palghat	Ernakulam	Kottayam	Alleppey	Quilon	Trivandrum

E.O. - Extension Officer

A.E.O. - Assistant Extension Officer.

1.7.2. Deputy Director (Extension)	-1
Extension Officers	-3
Assistant Extension Officers.	-6
Propaganda Assistant	-1
Operator	-1

1.7.3. The Deputy Director (Extension) is stationed at Ernakulam and the Extension Officers are located in nine Revenue Districts. The Propaganda Cell is located in the Directorate in Trivandrum District. The whole extension wing has state-wide jurisdiction.

1.8. Constraints and problems in fisheries extension

There is no proper machinery to channelise the technological development in the field of fisheries for practical application. The innumerable technological developments and research findings that could have been effectively utilised by the fishing industry and fishermen in the State for increased production and post-harvest handling and distribution of fish and fish products have not at all percolated to the grass-root level. They were allowed to stagnate and stale in the research laboratories themselves.

1.8.2. Brief description is given under code No. 1.1 and 1.7.2.

1.8.3. Though there are a number of training institutions in the country, there is no proper arrangement to absorb the personnel of the Fisheries Department for imparting training in extension work.

1.8.4. The most important technological problem of the Kerala Fishermen is the low productivity of their traditional fishing.

implements. They are still applying the age-old crafts and gears. At the same time, modern mechanised fishing methods are not easily adaptable to them. So there is urgent need to develop an intermediate technology by harmonising the good aspects of the traditional and modern techniques. Only a compromise between the age-old technique and modern technique will make the fishermen to come forward to accept the improved fishing methods. The efforts of the scientific institutes may be directed to the development of an intermediate technology suited to the local conditions.

1.8.5. The budget provisions earmarked for extension work is meagre as compared with the needs and requirements.

1.8.6. The works of the Extension Officers are confined to the popularisation of composite fish culture in the inland sector and practically no extension activity is carried out in the marine sector.

1.8.7. and 1.8.8. The fishing villages of Kerala are caught in a vicious circle of backwardness due to the prevalence of a number of socio-economic constraints. The fisherfolk are economically backward mainly due to the predominance of low productive traditional technology characterised by low catch per unit effort and an unorganised and highly exploitative marketing system. The social backwardness is primarily because of the poor organisation of fishermen, heavy indebtedness, restricted ownership of fishing implements and inadequate institutional support. The economic and social backwardness are closely interrelated and hence any development programme aimed at the development of the fisheries sector should be comprehensive and integrated.



1.8.9. A policy has to be evolved for the immediate transfer of technology in practical application. The research may also be reoriented giving priority to the productive needs of fishing villages. As far as possible, research findings without field application may be discouraged. Priority may also be given to the development of intermediate technology suited to the local conditions of fishermen.

## 2. Fisheries Development programmes envisaged in the VI Plan

### INLAND FISHERIES

#### Development of reservoir fisheries:

The programmes envisage development of 9000 hectares of reservoir areas during the period. This includes survey of fishery resources in inland water areas, establishment of nursery facilities at all the major reservoirs and rehabilitation of fishermen etc.

#### Fish culture in ponds and tanks:

The programme is to bring 2500 hectares of ponds and tanks in the State under fish culture by the end of the Plan period. This includes seed production through induced breeding techniques and fish culture operations etc.

#### Fresh water paddy-cum-fish culture:

The scheme aims at integrated development of crop-cum-fish culture in the low lying paddy fields of Kuttanad. The proposal is to develop paddy cum-fish culture in 20,000 ha.

Culture of giant fresh water prawns:

The scheme is for developing suitable techniques for mass production of seed and their further culture in the field.

Brackishwater fish/prawn culture:

The scheme is for rehabilitating the traditional inland fishermen. The project area comprises the estuarine and brackishwater regions of the State.

Mariculture:

Major components of the project are selection of suitable sites for mariculture, selection of suitable species, input supplies such as rafts, seed and other equipments etc.

Patrolling in backwaters:

The scheme is meant for preventing the high incidence of illicit fishing and for the conservation of resources in the backwaters.

Strengthening of brackishwater and inland research establishments:

The scheme is for strengthening the brackish and inland water research establishments to serve as extension research units.

Training of pisciculturists:

The Kerala Agricultural University will organise the training in co-operation with the Department of Fisheries and Central Marine Fisheries Research Institute.

MARINE FISHERIES

Small boat mechanisation for diversified fishing:

The programme is to introduce 170 mechanised boats during the period. These boats will carry out midwater pair trawling mainly for Anchoviella.

Purse-seining:

The project aims at introducing 90 boats for purse-seining operations. The average catch anticipated is 80 tonnes per boat.

Deepsea fishing:

The programme aims at introducing 30 combination vessels. These vessels will undertake lobster trawling, deepsea lobster trawling and prawn trawling.

Tuna fishing:

The proposal is to introduce 3 super-seiners during the plan period for tuna fishing.

Organisation of dory fishing:

The need for introducing an intermediate technology has long been felt for increasing the catches by the traditional crafts. Dory fishing is organised with a view to achieving this end.

Financial assistance for marketing of fish:

The programme is to render financial assistance to headload and cycle load fish hawkers. Working capital assistance will be provided to these categories of people for purchase of fish.

Large fish markets:

The proposal is to equip the large district markets in Kerala with modern fish markets in well constructed buildings with adequate provision for sanitation, like fly-proof netting, drains, and facilities for waste disposal.

Housing:

The housing programme of fishermen has been under implementation from the Third Five Year Plan. Though the achievements had exceeded the targets, the problem continues to be very acute. The present scheme of the Department is to further increase the dwelling facilities of the poor fishermen.

Community amenities including dispensaries:

The programme aims at construction of latrines, wells, common pathway, community halls, baby care centres, dispensaries and burial grounds.

Fishermen welfare fund:

The scheme is for increasing the quantum of assistance for relief measures to fishermen or their dependents as compensation for accidents, loss of equipment or loss of life while engaged in fishing.

Subsidiary industries:

The programme is to provide financial support for those interested in subsidiary occupations.

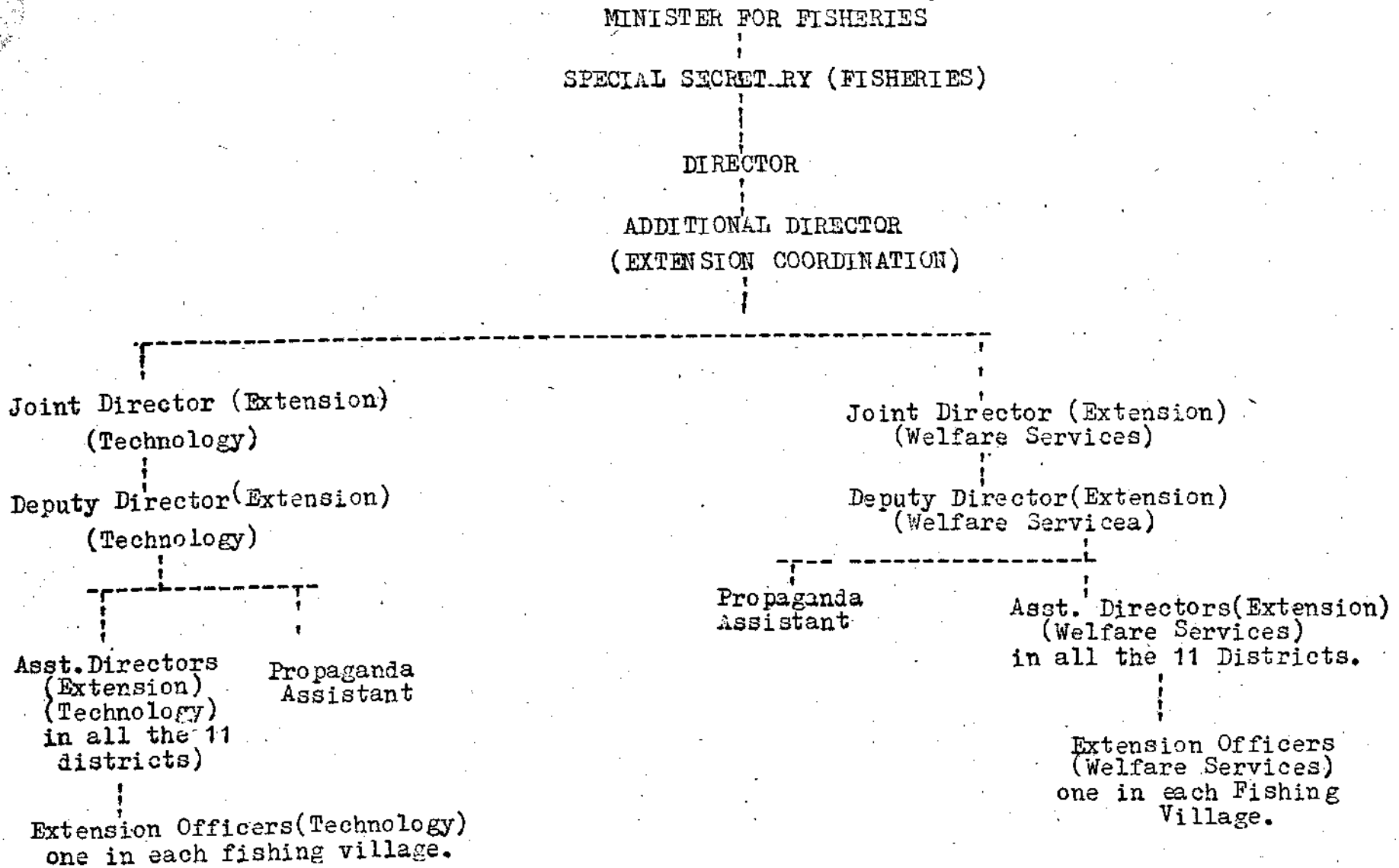
Development of fishing harbours:

The development of fishing harbours at Vizhinjam, Neendakara and Beypore will be continued under the Sixth Plan. Development of mini-fishing harbours and landing centres are among some other major schemes included in the Sixth Plan.

3. Fisheries extension needs for effective implementation of the Six Plan.

3.1. A realistic organisational set up for fisheries extension at different level is shown in the chart appended.

Realistic organisational set-up for fisheries extension required



3.2. Brief description is given under code No. 1.8.1 and 1.8.4.

3.3. Brief description is given under 1.8.3.

3.4. The fishermen of Kerala are educationally backward. The fishermen can adopt improved technologies in fisheries only with certain degree of basic education. Hence facilities may be provided for imparting formal and non-formal education to fishermen.

3.5. Training of extension personnel and type of training

3.5.1 to 3.5.4 - The desired organisational set up is discussed under code No. 3.1.

The success of the new system of extension basically depends on how best the extension personnel are trained to carry out the problems of the fisheries sector. Pre-service and inservice training should be given to the entire members of staff in the technology and welfare areas. The extension officers may be given intensive training based on the special problems of the fishing village in which they have to work. The technological and welfare problems of the fishing villages should be intimated to the authorities for suitable remedial measures. There may be effective feed back of information from the field to the implementing authority for referring these to the research institutes and subject matter specialists for evolving feasible solutions.

3.6. Training of fishermen.

3.6.1. The syllabus of the fishermen training centres may be suitably diversified to include all the modern techniques of fishing.

3.6.2. Fishing being a seasonal occupation, the fishermen are deprived of employment during lean months. During this period they can be advantageously employed in some productive occupations, like dairying, poultry, net making etc. This will give them employment and income. For this they should be given the necessary training in these vocations. Necessary institutional support may also be extended.

3.6.3. Kerala has vast inland resources that need rational exploitation. For this, the prospective fish farmers may be given the necessary training in the different aspects of culture fisheries. Popularisation of composite fish culture is a major step in this direction.

3.6.4. Under the proposed set up of fishermen village societies, the office bearers of the society will be selected from among the fishermen in the village. They are to be given training in co-operative management. Assistance of the cooperative training centres in the State may be sought.

3.6.5. The voluntary organisations in the fishing villages may be given sufficient departmental support to conduct non-formal education to fishermen.

### 3.7. Improvement of extension methods.

3.7.1. The extension wing may be sufficiently equipped to carry out demonstration of techniques developed by the different research institutes for the benefit of the fishermen. Specialised training may also be given for the staff undertaking demonstration of technologies.

3.7.2. A fisheries information service may be started in the State in the line of the Farm Information Bureau to provide upto-date information on various aspects of fisheries.



3.7.3. Need-based short films and slides may be arranged for display at regular intervals in fishing villages. Suitable audio-visual aids and films may be developed in collaboration with Kerala Film Development Corporation and Kerala Electronics Development Corporation.

3.7.4. A public Relation Officer with sufficient training may be posted in Fisheries Information service for the proper utilisation of the mass media to the benefit of the fishing community. It should be his duty to feed the mass media like the news paper and radio with the relevant news and information on Kerala Fisheries.

3.7.5. Brief description is given under Code No. 3.5.1 to 3.5.4.

3.7.6. The fishermen village societies envisaged in the action programme will form the forum for the fisherfolk in each village.

3.7.7. The full-fledged Project Cell envisaged in the action programme will undertake monitoring and evaluation of fisheries development programmes.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980  
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STATUS OF FISHERIES EXTENSION IN MAHARASHTRA

By Department of Fisheries, Maharashtra, Bombay 400 002

1. Present status of fisheries Extension

1.1. The Department of Fisheries, Maharashtra State, does not have an organised extension services cell; the extension duties were entrusted to the District Fisheries Development Officers who, through their subordinate technical staff, approached the beneficiaries in the industry.

1.1.10. Impact of schemes on development.

1.1.10.1. On production means (craft/gear)

The programme of mechanization has changed the traditional nature of village-based industry to export-oriented industry. The fishing vessels on mechanisation started using gear like trawlnets and commenced mechanized fishing. In some areas purse seines are also being operated.

1.1.10.2. On production

1) Marine	Year	Production
	1955-56	1.26 lakh tonnes
	1979-80	3.79 lakh tonnes

1.4. Education and training:

1.4.1. The Fisheries Department of the Government of Maharashtra has eight fisheries primary schools. One High School is also established. These schools are classified as vocational schools.

The Department provides financial assistance up to Rs. 12,000/- to private High Schools who come forward to introduce fisheries subject in their schools. The department also supplies scientific equipments up to the value of Rs. 500/- to each Zilla Parishad school which introduces fisheries subject. So far 11 High Schools and 18 Zilla Parishad schools in the State have taken advantage of these facilities.

1.4.2.1. The Department selects two Sr. Technical Officers in service for deputation to the Central Fisheries Extension Training Centre, Hyderabad for 10 months training every year.

The Central Institute of Fisheries Education, Bombay organises two-years' diploma course in fishery science for the District level officers. The Department selects two candidates every year for the above course. In addition to this CIFE conducts 6 months training course for Junior Technical officers of this department. Every year 30 junior officers are being trained.

1.4.2.3. It is felt necessary to train the fishermen in maintenance and proper handling of mechanised vessels. The Department has established training centres at Ratnagiri, Alibag, Versova and Bassein in Coastal areas. Intake capacity of these four training centres is 176 fisher-youths every year.

1.4.2.4. The Department also organises one month training course in inland fisheries at various fish seed farms. Every year about 150 fisher-youths are being trained at various fish seed units.

1.5.1. Information regarding cyclonic conditions is passed on to the fishermen by broadcasting and notifying the same at the important fishing ports.

1.5.2. By broadcasting and notifying on the board at important fishing ports.

1.5.3. Fishermen take advantage of this facility.

1.6.1. In view of the fact that there is no separate Extension cell for fisheries in the State there is no linkage with centre at present.

1.6.2. Konkani Krishi Vidhya Peeth, Dapoli, is expected to conduct research on fisheries problem as per the suggestion of the Department. They extend the facilities and the Department takes their results to the field if required.

1.6.3. For training in-service personnel, C.I.F.D. Bombay, and

1.6.4. C.F.D.T.C. Hyderabad are extending facilities. However, for imparting training to fisher-youths, Regional Fisheries Training Centre for Inland Fisheries Operatives, Agra and C.I.F.N.E.T. Cochin are extending facilities to State Government.

1.7.1. There is no separate cell for purely Extension work in the State. However, the District Offices and Regional Offices to some extent do the extension work.

1.7.2. Not applicable in view of remarks at 1.7.1.

1.7.3.

1.8.1. In view of absence of separate extension unit the

to information on these points may be treated as Nil.

2. A brief note on all the fisheries schemes envisaged for VI Five Year Plan.

SCHEMES INCLUDED IN THE PLAN 1980-85

2.1. Socio-economic upliftment schemes

Apart from the schemes for education, research and

production, schemes for strengthening of co-operative sector, marketing of fish through co-operative societies, have also been incorporated in the Five Year Plan 1980-85 for Fisheries.

The programme for fisheries development during the Five Year Plan 1980-85 under various schemes involves an outlay of Rs. 15 crores.

In addition to this, it is proposed to avail of Rs. 395.50 lakhs from Central Government as central share for central schemes. It is also proposed to avail financial assistance to the extent of Rs. 16.80 crores from the National Co-operative Development Corporation for the schemes implemented under NCDC programme.

#### INLAND FISHERIES

##### 2.2. Fish Seed Production Scheme

Considering even the existing water resources in the State the total requirement of fish seed for optimum stocking is about 40 crores. With large number of irrigation projects coming up every year, the water resources are naturally enhanced. It is anticipated that within the next 10-15 years the total requirement of fish seed will be about 60 crores. The total fish seed that can be imported from Calcutta is about 10 crores. It is, therefore, essential to produce/procure as much fish seed locally as may be possible firstly to reduce dependance on Calcutta market and to gradually attain self-sufficiency in this respect.

So in order to meet the requirement further expansion of this programme is absolutely essential. So far 17 fish seed farms are established where the fish seed production programme is undertaken. At present it is possible to obtain about 10 to 12 crores of spawn from these fish seed units resulting in

making available 3 to 4 crores of fry for stocking operations. Fourteen more fish seed farms are under construction at various places in the State at different stages of completion which will start functioning in near future. It is also proposed to select new sites to construct more such units in the State to meet the requirement for optimum stocking of the enhanced water resources.

### 2.3. Inland Pisciculture

The State has 2.73 lakh hectares of impounded water-spread area suitable for fish culture, and this is expected to increase in future due to coming up of the irrigation projects. Prior to the First Five Year Plan the department supplied the fish seed to the pisciculturists by importing it from the West Bengal and also by local collection. Efforts are being made to bring more and more area under fish culture by extending financial help to the pisciculturists who are economically backward, increasing the import of fish seed and establishing fish seed production farms in the State.

It has been decided to undertake import of fish seed through the Maharashtra Rajya Maahhimar Sahakari Sangh.

### B ACKISH WATER FISH FARMING

#### 2.4. Survey of brackish water areas

The present production from the brackish water of the Maharashtra State is negligible. Though according to one estimate prepared by Government of India there is about 80,000 hectares of brackish water area, precise information about the area is not available. Hence a programme for survey of brackish water area has been taken up to ascertain the areas suitable for conversion into brackish water fish farms. The survey work will

be continued during the sixth plan period. Outlay of Rs. 10 lakhs is proposed for undertaking the survey.

2.5. Assistance for construction of brackish water fish farms

It is proposed to implement a scheme of "Pilot Project on Brackish Water Fish Farming" as this potential water resource has remained untapped. The cooperative societies and the pisciculturists interested in brackish water fish farming may come forward to undertake this type of fish culture on small scale basis. It is proposed to grant 55% loan, 25% special Redeemable Share Capital and 20% subsidy to the cooperative societies and 25% subsidy only to the individual fishermen for this purpose. The individual fishermen will have to raise the remaining amount from other sources.

Under National Cooperative Development Corporation pattern the State will get 80% finance in the form of 60% loan and 20% subsidy by way of reimbursement for construction of fish farms by the cooperative societies. 20% provision will have to be provided by the State in addition to 25% of the financial assistance to the individual fishermen in the form of subsidy.

Formulation of suitable leasing policy for brackish water area is under active consideration of the State Government. Main objective of the policy is to provide gainful employment to weaker section of the community.

2.6. Pilot Project on brackish water fish farming

A pilot project for construction of a brackish water farm has been taken up. Construction of the farm is in progress and will be completed in the year 1980-81.

The financial outlay of about Rs. 24.00 lakhs on construction of farms, culture sheds, laboratory and office building and staff quarters and other equipment is required. An amount of Rs. 7.00 lakhs will also be required to meet the operational expenses including on account of staff.

## MARINE FISHERIES

### 2.7. Mechanization of fishing vessels

The scheme occupies a prime place in the Fisheries development activities undertaken by the department, because it aims at not only the increase in the production of fish but also bringing the fishing operations on modern lines. Use of mechanically propelled vessels and mechanical devices in fishing operations has enabled the fishermen to exploit fishery resources, further away from the coast line. The success of the scheme is reflected in the increase in the production of fish from 1.20 lakh tonnes in 1961 to about 3.57 lakh tonnes in 1979-80. The scheme is broadly divided into following three parts.

#### 2.7.1. Mechanization of fishing crafts under NCDC Programme

Construction of a full-fledged mechanized fishing vessel, on an average, needs capital investment to the tune of Rs. 2,00,000/-. It is beyond the scope of average fisherman to raise funds from his own resources to that extent. Under this programme, the fishermen groups were granted substantial financial assistance for projects of mechanized fishing vessels. From the year 1978-79, Government have adopted the NCDC pattern of financial assistance under which 100% finance is provided to the fishermen groups to intensify the programme of mechanization.



Under this new pattern of financial assistance through NCDC, the Government availed 80% finance from NCDC in shape of 60% loan and 20% subsidy and passed on 100% finance to cooperative societies as 25% special Redeemable Share Capital, 55% loan and 20% subsidy. This attractive pattern of substantial financial assistance has turned out to be very popular. The impact of the scheme could be judged from the fact that the size of mechanized fleet of the State contributes to about 40% of the total mechanized fleet of the country. By the end of 1980, Maharashtra has as many as 3,525 mechanized boats. It is proposed to introduce 925 mechanized boats during 1980-85 for which a plan outlay of Rs. 1480 lakhs will be required. Only 20% of the total investment is required to be provided in the plan as 80% of the investment will be available from NCDC by way of reimbursement.

#### 2.7.2. Mechanization with institutional finance

With a view to intensifying the mechanization programme to achieve increased fish production, financial assistance to the extent of 25% subsidy of the cost of mechanized boat is provided to the individual or group of fishermen who raise the finance from financing institutions other than the district central cooperative banks for construction of mechanized fishing boat. Under this scheme, it is proposed to introduce 50 mechanized boats during the plan for which provision of Rs 20.00 lakhs will be required.

#### 2.7.3. Assistance to the fishermen doing traditional fishing by sailing vessels

In all the previous plans there was provision to assist only for mechanization of fishing boats. Poorer fishermen engaged in traditional fishing by means of sail boats were not given assistance. With the high cost of wood and sail cloth this weaker section among the fishermen have been finding difficulty in

constructing new boats. These fishermen who are financially very backward deserve assistance so that they can pursue inshore fishing in the creeks by sail boats. It is, therefore, proposed to provide financial assistance for construction of sail boats or dinghies.

During 1980-85 it is proposed to grant financial assistance to 925 groups of fishermen under NCDC pattern and 50 fishermen who propose to construct fishing vessels with institutional finance and 200 fishermen for sail boats or dinghies. The increase in the production of fish per annum by introduction of these boats will be 20,000 M.Ts. approximately.

A provision of Rs. 400.00 lakhs will be required.

#### 2.8. Training and Education

Recently the State has accepted the NCDC pattern of financial assistance for introducing mechanized boats in the State. Hence now the State gets 80% finance from the NCDC. This has given boost to the mechanization programme. A group of fishermen sponsored by the fisheries cooperative society for introducing a mechanized boat with Government help should have one trained fisherman. It is thus imperative to accelerate the training programme. At present there are four training centres one each in the four marine districts, with a capacity to train 176 fisheryouths annually. These training centres will not be in a position to cope up with the increasing demand for training the fisheryouths. It is proposed to establish two more training centres, one in Ratnagiri District and other in Thane District for which a provision of Rs. 18 lakhs is proposed.

The training of fisheryouths in modern methods of fishing at Ernakulam, Agra and at the short-term training course at the departmental training centres will also be continued. The State extends financial help to the private high schools and Zilla Parishad

primary schools for introducing "Fisheries" subject in their schools. The subject has also been included in the syllabus by the S.S.C. Board. It is proposed to continue this scheme.

#### INFRASTRUCTURE

#### 2.9. Facilities for preservation, transport and marketing of fish

Fish is a highly perishable food item and, therefore, needs to be properly preserved and expeditiously transported to the consuming centres. One of the established methods of preservation of fish is to ice it and keep in cold storage. Fish also has to be sent to fish markets through trucks wherever other adequate and cheap facilities are not available. Fishermen and their cooperative societies are not financially well placed to establish ice factories and cold storages or purchase transport vehicles themselves. It is equally not advisable to allow entry of non-fishermen in this activity lest they should exploit the situation. It is, therefore, proposed to continue financing the fishermen's cooperative societies to enable them to establish ice factories and cold storages at important fish landing centres and to purchase transport road vehicles.

Out of the capital expenditure required for an ice factory and cold storage, a society will receive from the State Government 25% as SRSC, 20% as subsidy and 55% as loan; 50% of the cost as subsidy and 50% as loan on purchase of trucks. NCDC will reimburse 80% of the State Government's investment, on 60% loan, 20% subsidy basis.

To enable the Municipalities and Gram Panchayats to construct fish markets with necessary facilities to sell the fish in hygienic conditions, the State Government will continue to sanction them, in the form of loan, the entire cost of construction.

During the period of five years it is proposed to provide finance for establishment of 10 additional ice factories with cold storages in maritime districts, 3 such factories in inland districts, purchase of 40 fish transport vehicles in marine and 10 vehicles in the inland areas, in the cooperative sector. Gram Panchayats and/or Municipalities are also proposed to be sanctioned loans to enable them to construct five fish markets, three of which will be in the marine districts and two in the inland districts.

2.10. Assistance for implementing the scheme for marketing of fish in cooperative sector

The total marine fish production in the year 1975-76 was estimated at 3.60 lakh tonnes valued at Rs. 86 crores. Out of this nearly 55% of the fish is sold in fresh condition and remaining viz. 45% is converted into dry fish, total value of which is estimated at about Rs. 12 crores. This gives an idea of magnitude of the problem of marketing of fish. For marketing of fresh fish many fisheries cooperative societies have come forward. Still much has remained to be achieved in this direction also to eliminate the middlemen. However, the dry fish trade is at present mostly in the hands of private fish merchants. Unless the cooperative societies are assisted in a substantial way to organise themselves to meet the situation and helped financially to the extent necessary, there cannot be any impact of cooperatives on the marketing system. The societies will be financially assisted by Government in the form of share capital contribution to enable them to raise funds from the cooperative banks. The societies will also be granted financial assistance for construction of godowns and purchase of transport vehicles. The societies will be granted managerial subsidy to enable them to provide necessary staff to handle their working efficiently. Detailed scheme is being worked out. However, a token provision of Rs. 5 lakhs is proposed in the Plan 1980-85.

OTHER SCHEMES

2.11. Fishery requisites

The cost of fishery requisites such as nylon twine, monofilament, synthetic twine, cotton twine and H.S.D. oil is beyond the reach of poor fishermen. In order to induce them to use modern fishing gear to get increased fish production financial assistance in the form of loan and subsidy is being extended to them since 1959-60, which has become popular among the fishermen in their fishing trade. The demand is likely to be increased day by day due to increase in mechanized fishing vessels. In near future the demand is expected to be increased in view of the proposed intensification of the mechanization scheme.

2.12. Assistance to the Maharashtra Fisheries Development Corporation for undertaking Deep Sea Fishing Project etc.

The Maharashtra Fisheries Development Corporation Ltd. was established in February 1973 and commercial activities of the Fisheries Department were transferred to it. It was also envisaged to undertake deep sea fishing programme through it. However, it was not possible to take up this programme for want of necessary expertise and knowhow of the fishery resources of the deep sea. Decision was taken to wind up the corporation and, accordingly, the activities were transferred to the State agencies or corporate agencies. However, in view of changed circumstances, it has been decided to revive the activities of the corporation in the matter of fresh water fisheries and marine fisheries. It is also decided to take up new schemes of purely commercial nature, through corporation. An ad-hoc provision of Rs. 25 lakhs is proposed for grant of share capital to the corporation.

2.13. Development of fisheries cooperatives

In order to improve the socio-economic conditions of the fishermen and make them less dependent on middlemen for marketing of fish, they are being encouraged to come under cooperative fold. Under this scheme share capital contribution, loan for godowns and managerial subsidy is granted to fishermen's cooperative societies. Provision of Rs. 22.00 Lakhs is proposed for the Five Year Plan 1980-85.

2.14. Grant of loan to fishermen for aspects not covered by any specific scheme

Fisherman in general is financially in a very indifferent condition and finds it extremely difficult to meet expenses of even minor items such as overhaul and repairs of the fishing boat, engines, winch, fishing nets etc. He has also to purchase synthetic twine for repairs or replacement of the torn or lost nets. He has to incur expenses on purchase of fish hooks, sail cloth, fishing stakes etc. It is for this reason that small loans of small repayment period are being sanctioned to the fishermen at low rate of interest. It is proposed to continue this activity further by sanctioning loans to the tune of Rs. 40 lakhs to the fishermen.

2.15. Cooperative Projects

With a view to ensuring that the primary producer gets best returns and further with a view to bringing all aspects of fisheries from production to marketing including export under cooperative fold, three integrated fisheries cooperative projects with a total outlay of about Rs. 130 lakhs were introduced in the marine districts, one each in Ratnagiri, Thane and Kulaba districts.

The 25% of the cost was borne by Government and 75% finance received from the Agricultural Refinance & Development Corporation.

The State of Maharashtra has also made considerable progress during the decade in increasing fresh water fish production. Incidentally, it may be stated that the fishermen in the inland fisheries section are much illiterate, backward and poor. The aspect of marketing of fish produced in inland areas is also beset with various difficulties. There are no landing, preservation and transport facilities. The illiteracy and financial weakness also compel them to sell the catch to middlemen. In the interest of developing the inland fisheries, it is essential to develop co-operative marketing as it attains better price to the fishermen. With this in view, four integrated inland fisheries development projects, one each in Aurangabad, Yeotmal, Kolhapur and Nasik or Dhule are proposed to be introduced during the Five Year Plan 1980-85.

The projects are estimated to involve funds to the extent of Rs. 25 lakhs in the form of capital expenditure. 80% of the finance will be received from the NCDC in the form of loan and subsidy and the balance 20% will be borne by the State Government.

2.16. Survey for estimation of fish catch from Inland Water Resources

No reliable statistics of catch of fish from inland water resources are available at present. The Statistical Section of the Department of Fisheries is conducting a survey for estimation of fish catch in Marine Fisheries by random sampling method. Currently, the estimation of fish catch in fresh water fisheries is done by empirical formula based on stocking. However, this formula suffers from several limitations.

As the stocking of fish is increasing every year, the above formula does not give a correct picture of production for different areas of tanks and reservoirs. It is now proposed to conduct the sample survey to estimate fish production in fresh water fisheries in each district of the State. The survey will be conducted on the basis of experience based on pilot survey conducted by the Department of Fisheries, pilot survey conducted by the National Sample Survey Organisation and Survey to Study Input and Output of Inland Fisheries conducted by the Directorate of Economics and Statistics.

In the sample survey it is also proposed to collect data on prices of fresh water fish, biological data on length and weight for fish species. The survey will be conducted for one fishery year i.e. from July to June during the plan period. The scheme is estimated to cost Rs. 4.00 lakhs and involves appointment of staff.

#### 2.17. Fish Farmers Development Agency

This scheme aims at promotion of intensive fish culture in a compact area, which will act as a nucleus for future expansion in the surrounding areas so as to gradually cover the entire water resources in the State. The scheme, therefore, mainly envisages an integrated approach for dissemination of technology to the field by providing financial assistance by way of loans and subsidies, for proper training of the operatives in the advanced methods, providing all required inputs and also providing well trained technical staff for proper and close supervision.

At present two such agencies are started, one in Bhandara District and another in Chandrapur District, with the assistance from Central Government. On examining the utility of these agencies, more such agencies will be established in State Sector.



Provision of Rs. 12.50 lakhs is proposed for the scheme. Besides Rs. 12.50 lakhs will be available from the Central Government as central share.

2.18. Improvement of landing and berthing facilities

The rapid pace of mechanization programme has made it absolutely imperative to provide landing and berthing facilities to the fish landing centres along the coast. The scheme for improvement of landing and berthing facilities at the minor fishing harbours was introduced in the Second Five Year Plan period. This scheme is continued during the last ten years and 23 works such as construction of small jetties, removal of rocks from the navigation channel, erection of guidelights were completed at a cost of Rs. 29.77 lakhs.

A project for construction of full-fledged fishing harbour at Mirkarwada in Ratnagiri District at a cost of Rs. 344.73 lakhs is being implemented. The work of this project has already been started from the year 1978-79 and is expected to be completed by 1982-83.

The State Government has decided to develop a full-fledged fishing harbour at Agardanda in the Kulaba District and at Satpati in Thane District. The Directorate of Pre-Investment Survey of Fishing Harbour Projects, Bangalore, has prepared a project report for Agardanda project at a cost of Rs. 4397 lakhs and the same is under consideration of Government of India. The project report for Satpati fishing harbour is under process of the same authority. The rough estimated cost of the project is to the extent of Rs. 11 crores.

The scheme was originally a centrally sponsored scheme. From 1979-80, it has been classified as a shareable central scheme for which State has to provide 50% finance from its plan. During 1980-85 a provision of Rs. 396.50 lakhs is proposed as State share.

2.19. Infrastructural facilities in the coastal fishing villages

Under the scheme, infrastructural facilities for fishing industry, such as approach roads, water supply, fish curing yards, community building, are provided. About 70 works of providing basic amenities such as approach road, open sheds for sorting landed fish and fish drying platforms at the fish landing centres along the coast have been completed during the last ten years. The project for construction of community building at Dhakti Dahamu costing Rs. 9.70 lakhs and for Harnai Paj in Ratnagiri District costing Rs. 11.81 lakhs have been initiated in 1978-79. The same is under progress.

The scheme was centrally sponsored scheme under which 100% finance was provided by the Central Government. Subsequently, from 1979-80 it has been classified as district level State scheme.

A provision of Rs. 24.50 lakhs is provided for 1980-85.

2.20. Employment

The various schemes in marine and inland fisheries will provide additional direct employment to 30,000 persons and indirect employment to 10,000 persons.

Additional fish production

The base level production (Marine fish) in 1979-80 which was 357000 M.Ts. is expected to be raised to 4,20,000 M.Ts.

per annum by 1985. Similarly, the inland fish production, which was 24,000 M.Ts. in 1979-80 will be raised to 40,000 M.Ts. in 1985. The total fish production is, therefore, proposed to be raised to 4,60,000 M.Ts by 1985, i.e. by about 19% and the average annual rise will be approximately 2.5%.

3. Fisheries Extension needs for effective implementation of VI Plan Schemes

3.1. Realistic organizational set up for fisheries extension at different levels and coordination:

In the absence of a separate organized cell for extension, a full fledged extension wing will be essential for the State.

There should be a senior experienced officer of the top level of state with subordinate staff at Regional levels for coordination with staff at Taluka level or a group-of-talukas level. Chart of proposed Extension cell is appended (Annexure I).

3.2. Technological needs:

A) Marine

- a) Introduction of diversified fishing methods as purse seining.
- b) Introduction of technology such as insulated boxes on board.
- c) Introduction of deep sea fishing vessels.
- d) Collection of up-to-date information in the industry to assist needy persons from the producers to exporters.
- e) Introduction of new fishing methods for lobster, squids.
- f) Monitoring introduced methods.

B) Inland:

- a) Introduction of small fishing crafts.
- b) Introduction of induced breeding/bund breeding.
- c) Introduction of rearing ponds.
- d) Introduction of composite fish culture.
- e) Introduction of insulated boxes, transport vehicles, mechanized vessels.

C) Brackish water:

- a) Introduction of farms for fishermen families.
- b) Training of youths in seed collection and rearing technique.

3.3. Linkage desired with various organisations:

Linkage is essential with Government of India institutions such as Exploratory Fisheries Project; with cooperative societies; private/state Government institutions and departments such as State Pollution Prevention Board; Private entrepreneurs and local bodies.

3.4. Fisheries Educational needs have been provided for Sr. College level. However, Konkan Krishi Vidyapeeth is contemplating fisheries education upto graduate level.

3.5.1. } State level, regional level, and district level officers are  
3.5.2. } trained at C.I.F.E.

3.5.3. } There are no facilities in the State to train Block or  
3.5.4. } village level workers in fisheries at present.

3.6.1. Diversification courses for fishermen if required are given at Integrated Fisheries Project, Cochin.

3.6.2. Training in additional vocations is not being given by this department. However the Technical Education Department is contemplating to provide the education.

3.6.3. Training of fish farmers in Inland Fish Culture is being organised at Fish Seed Units of this department and annually about 100-150 fisher-youths are being trained.

3.6.4. Training in Fisheries Cooperative management is organised by Vaikunth Mehta National Institute of Cooperative Management, Poona as per the needs.

3.6.5. Non-formal Education is not being imparted by the department.

3.7.1 to 3.7.7. As there is no staff for extension work in the Department only the demonstration method is being used by the District Offices. However, in rare cases audio-visual aids are being used by the Department. For information service, the Department is publishing six monthly periodical namely "Matsyavikas Patrika".

ANNEXURE- I

PROPOSED FISHERIES EXTENSION CELL IN MAHARASHTRA STATE

Deputy Director (Extension Services)

R.E.O. Konkan	R.E.O. Nagpur	R.E.O. Pune	R.E.O. Aurangabad
E.O. Thane	E.O. Bhandara	E.O. Pune	E.O. Aurangabad
E.O. Kulaba	E.O. Chandrapur	E.O. Kolhapur	E.O. Beed
E.O. Ratnagiri	E.O. Nagpur	E.O. Sangli	E.O. Parbhani
E.O. Bombay	E.O. Wardha	E.O. Satara	E.O. Osmanabad
	E.O. Aurawati	E.O. Solapur	E.O. Nanded
	E.O. Buydhana	E.O. A'nagar	
	E.O. Yeethal	E.O. Nasik	
	E.O. Akola.	E.O. Dhule	
		E.O. Salgaon.	

R.E.O. - Regional Extension Officer

E.O. - Extension Officer.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980

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STATUS REPORT ON FISHERIES EXTENSION IN TAMILNADU

BY C. CHELLAPPAN, I.A.S.,

Director of Fisheries, Madras 600 006

The Fisheries Department of the erstwhile Madras Presidency, started in 1907, was not only a pioneer in Fisheries Research and Development, but also a forerunner in Fisheries Extension work. The fish curing yards with the salt subsidy scheme, the fishery schools and the fishermen Cooperatives in the coastal fishing villages are only a few examples of the past fishery extension activities of the Department. The present status of the Fisheries Extension work is given below under the prescribed code numbers and titles.

- |        |  |             |
|--------|--|-------------|
| 1.     | <u>Present status of Fisheries Extension</u> |             |
| 1.1.   | Fisheries Extension Schemes undertaken       | as detailed |
| 1.1.1. | Title and scope of each Scheme               | below       |
| 1.1.2. | Period of implementation                     |             |

1.1.1. (1) Rural fishery demonstration

To popularise fish culture in temple tanks, Panchayat tanks etc. fish seeds of quality fish are stocked, cultured and harvested by the Department and demonstrated to the public on the profitability of fish culture in the inland waterspreads. From 1930 - continuing.

1.1.1. (2). Major reservoir fisheries

With a view to increase the inland fish production all the major reservoirs are stocked with quality fish seeds and fish harvested by this Department. From 1960 and continuing.

1.1.1. (3). Fish Farmers Development Agency

In order to encourage private fish farming and to popularise composite fish culture practices and to step up the per hectare fish production in inland ponds and tanks, Fish Farmers Development Agencies have been established at Thanjavur, Trichy, Madurai and Dharmapuri Districts. From 1976 and continuing.

1.1.1. (4). Inshore fishery survey scheme

To find out new fishing grounds in the inshore area and to popularise new and diversified fishing methods among the fishermen, inshore fishing stations have been established at Madras, Cuddalore, Mallipattinam, Rameswaram and Kanyakumari. From 1959 and continuing.

1.1.1. (5). Fishing gear technology

To design and popularise new fishing gears for fishing in the sea, brackish waters, reservoirs and other inland waters. From 1975 and continuing.

1.1.1. (6). Shrimp culture scheme

For evolving techniques of prawns in brackish water and in cages in marine and brackish water environment. From 1977 and continuing.

1.1.1. (7). Survey of estuaries and backwaters

To survey the extent of estuaries and backwaters in the State, their suitability for brackish water prawn and fish culture and to assess the seed resources of prawns and other brackish water fishes suitable for culture. From 1975 and continuing.



1.1.1. (8). Pearl culture

To evolve techniques and production of culture pearls on a commercial scale. From 1976 and continuing.

1.1.1. (9). Mariculture of edible oysters and mussels

To evolve techniques for large scale production of edible oysters and mussels for human consumption and for converting them into animal/prawn/fish feed. From 1975 and continuing.

1.1.1.(10). Sea weed culture

To evolve techniques for culture of Gracilaria, Gelidiella and Sargassum and production of agar agar and algin.

1.1.1.(11). Trash fish utilisation scheme

For utilising the trash fish catches in marine landings by conversion into edible products for human consumption and their reduction into cheap protein rich animal feeds. From 1975 to 1978.

1.1.1.(12). Technological improvements in dried fish

To make technological improvements in the production of dried salt cured fish of good quality with better shelf life and consumer appeal. From 1975 to 1978.

1.1.1.(13). Quick transport facilities

To facilitate the fishermen to transport their catches from the landing centres to the nearby marketing centres, the department has provided them with vans on nominal hire charges through the Fishermen Cooperative Societies, Marketing Unions and Federations. From 1947 and continuing.

1.1.1.(14). Fisheries Training Centres

To impart training to the fishermen boys in maintenance of mechanised vessels, operation, fabrication of nets etc. Six Fishermen Training Centres are in operation at Madras, Cuddalore, Nagapattinam, Mandapam, Tuticorin and Colachel. From 1956 and continuing.

1.1.1.(15). Landing and berthing facilities

To facilitate safe landing and berthing of trawlers and mechanised boats. The fishing harbour at Tuticorin has been completed. The Madras Fishing Harbour is nearing completion. The harbour at Chinnamuttom is awaiting sanction. Landing facilities have been provided at Cuddalore, Nagapattinam, Rameswaram and the work is in progress at Wallipattinam and Kodiakarai. From 1963 and continuing.

1.1.1.(16). Ice Plants and Cold Storages

To keep the quality of fish and to stock the fish during heavy and untimely landings, 36 Ice Plants and Cold Storages have been constructed along the coastal villages for the benefit of the fishermen. Following the footsteps of the Department, a number of private entrepreneurs have put up Ice Plants throughout the coast in many places. From 1961 and continuing.

1.1.1. (17). Fish marketing

Fish markets have been constructed at important places and grants have been given to Panchayats and Municipalities for improvement of the same. Now, the Tamilnadu Fisheries Development Corporation Ltd. has taken up the fish marketing in Madras City and other Districts in a big way, procuring quality fish from fishermen and supplying to the customers at reasonable rates. From 1947 and continuing.

1.1.1. (18). Construction of dry fish storage

One of the accepted methods of fish preservation is sun drying. In order to conform the finished products to a higher rational standard, it is necessary that they should be stored hygienically. To satisfy this requirement the Marine Products Export Development Authority have volunteered to spend Rs. 5.00 lakhs for construction of a modern dry fish godown at Tuticorin and suitable land has been made available in the fishing harbour complex at Tuticorin for such construction. This will greatly facilitate hygienic storing and export of dried fish. From 1963 to 1965.

1.1.1.(19). Loan to Fishermen Cooperative Societies and Federations

Primary Fishermen Cooperative Societies have been organised in fishing villages and District Cooperative Federations have been formed for improving the fishing industry, and the welfare of fishermen through Cooperative enterprises. All types of loans, long-term, and medium-term, are given to the fishermen through the short-term Cooperative Societies for purchasing fishing equipments and to clear the debts and free them from the clutches of the middlemen. From 1952 and continuing.

1.1.1.(20) Nylon subsidy scheme

To replace cotton nets and to popularise nylon nets and to increase the fish catches, the advantages of using nylon nets were explained and nylon yarn was distributed to fishermen through the Fishermen Cooperative Societies on subsidy basis. The subsidy was later discontinued from 1972, with the demand for nylon increasing from the fishermen.

1.1.1. (21). Fishermen housing scheme

There are 3.37 lakhs of marine fishermen living in 402 marine fishing villages scattered all over the coast of Tamilnadu. They live mostly in huts in constant danger of destruction by fire, cyclone, sea erosion etc. To provide them better accommodation, the Department has sanctioned sofar 8000 houses, out of which 4000 have been constructed and allotted to them. From 1958 and continuing.

1.1.1. (22). Installation of guide lights

As an important socio-economic measure to save the lives of marine fishermen from any possible disaster in the sea during their return from fishing trips, suitable guide lights are being installed in needy fishing villages along the coast. From 1959 and continuing.

1.1.1. (23). Distress relief to fishermen

After the constitution of fishermen welfare and distress relief fund in 1978, the families of fishermen whose bread-winners die while fishing in the sea are paid an ex-gratia of Rs. 5,000/- of which Rs. 2,000/- is paid in one lump sum initially, the balance being paid in 30 equal monthly instalments of Rs. 100/- each. This fund is administered by a high level Committee which ensures that the relief is made available to the bereaved families with the least delay. Further to enable the children of such deceased fishermen to take vocational education, an additional sum of Rs.5,000/- limited to the extent actually necessary for completing the course is given. From 1978 and continuing.

1.1.1.(24). Cyclone relief loans and grants

a) When the fishing villages are affected at the time of cyclone and heavy floods, and thereby if the fishermen lose their belongings like crafts and tackles, they are given loan and subsidy to compensate the loss. The affected members are taken to safe places and they are fed. From 1964 and continuing.

b) Cyclone shelters are constructed in collaboration with Agencies like India Red Cross Society. From 1976 and continuing.

1.1.1.(25). Mechanisation of crafts

Introduction of mechanised fishing crafts was done to make the traditional fishermen adopt modern fishing methods to reach distant fishing grounds quickly and bring back the fish catches in time to the shore. This Scheme is implemented now by the Tamilnadu Fisheries Development Corporation availing traditional finance. From 1956 and continuing.

1.1.3. Technology based schemes

Vide items 1.1.1.(1) to 1.1.1. (12)

1.1.4. Services based Schemes

Vide items 1.1.1. (13) to 1.1.1. (18)

1.1.5. Fishermen Welfare Programme

Vide items 1.1.1. (19) to 1.1.1. (25)

1.1.6. Brief descriptions of schemes

Vide 1.1.1. (1) to 1.1.1. (25)

1.1.7. Source of technology

Tamilnadu State Fisheries Department and I.C.A.R.  
New Delhi (Ministry of Agriculture, Government of India, New Delhi).

1.1.8. } Given in the Annexure

1.1.9 }

1.1.10. Impact of schemes on development

1.1.10.1. } The fish production has steadily increased

1.1.10.2. } consequent on the implementation of the new Schemes.

1.1.10.3. The socio-economic conditions of the fishermen have also been improved.

1.1.10.4. There had been enlightenment among fishermen for taking up improved methods of fishing, culture, hauling, marketing and storage. Public have preference for quality fish.

1.1.10.5. There is a demand for infrastructure facilities from the fishermen. The facilities provided by the Department are fully utilised by the fishing community and had also helped private entrepreneurs to take up the business of ice production and marketing and processing.

1.1.10.6. The facilities given to the fishermen for transporting and marketing their catches are fully utilised by the fishermen.

1.1.10.7. Fishermen are satisfied with the welfare measures taken up by this Department.

1.2. Schemes for fishermen community taken up by departments other than fisheries Departments (Applied Nutrition, Adult Education, Integrated Rural Development etc.).

1.2.1. Implementing agencies

Applied Nutrition Programme is implemented by the Panchayat Unions.

Integrated Rural Development is implemented by the District Collectors and Adult education is implemented by the Director, National Adult Education Programmes.

1.2.2. Programmes

Renovation of Tanks.

Supply of quality seeds for stocking.

Exploitation and supply of fish free to nursing mothers, pregnant women and children.

1.2.3. Impact

After supplying nutritious fish food for 5 years the scheme is carried by Panchayats under piscicultural schemes.

There is a marked improvement in the health of fish eaters.

1.3. FISHERIES COOPERATIVES

1.3.1. Structure of Fisheries Cooperatives (Apex body, District Federation, Primary Societies etc.)

District Fishermen Cooperatives Federation of District concerned and Taluk Fishermen Cooperative Marketing Unions Concerned.

1.3.2. Central Societies - 9 District Federations.  
10 Marketing Unions.

1.3.3. The Fishermen Cooperatives Societies in Tamilnadu are classified on functional basis as follows:-

S.No.	Type of Societies	Number	Member-ship	Share Capital in lakhs
1.	Primary Fishermen Co-op. Societies	473		
2.	Primary Fishermen Co-op. Marketing Societies	5		
3.	Fishermen Co-op. Societies organised under Half a Million Job Programme and Employment Promotional programme	16		23.23
4.	Co-op. Fish Marketing Union	10	496	0.23
5.	District Fishermen Co-op. Federation.	9	702	8.91
		----- 513 =====		

1.3.4. Functions : To uplift the socio-economic conditions of fishermen, to eliminate middle men and to provide the needs of the fishermen for living.

1.3.5. Performance : To improve the industry Coops. need revitalisation.



1.3.6. Management : Elected office bearers of the relevant society with service assistance by Departmental staff.

1.3.7. Programme for revitalisation : Under consideration.

The main functions of these Societies are to channel loans from the Government to their members. Long term loans and medium term, short term, working capital loan, and godowns loans are granted by Government to Fishermen Co-op. Societies since 1956-57.

A sum of Rs. 73 lakhs has been given so far since 1956-57 as detailed below:-

i.) Long term loan	Rs. 36,92,070
ii) Medium term loan	Rs. 16,07,833
iii) Short term loan	Rs. 48,700
iv) Working capital loan	Rs. 7,64,800
v) Godown loan	Rs. 89,450
vi) Elimination of middlemen scheme	Rs. 11,94,575

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Total: Rs. 73,97,428  
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Nearly sixty Fishermen Co-operative Societies are running fair price shops for their members. Action is being pursued to ensure that more than 100 societies have their fair price shops within two to three years. All the assistance i.e. distribution of nylon yarn, socio-economic measure assistance, cyclone and distress relief are routed through the Fishermen Co-operative Societies. In the allotment of mechanised boats by the Tamilnadu Fisheries Development Corporation, preference is given to members of the Fishermen Co-operative Societies. Majority of the Fishermen Cooperative

Societies are in the nature of credit societies. The Inland Fishermen Co-operative Societies take lease of fishery rights of inland waters which in turn gives them on sub-lease to their members. Few Fishermen Co-op. Societies have their own fish markets and few have taken the lease of fish markets.

Some of the primaries undertake purchase and distribution of nylon yarn and other crafts and tackles. Rameswaram Fishermen Co-op. Society is operating mechanised fishing boat and is actually engaged in fishing trade. The Mettur Dam Fishermen Co-op. Society and Mettupalayam Fishermen Co-op. Society are successfully conducting marketing activities. The Sembadapalayam Fishermen Co-op. Society is engaged in production and sale of fishing nets through their members. Colachel Fishermen Co-op. Society is looking after entire water system to Simon Colony. District Fishermen Co-operative Federation, Thanjavur is taking lease of inland water and has a good record.

#### Integrated Rural Development Programme Scheme

The Fishermen Co-op. Societies play a prominent role in the implementation of Integrated Rural Development Programme scheme in certain districts viz., Chingleput, Tirunelveli and Kanyakumari. The subsidised nylon yarn worth more than Rs. 12 lakhs has been distributed to the fishermen members of the Fishermen Co-op. Societies in Chingleput District, through the Madras District Fishermen Co-op. Federation. In Tirunelveli district, 12 country crafts worth of Rs. 48,000/- have been distributed to the members of the Fishermen Co-operative Society. In Kanyakumari district 20 mechanised boats have been distributed to the fishermen members through four primary fishermen Co-operative Societies, by allowing subsidy at 33 1/3 % of the cost of the boats to the members.

### Member Education Programme

In spite of so many schemes implemented for the welfare of fishermen there is not much awakening among the fishermen on their problems. The schemes are not received by the fishermen in proper spirit. Again collection of loan is posing a problem. Lack of education among fishermen is the main cause for the above atmosphere.

A member education project is being implemented at Tuticorin. An Assistant Director of Fisheries is appointed as Project Officer. He is assisted by three Co-op. Sub Registrars/Lecturers and Two Senior Inspector/Lecturers. This Project is conducted under the auspices of National Coop. Union of India with the financial assistance of National Co-op. Development Corporation.

### Fisheries Co-operative Banks and State Level Federation

There is an active thinking with all those who are associated with the Fishermen Co-op. Societies about the formation of Fisheries Co-op. Banks and Apex Fishermen Cooperative Federation. Formation of such banks will certainly give fillup to the reorganisation and re-vitalisation of fisheries co-operative societies. Even though the guidelines, terms and conditions of the Reserve Bank of India have been communicated to the State and Central Cooperative Banks, these banks, have not shown much interest in financing. It would be advantageous to form District Co-operative Fisheries Banks not only to get financial assistance from Reserve Bank of India but also to mobilise and utilise the savings of fishermen community.

A Statelevel Federation which is to be organised is likely to take up production and marketing schemes as a centralised agency for fisheries co-operatives. Besides, this will serve as an agency for co-ordination of internal marketing activities and to function as an agency to seek and distribute institutional aid.

1.4. Education and Training

1.4.1. Educational programmes and facilities

Upto 1961, Fisheries schools were run by the Fisheries Department in the coastal fishing villages. These were subsequently taken over by the Education Department. The Central Polytechnic under the control of Director of Technical Education runs a 3 years (6 semesters) Diploma course in Fisheries Technology and Navigation (D.F.T.N.) after S.S.L.C. with a strength of about 15 to 20 candidates every year. Two semesters provide practical training in sea fishing, fish processing fish culture etc. These diploma holders are absorbed in the Fisheries Department in the grade of Sub Inspector of Fisheries. A Fisheries College has been started in Tuticorin in the year 1975-76 by the Tamilnadu Agricultural University and is offering Fisheries Science (B.F.Sc) Course for 20 students. The B.F.Sc. course is for 4 years after P.U.C. and the syllabus carries all aspects of Fisheries.

1.4.2. Training programmes and facilities

1.4.2.1. In-service Training

Direct recruits through Tamilnadu Public Service Commission in the categories of Assistant Director of Fisheries, Inspector of Fisheries, Research Assistant, Sub Inspector of Fisheries and Laboratory Assistant are given in-service training in all branches of fisheries including fisheries co-operatives, statistics, and office administration for a period of 12 months from 1979 onwards (till 1978 the period of training was 10 months) in the Staff Training Institute of the Fisheries Department at Madras. The training covers both theoretical and practical aspects in all branches not only in the various departmental centres within the State, but also in important places of fisheries interest outside the State. The Principal of the Staff Training Institute is a

Deputy Director of Fisheries and he is assisted by 2 Assistant Directors and 3 instructors in the grade of Research Assistants/Inspector of Fisheries. All the staff in the Institute are normally post-graduates trained in the Central Institute of Fisheries Education, Bombay to ensure a high standard of training. The Co-op. Sub-Registrar instructor provides Co-op. training. Besides, the Staff Training Institute also arranges for the practical training of the Central Polytechnic students for the Diploma course in Fisheries Technology and Navigation for 2 semesters of 6 months each in sea fishing, fish processing, fish seed production, fish culture etc.

Departmental officers and staff are also being deputed regularly to such institutions as Central Institute Fisheries Education, Bombay, Central Inland Fisheries Research Institute, Barrackpore, Central Fisheries, Nautical and Engineering Training, Madras/Cochin etc., for advance training in fisheries development, piscicultural techniques, management, exploitation and processing. Besides, higher level officers are also deputed for the various business management, planning and development training courses conducted by the various Management institutes. Such deputations will be continued during the VI Plan period, as training in such specialised fields is a continuous process and the Department will stand to benefit.

#### 1.4.2.2. Extension Staff Training

The Staff Training Institute of the Department at Madras provides for necessary extension staff training also. 27 Nos. of Assistant Directors of Fisheries, Inspectors of Fisheries and Research Assistants and 80 private entrepreneurs have so far been given training in Brackishwater prawn and fish culture. 102 rural youths were trained in prawn culture under the TRYSEM programme. 298 fish farmers of the Fish Farmers' Development Agencies at Thanjavur, Trichy, Madurai and Dharmapuri were trained in composite fish culture. 77 Fishery guards of the Department were given training in fishery conservancy measures.

Besides the above, one or two Sub Inspectors of Fisheries of this Department are deputed every year to the Central Fisheries Extension Training Centre at Hyderabad for training in fisheries extension.

#### 1.4.2.3. Co-operative Staff Training

The co-operative staff like co-operative Sub-Registrar, Inspector of Co-operatives required for running fishermen Co-operative are now taken on deputation from the Co-operative, Department. The Deputy Registrar of Co-operative, is also taken on deputation from the Co-operative Department to assist the Director of Fisheries in his statutory functions of Registrar of Co-operative, Societies of Fisheries Co-operatives. The Staff Training Institute of the Department has a Co-operative Sub-Registrar Instructor who imparts training in co-operation

#### 1.4.2.4. Fishermen Training

Six Fishermen Training Centres have been started during the previous successive Plan periods at Tuticorin, Nagapattinam, Madras, Cuddalore, Mandapam and Colachel between 1956 and 1964 to provide training to the fisher-boys over a 10 months period on improved fishing methods, handling of mechanised boats, fabrication and mending of nets, etc. The strength of each marine fishermen training centre is 50 except at Mandapam which can take in 60 candidates at a time. So far 4814 fishermen trainees have been trained at these centres.

At Tuticorin, a Junior Mechanic course is also being conducted to impart training to fishermen in the handling, repairing and overhauling of marine diesel engines. Since 1963, a total of 301 Junior Mechanics have been turned out.

Each student of the training centre is at present given a stipend of Rs. 50/- p.m. which was fixed as for back as in 1961. Recently the Government has increased the stipend from Rs. 50/- to Rs. 75/- from August 1980. Government is also examining the reorientation of the fishermen training programme to include diversified fishing, fisheries extension work, welfare of fishermen and fisherwomen etc.

#### 1.4.2.5. Non-Formal Education

The fishermen section of the population contributes significantly to school developments requiring non-formal education. However, the non-formal education Department and voluntary agencies are attending to the non formal education of the fishermen as in the case of others.

#### 1.5. Information and communication services

##### 1.5.1. Type of information regularly provided to fishermen

- i. Weather warning
- ii. Seaward artillery practice warning
- iii. Rocket launching
- iv. Developments in fishing, fish processing and fish culture.
- v. Notifications regarding supply of boats, nylon twine, auction of boats, fishing rules and regulations, fishery conservancy measures etc.

##### 1.5.2. Mode of communication

- i. Telegram.
- ii. Tom-tom
- iii. Personal contact
- iv. Radio
- v. Leaflets in Tamil and demonstrations
- vi. Notifications and articles in Tamil dailies.

1.5.3. Impact of the Services on fishermen

Lives and loss of property are saved at the time of danger and they are taken to safer places. There is fair response from the fishermen for the notifications issued in Tamil dailies and through leaflets and the fishermen have been found to evince interest and react promptly in all matters affecting their earnings.

1.6. Linkages with other organisations in Fisheries Extension

1.6.1. Linkages with other organisation on fisheries extension

(Department of Agriculture, Fisheries Division Extension Directorate of Union Ministry etc.)-

The extension wings of the Tamilnadu Fisheries Department have been extended to Tuticorin and Tanjore regions at the instance and approval of the Government of India, Department of Agriculture and provide an effective linkage for extension between Government of India and the State Government.

1.6.2. Linkages with fisheries research organisation for technology training.

The Departmental staff are deputed to all the Central Institutes of Fishery Research like the Central Marine Fisheries Research Institute, Central Inland Fisheries Research Institute, to attend Summer Institutes and other ad hoc training and refresher courses conducted by them from time to time. Their extension news letters, and bulletins are received regularly, and the improved technology found in them, passed on to the Department staff and fishermen. Similar linkage is there between the Fisheries Department and the University Research Departments and the Tamil Nadu Agricultural University also.



1.6.3. and 1.6.4. Linkages with fisheries educational organisation for education and training.

The Departmental staff are deputed for training in the following institutes:

Central Institute of Fisheries Education, Bombay, Barrackpore, Hyderabad, Agra, Central Institute of Fisheries, Nautical & Engineering Training, Cochin and Madras.

1.6.5. Linkage with Public financing institutions

Financial assistances are received from Agricultural Refinance Development Corporation, Commercial Banks through the Tamil Nadu Fisheries Development Corporation for Mechanisation programme. The lead Banks in the districts provide financial assistance to the Fish Farmers of Fish Farmers' Development Agencies for renovation of tanks etc. The Banks also provide loans for private entrepreneurs for viable prawn culture and other fisheries projects on the furnishing of technical feasibility certificate by the Department.

1.6.6. Linkages with Fishery Cooperatives

Financial assistance provided by National Co-operative Development Corporation, New Delhi for fishermen Co-operatives are being utilised by the Department for development of fisheries in the State.

1.6.7 Linkages with any other organisations relating to Fisheries matters

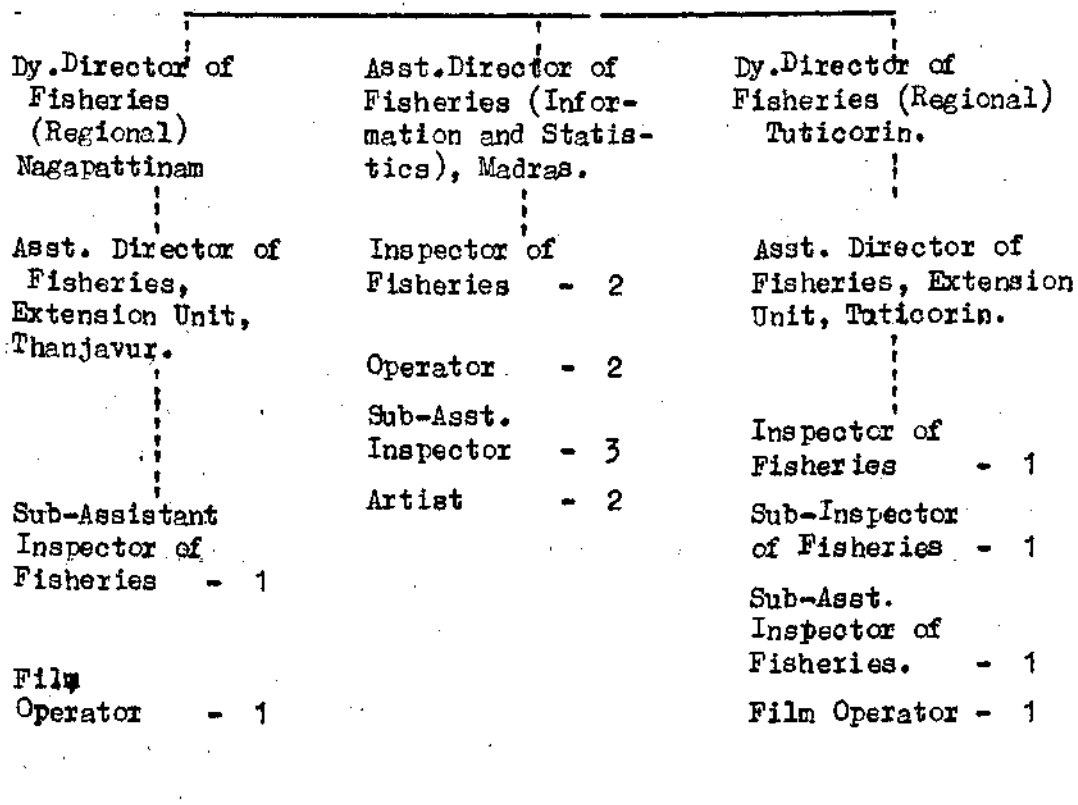
- i. F.A.O. Small Scale Fisheries Project and Bay of Bengal Programme.
- ii. MIDCA Project.

1.7. Organisational Set up for Fisheries Extension

1.7.1 & 1.7.2.

Director of Fisheries

Joint Director of Fisheries  
(Research and Extension)  
Madras



1.7.3. Location and jurisdiction

- |  |  |
|--|--|
| <p>1. Asst. Director of Fisheries (Information &amp; Statistics) Madras.</p> <p>2. Asst. Director of Fisheries (Extension Unit) Thanjavur.</p> <p>3. Asst. Director of Fisheries, (Extension Unit), Tuticorin.</p> | <p>Madras, Coimbatore, Ooty, Erode, South Arcot, North Arcot, Salem, Dharmapuri Districts.</p> <p>Thanjavur, Trichy, Pudukottai and Madurai.</p> <p>Tirunelveli, Kanyakumari and Ramnad districts.</p> |
|--|--|

Apart from this, all the regional Assistant Directors of Fisheries with their Inspectors of Fisheries and Sub Inspectors of Fisheries are also doing extension work. Fish Farmers' Development Agency, Trichy, Thanjavur and Madurai are doing extension work in freshwater fish culture in their respective districts.

1.8. Constraints and problems in Fisheries Extension

1.8.1. Technological

There are no serious technological constraints in Fisheries extension, technology being provided by the State and Central agencies.

1.8.2. Inadequacy of personnel at different levels

The main problem is lack of adequate extension officers and personnel at different levels. There are only 3 extension units for the entire State. The staff pattern is not similar for all the extension units, though the work is similar. Full time extension staff are necessary for effective extension work. Full time specialists should be appointed for each type of subject in the extension unit as the area to be covered is extensive with a coastline of 1000 km and numerous fishing villages, both inland and marine.

1.8.3. Lack of training facilities

There are at present no separate fisheries extension training centres in the State. Fisheries extension forms just a part of the training programme at the Staff Training Institute. A separate extension training centre is necessary to train not only the departmental personnel of different categories but also fishermen and fisherwomen in extension work.

1.8.4. Technological gaps if any will have to be closely watched and provided.

1.8.5. Financial constraint is the main problem in fisheries extension in the State. Liberal grants by the Central and State Governments are needed for the expansion of the fisheries extension activities.

1.8.6. Performance gaps are wide because of the magnitude of the work and the limited finance, staff and facilities made available.

1.8.7. Social constraints are not much, since the fishermen are receptive to the extension work.

1.8.8. Economic constraints

Lack of sufficient funds at the State level.

Lack of financing enterprises through Nationalised financial institutions.

Poverty of fishermen community as a whole.

1.8.9. Policies and priorities are also chief constraints for fisheries programmes and extension work. These are usually accorded the lowest priority and a change of this attitude is necessary.

2. FISHERIES DEVELOPMENT PROGRAMMES ENVISAGED IN THE VI PLAN

Fisheries development programmes envisaged in the VI Plan aim at stepping up fish production, both marine and inland, both for export and for internal consumption. The operational efficiency of catamarans and other indigenous crafts are to be improved by appropriate intermediate technology and by introduction of suitable beach landing crafts fitted with outboard motors and inboard engines. Commercial coastal aquaculture will be popularised and better fish handling and processing techniques will be adopted to prevent fish spillage and ensure better utilisation of fish catches. Quality fish seed production will be increased and inland fish production

intensified by composite fish culture through Fish Farmers' Development Agencies. The socio-economic conditions of fishermen and fisherwomen are to be improved.

Based on these principles, the following fisheries development programmes have been envisaged in the VI Plan.

Name of the Schemes	Outlay for VI Plan proposed (Rs. in lakhs)
i) Grant of subsidy and distribution of inboard and outboard motors.	270.00
ii) Introduction of smaller fibreglass boats.	150.00
iii) Supply of insulated boxes or suitable containers to traditional fishermen.	10.00
iv) Grant of subsidy on the purchase and distribution of nylon twine to the traditional sector fishermen by the cooperatives.	20.00
v) Mooring facilities and landing jetties to traditional crafts.	25.00
vi) Grant of subsidy and provision of margin money on introduction of mechanised boats.	195.00 292.00
vii) Grant of subsidy on the purchase of different types of gears (other than bottom trawls) by the existing mechanised fishing boats for diversified fishing operations.	25.00
viii) Deep Sea fishing (assistance to Tamil Nadu Fisheries Development Corporation Limited)	50.00
ix) Establishment of fish seed farms.	300.00
x) Development of Reservoir Fisheries.	50.00
xi) Development of prawn farming and molluscan culture in Tamilnadu.	100.00

Name of the Schemes	Outlay for VI Plan proposed (Rs. in lakhs.)
xii) Culture of edible molluscs	5.00
xiii) Pearl Culture for commercial exploitation.	125.00
xiv) Training programme for fishermen and officials.	15.00
xv) Research survey and statistics.	25.00
xvi) Aquarium and Oceanarium	40.00
xvii) Socio-economic measures to fishermen	200.00
a) Link roads.	10.00
b) Guide lights.	
xviii) Fishing harbours and landing facilities and other Centrally sponsored programmes.	150.00
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	Total: 1,882.00
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3. Fisheries Extension needs for the effective implementation  
of the VI Plan schemes

3.1. Realistic organisational set up for fisheries Extension at different levels and coordination

The existing organisational set up for fisheries extension had already been given under item 1.7. This will not be adequate for effective implementation of the VI Plan schemes. Each Regional Assistant Director of Fisheries in-charge of a coastal district should be provided with one Inspector of Fisheries (Marine extension), one Inspector of Fisheries (Inland extension) and 2 Sub Assistant Inspectors of Fisheries and each Regional Assistant Director of Fisheries in-charge of Inland district should be provided with one Inspector of Fisheries (Inland extension) and one Sub Assistant Inspector of Fisheries separately for attending to all the extension works. Each Regional Assistant Director of Fisheries should be provided with separate set of extension equipments, audio visual aids etc. and vehicle for intensive extension work. The extension programme and activities have to be coordinated by separate Deputy Director of Fisheries (Extension) attached to the Directorate.

3.2. Technological needs

Suitable intermediate technology in the form of beach landing crafts with inboard- outboard motors within the means of the poor fishermen has to be evolved and popularised to improve the small scale fisheries sector which contributes nearly 65% of the total marine fish landings in the State. Cheap portable and durable insulated boxes have to be designed and popularised among the fishermen for bringing the quality fish catches in good condition and for securing better prices for them. Attractive technologies for diversifying the fishing methods are needed to divert the fishermen from trawling for prawns and to avoid clashes between the traditional crafts and mechanised boats. Deep sea fisheries resource survey to assess the fishery potentials is necessary to launch on deep sea fishing programme.

High rate of survival of major carp and quality fish fingerlings required for composite fish culture should be achieved. By cross breeding and other technologies, fast growing species capable of breeding right through the year have to be evolved to ensure adequate quality fish seeds for culture. Research on prolongation of major carp breeding season is needed to make available the major carp fingerlings for stocking the tanks which in Tamil Nadu get filled up by October or November only following the North East monsoon rains. Productivity and per hectare fish production of the reservoirs have to be improved. Appropriate technology is needed for commercial culture of prawns, edible oysters, mussels and sea weeds. Pearl oyster farming techniques are needed to produce and supply the oysters required regularly for the culture pearl project. Trash fish processing and utilisation, popularisation of frozen fish, fish fillets, mixed meat etc. are other area of technological needs in Tamil Nadu.

### 3.3. Linkages desired with various organisations

Attempts are being made to tackle some of the technological problems listed above with the research and development staff within the State. But considering the limitations of funds, equipments, facilities and personnel available within the State and the magnitude and diversity of the technological needs to be coped up assistance and suitable linkage have to be sought for from agencies and organisations like the Ministry of Agriculture, Government of India, Indian Council of Agricultural Research, New Delhi, Marine Products Export Development Authority, Cochin, F.A.O. Small Scale Fisheries Project, Madras, SIDA, United Nations Development Programme, National Co-operative Development Corporation, Central Salt and Marine Chemicals Research Institute, Bhavnagar, Tamil Nadu Agricultural University and other Universities.



3.4. Fisheries Educational Needs

Steps have to be taken to improve the quality of the D.F.T.N. Course in the Central Polytechnic by updating both the syllabus and the attainments of staff and by providing for adequate practical training for the candidates in the latest technologies. All the staff of the Fisheries Department should be enabled to undergo the postgraduate training in the Central Institute of Fisheries Education, Bombay to get an all-India knowledge in Fisheries as well as the International developments in Fisheries Science.

3.5. Training of Extension personnel and type of training

3.5.1. State level officers may be trained in Project Planning Management and evaluation techniques.

3.5.2. District/Regional Level Officers may be trained in project implementation techniques of various extension programmes.

3.5.3. Block Level Officers may be trained in the details of the various extension schemes as well as the follow up programme.

3.5.4. Village level work<sup>ers</sup> are to be trained in the collection of basic statistics of fishing census, fish landings, methodologies of the various extension schemes tabulation of data etc.

3.6. Training of Fishermen

3.6.1.

& Diversification course in fisheries Training

3.6.2. Centres has to be introduced. Training in additional vocations like prawn juvenile collection, prawn culture, mussel and oyster culture, sea weed culture etc. has to be given.

3.6.3. Training of fish farmers

Fish Farmers' Development Agency and Staff Training Institute are giving training for fish farmers and TRYSEM programme training is envisaged in prawn farming.

3.6.4. Training in Co-operative Management

At present, fishermen are the President, Secretary and members of the Fishermen Cooperative Societies. They are guided by Fisheries Executive Staff and Co-operative staff working in Fisheries Department. National Co-op. Development Corporation has arranged for educating the fishermen on cooperation with an Institute headed by an Assistant Director of Fisheries at Tuticorin.

3.6.5. Non Formal Education of fishermen has to be taken up intensively to upgrade their educational social status as well as to make them easily associate with the fishery developmental programmes intended for them.

3.7. Improvements in Extension methods

3.7.1. Demonstrations of technologies of fish seed production, composite fish culture, prawn and juvenile collection, prawn culture, fish curing, drying of fish, icing of fish, transport of iced fish e are at present done by the extension units of the Department.

3.7.2. & An audio visual unit and an Extension Unit with Inspector

3.7.3. of Fisheries for each Unit and one Film Operator in each Unit attached to the Directorate have been covering the entire State doing propaganda and publicity by screening films in fishing villages, schools and colleges distributing various leaflets, handouts, brochures, pamphlets etc. and also arranging to give lectures on Fisheries Development. Both the Units are equipped with Projectors, Tape Recorder, Public Address System and other audio visual aids.

There are at present totally five film projectors (RCA) and one is to be purchased for the Extension Unit at Thanjavur. Also the following equipments are available with the Units.

1. Philips Amplifier with Microphone - 1.
2. Slide Projector - 1.
3. HMV (Fiesta) Record Player - 1.

There are seventeen films in all, and out of this 9 films are in English (Colour), 7 films are in Tamil (Black and White) and 1 silent film (Black and white).

Statistics, handouts and pamphlets of fisheries activities are brought out periodically and distributed to the fishermen, those in fishing industry etc. Scientific community is served with journals, like "Madras Journal of Fisheries" published by this Unit. About 62 handouts and booklets and 90 fisheries statistical reports have been so far published. About four volumes of Round up and seven volumes of news letter each containing 12 issues have been brought out. Recently two more extension units have been established, one at Tuticorin and another at Thanjavur to intensify extension work in the districts.

#### 3.7.4. Proper utilisation of Mass media

Radio and Doordharshan talks and group discussions on the various schemes and achievements of the Government are given by various officers of this Department. About 26 talks on various topics were arranged by this Unit through the All India Radio, Madras, Trichy and Tirunelveli for the year 1980. About five programmes have been telecast in T.V. Fishery Development projects and Fishermen Welfare Programmes were telecast in Madras T.V. as a weekly social in August 1980 in the form of a folk song "Villupattu".

Frequently, articles of fishery interest are also published in the Tamil and English Dailies.

However, it is in fitness of things that mass media organisations like TV, AIR, Press, Information and Public Relations Department, Directorate of Advertisement and Visual Publicity, Government of India, Field Publicity, Government of India and Films Division, Government of India, take into account the various developments that have been taking place in the fishing industry, research and extension, coordinate their efforts with the State Fisheries, give wider coverage and thus fulfil the long standing need to make the proper impact among the fishermen, fish trade and public at large.

3.7.5. Collection, transmission and utilisation of feed-back information

There is no separate machinery at present for this. The regional Assistant Directors of Fisheries and their staff, the extension units and the Fishermen Co-operatives are now used for collection and transmission of the feed back information which are processed by the Assistant Director of Fisheries (Information & Statistics) of the Directorate.

3.7.6. Creation of fishermen forum

There is no fishermen forum now and this may be organised.

3.7.7. Monitoring and evaluation

Monitoring and evaluation are not now done for the extension programme. This has to be done by adequately strengthening the extension units.

ANNEXUREStatement showing the Plan Schemes under the various Developmental heads

(Rs. in Lakhs)

Scheme	Actuals				Total Fifth Plan Expenditure.
	1974-75	1975-76	1976-77	1977-78	
1	2	3	4	5	6
1. <u>Direction and Administration</u>	-	0.05	0.28	1.12	1.45
2. <u>Research</u>	1.72	5.98	4.58	7.29	19.67
3. <u>Education and Training</u>	2.36	1.86	2.56	6.96	13.74
4. <u>Inland Fisheries</u>	6.68	4.60	5.74	7.04	24.06
5. <u>Fishing Harbours and Landing facilities</u>	0.02	0.04	8.04	5.64	5.74
6. <u>Deep Sea Fisheries</u>	2.90	5.70	7.20	5.22	21.02
7. <u>Processing Preservation and marketing</u>	1.31	1.45	1.35	1.34	5.45
8. <u>Mechanisation and improvement of fishing crafts</u>	1,56.66	94.17	83.76	91.81	4,25.68
9. <u>Other Expenditure</u>	0.81	1.01	0.60	75.78	78.20
10. <u>Centrally Sponsored Scheme</u>	10.11	9.47	5.57	11.58	37.13
11. <u>Central Sector Scheme</u>	14.13	4.50	..	..	18.63

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980

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STATUS OF FISHERIES EXTENSION IN GUJARAT STATE

By Department of Fisheries, Gujarat, Ahmedabad 380 016

1. Present status of Fisheries Extension

The status of Fisheries Extension in Gujarat State is not different from any other maritime and inland State in India. Considerable extension programmes have been implemented by the State Government in the field of Agriculture. However, there have been no separate extension programmes in the field of fisheries in Gujarat State. Therefore, it can be said that the present status of Fisheries Extension in Gujarat is complimentary to what has been observed by the National Commission on Agriculture in their report on Fisheries (Part VIII). Although developmental activities in respect of Fisheries in Gujarat has been initiated in the beginning of country's First Five Year Plan (1951-1956), when Gujarat was a part of bilingual Bombay State, no special efforts have been made for carrying out systematic extension programmes. During the second Five Year Plan (1956-1961) major part of the developmental projects in Fisheries, having a theme of GROW MORE FOOD, carried from the first Five Year Plan, has been strengthened by adopting mechanisation programme of fishing vessels. Gujarat came into existence in May 1960 when a separate Directorate of Fisheries has been brought up, to take up developmental programmes in the field of fisheries in Gujarat.

Gujarat has a gift of two natural Gulfs viz. Gulf of Kutch and Gulf of Cambay, which are considered to be the best breeding grounds for several commercially important species of fishes, besides a coastal belt of 1663 kms. and a continental shelf area of 164,183 km<sup>2</sup>

offers sufficient scope for the fishermen to develop fishing activities through traditional fishing methods and modern trawling/gill-netting methods. Excellent inland watersheds, by way of four major rivers and several irrigation reservoirs, canals and perennial rural ponds, provided equal opportunities for developing inland fisheries activities. Brackish water areas and estuaries all along the coastal belt provide excellent opportunities to boost up fish production by adopting coastal aquaculture for commercially important species of fishes like chanos and mullets, besides shrimps. Despite these excellent resources, fisheries was almost neglected by administrators and planners till the formulation of developmental plans by the National Planning Commission. Without separate extension agencies in the Fisheries sector and without having any special scheme for extension, good many developmental projects have been taken on hand having little hidden provision for extension programmes. Only in recent years separate extension scheme has been drawn up in the Fisheries sector of Gujarat State (1978-79). But here too main emphasis of the newly formed extension unit has been by and large on the Inland Fisheries sector, may be due to observations made by the National Commission on Agriculture in their report quoted in earlier para.

#### 1.1. Fisheries Extension schemes undertaken

##### 1.1.1. Title and scope of each scheme

The major title of the scheme is strengthening of extension and publicity programmes through which several illustrative and informative pamphlets and educative booklets have been brought out. Besides a departmental bimonthly magazine MATSYA VIKAS is also being published since 1970.

##### 1.1.2. Period of implementation

Virtually the publication of bimonthly magazine "Matsya Vikas" started in later part of the year 1970, is the milestone

in extension programmes. However, most of the developmental schemes taken on hand since 1960 onwards have been having provision to bring out illustrative booklets, pamphlets etc. for disseminating the aims, objectives and benefits of the various developmental schemes. Participation of department in State and national level exhibition has also been continued since the formation of Gujarat State. State level fisheries officers conferences, fisheries festivals, seminars etc. have also been arranged depending upon finance and need to have such programmes.

#### 1.1.3. Technology based schemes

Mechanisation of fishing craft, improvement of traditional fishing boats, modernisation of fishing gear, adoption of various methods of preservation, processing and transport, strengthening of cooperatives, development of inland fisheries in reservoirs, introduction of quality fish seeds in inland water-sheets, induced breeding experiments on Indian major carps at fish farms, etc. have been taken on hand by the department to pass on technology to fishermen and entrepreneurs through extension services.

#### 1.1.4. Service based schemes

Establishment of service stations, ice and cold storage plants, marketing and distribution channels, landing and berthing facilities at important fishing centres, improvement and assistance for creation of fisheries godowns, establishment of consumer diesel pumps by cooperatives, marketing facilities in Inland fisheries etc. have been effectively implemented by the department during the last two decades after the formation of Gujarat State.

#### 1.1.5. Fishermen Welfare Programmes

Three primary fisheries schools in coastal villages of Folak, Bhadbhoot and Umarsadi. Fishermen training centres at Veraval, Porbander, Ukai, Valsad, Vansada, and cultural activities



in few selected fishing villages have also been undertaken as a part of fishermen welfare programmes.

1.1.6. Brief descriptions of 1.1.3, 1.1.4 and 1.1.5.

#### Mechanisation of fishing crafts

Through this programme traditional fishing crafts like small machhvas, lodhias, canoas, etc. of the fishermen have been mechanised, by installing either out-board motors or inboard engines. The programme has been initiated since 1953 and at the end of 30 June 1980, there are 2454 powered boats with inboard marine diesel engines and 830 powered boats with outboard motors. The scheme also provides financial assistance for adopting modern fishing trawler. The departmental experimental exploratory survey through 49ft fishing survey vessels since 1962 helped fishermen to switch over to take up modern fishing by adopting trawling in off-shore waters of Gujarat.

#### Improvement of traditional boats

Financial and technical assistance for improvement of existing pattern and design of the traditional fishing boats of fishermen have been given under this scheme. The then Saurashtra State introduced 20 improved design boats with technical expertise of the F.A.O. in 1954. These new boats remained as models for the fishermen in constructing new fishing boats.

#### Modernisation of fishing gear

Till the introduction of synthetic fishing gear in 1953 the fishermen used to conduct fishing operations with the help of cotton and hemp twine-made fishing nets. During the Saurashtra State regime, the then Marine Products Department of the State imported nylon fishing twine under the Indo-US Technical Mission Programme. The efficiency and effectiveness of this fishing gear attracted the fishermen to take up fishing through nylon nets

and twines. In order to give boost to this line, Government made liberal procedure to allow subsidy to those fishermen who would go for fishing with synthetic twine. As a result presently over 97% of the fishing gear adopted in marine and inland fishing activities is made out of synthetic twine.

#### Programmes for preservation, processing and transportation

Modern methods of preservation, processing and transportation have been adopted by Government through their demonstration boats and experimental units. Attracted by the results, fishermen started adopting the methods by availing loan assistance from Government. Ice and cold storage plants received by Government under the Indo-US T.C.M. aid have been helpful in catering the needs of fishermen. Besides liberal procedure of availing loans/subsidies etc. for entrepreneurs establishing ice & cold storage plants, processing units etc. have been adopted.

#### Strengthening of cooperatives

Cooperative movement in fisheries, started since 1951, gained momentum during the second Five Year Plan period (1956-1961), with the establishment of apex-cooperative body under the title Gujarat Fisheries Central Cooperative Association-Ltd. (Feb. 1956). Through this State level cooperative organisation, coordinated marketing and distribution channels have been established. As a result fishermen started getting best returns for their labour. Share subsidies, marketing loan and financial assistance for godown construction by Cooperative societies are some of the projects, through which efforts to strengthen the fishermen cooperative societies have been undertaken.

#### Fish seed production, augmentation and exploitation of inland fisheries resources

Under this major inland fisheries scheme, the department

established fish seed production farms at Godhra, Dabhoi, Prantij etc. during Second Five Year Plan. Induced breeding experiments carried out at these fish farms resulted in getting quality fish seed. These fish seeds have been stocked in selected reservoirs and water sheets, which have come up as a result of development of irrigation and agriculture fields. The number of fish seed production centres has been further increased by establishment of Inland Fisheries Development Station at Ukai, composite fish culture farm at Lingda, Dantiwada etc. All India Coordinated programmes like composite fish culture and fish seed production under the Indian Council of Agricultural Research have been taken up by the department since 1975. Besides, in order to meet growing demand of quality fish seeds, the department, on an average, imports 4 crore of quality fish seeds of major carps from Calcutta. As a result of stocking of fish seeds in various water sheets in Inland waters, the fish production from fresh water is estimated to have reached a record figure of 16,000 tonnes during 1979-80, which was hardly 1000 tonnes during the year 1960. Extensive systematic surveys of inland water sheets have also been carried out and these have been stocked with quick growing varieties of fish seeds. Government, by a special resolution, put all watersheets in inland sector under the control of Fisheries Department during the year 1973 for taking up concentrated coordinated development programmes of fisheries in Inland waters. The policies, procedures and other details about inland fisheries developmental activities in various reservoirs, rural ponds, minor irrigation tanks, canals etc. have been worked out and implemented since 1976. To intensify fish culture in the rural watersheets the State has launched a scheme for the improvement of village tanks since 1978-79 under which village ponds taken up by fish farmers can produce an average of 2 tonnes of fish per hectare after having spent adequate finance on renovation of the pond, fish seed stocking etc.

Besides, the department has also formulated Integrated Aquaculture Programmes involving agriculture, animal husbandry, poultry, floriculture, duckery and piggery. This programme is presently being implemented in Tribal area and 50% financial assistance by way of subsidy is provided. Due to intensive efforts in inland fisheries development, the fish production from inland waters has shown an increasing trend. Various developmental projects have specially been taken up in Tribal and Backward areas not only to achieve increase in fish production but also to improve socio-economic status of this weaker section of the society. Specialised training programmes in reservoir fishing techniques have been organised at Inland Fisheries Training Station, Ukai. Till the end of 30 June, 1980 over 200 tribal youths having membership in the Tribal Fishermen Cooperative Societies in the command area of the Ukai reservoir have been trained in reservoir fishing techniques. These trained tribal youths have been an instrument to induce other tribal family members to take up fishing as a profession. The Ukai reservoir which was completed in 1970 started giving a good fish production after regular fishing operation commenced since September 1976.

#### Service based schemes

Establishment of cold storage, ice plants, service stations, landing and berthing facilities, harbour development, boat-yards, etc. have been given prime importance in service based schemes operated by the department. Technical know-how, financial assistance, assistance in allotment of land, machinery etc. have been provided to entrepreneurs. It is added here that in order to provide quick and efficient service to fishermen for their marine diesel engines, the department is running fully equipped service stations at Valsad, Veraval, Porbandar, Mangrol etc. Boat building yards of the GFCCA and other cooperative societies have also been assisted financially by the department by providing subsidy and giving preference in constructing boats for fisheries.

department and also making a term to fishermen availing loan/subsidy etc. for machanisation or improvement of boat.

Welfare programmes

Fishermen welfare programmes in the form of running fisheries schools and training centres in coastal villages have been taken up. As a result, the educational standard of the fishermen in the areas where fisheries schools/training centres are located have been brought up to some extent. However due to lack of enthusiasm amongst the fishermen community the education standard of Gujarat fishermen is not at all different from their counterparts in other states in India. Operative training centres initiated at Veraval, Porbandar, Wkai (for inland fisheries), Valsad etc. have been constantly engaged in imparting practical and theoretical training to fisher-youths and fisher-women in handling engines, boats, gear, fabrication, boat and processing sanitation, processing techniques etc. There have been other fishermen welfare programmes, wherein fishermen cooperative societies have been provided with radio sets and were assisted in procuring other items of cultural importance. However, taking into consideration some administrative hazards such welfare programmes have been dropped while planning various other developmental projects for socio-economic upliftment of fishermen.

1.1.7. Source of technology for 1.1.3.

The Indo-US Technical Cooperation Mission programmes, Food&Agricultural Organisation Expertise Services, training of departmental officials and technical cadre personnel at All India Training Institutes like Central Institute of Fisheries Education, C.I.F.N.E.T., C.I.F.R.I., C.M.F.R.I., C.I.F.T. have been helpful in introducing modern scientific technology evolved in various aspects of fisheries science. Besides research, survey and investigational efforts at departmental Gujarat Fisheries Aquatic Science Research

Institute at Okha and Inland Fisheries Development Station at Ukai have been respectively engaged in conducting experimental applied programmes for development of marine and inland fisheries sectors.

1.1.8 Financial, Physical targets and achievement of Schemes.

1.1.9

As hinted in earlier paras, there has been absence of a special or separate extension scheme in Gujarat Fisheries till the end of Fifth Five Year Plan. A "sensu-stricto" extension scheme drawn up in recent year 1978-79 is yet to be evaluated. However, the finance provided under this new special extension programme, the position about physical achievement is restricted to publication of illustrative pamphlets, participation in All India & State level exhibitions, publication of extension pamphlets & booklets only. T.V. programmes in selected inland districts having television coverage, have been arranged. As a result there has been an encouraging response by the local population to take up fish culture activities in the watersheets and ponds available in their respective areas.

1.1.10. Impact of schemes on development

1.1.10.1. On production means (craft/gear)

Though there was no specific extension scheme in operation in the first five Five-Year Plans and Annual Plans from 1951 to 1979, departmental developmental schemes described in earlier paras having built-in provision for extension have resulted tremendously in adopting modern and improved fishing boats and gear. Demonstration-cum-training boats, survey-exploratory fishing vessels, deep sea fishing trawlers operated by the department, during all these years have attracted large number of fishermen and entrepreneurs to adopt fishing through new technology of boat design and gear fabrication.

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#### 1.1.10.2. On Production

Fish production reached a figure of 2.23 lakh tonnes by the end of 1979-80, wherein inland fish production achieved a figure of 0.16 lakh tonnes. This is entirely due to intensive mechanisation programme, adopting new techniques of fishing gear, adoption of fish culture technology and induced breeding in inland fisheries, effective marketing and distribution channels, adequate berthing and landing facilities, provision of sufficient number of trained personnel for handling modern boats, engines etc.

#### 1.1.10.3. Socio-economic conditions

The socio-economic conditions of the fishermen have shown an upward trend alongwith the developmental activities. The average income of the fishermen is varying from place to place depending upon the type of craft, area of operation and gear used. The fishermen used to market their catch directly to the fish merchants, who used to finance them in the off-season, besides looking after their routine needs. However, with the advance of cooperative movement, majority of fishermen have been covered under the cooperative fold and as a result there has been considerable improvement in the average income of the fishermen. The educational and training facilities extended to the fishermen community have also helped the community in bringing up the social status of the fishermen in the general society. Fishing which has been considered as a profession for socially backward people has now been considered as a handsome vocation bringing fairly good returns besides fetching foreign exchange to the country.

#### 1.1.10.4. Services to society

Due to introduction of cooperative movement more and more fishermen have been convinced about the advantages of cooperative marketing and thereby getting maximum benefits for the laborious

efforts put in fish catching in sea as well as in inland watersheds, especially in dams and reservoirs. Supply of fishery requisites, nylon, twine and nets at subsidised rates through cooperative societies have been of great help to fishermen and tribals entering into this field. Government owned corporations and apex cooperative association having major Government share have been constantly engaged in introducing various fish-based industries to cater to the needs of fishermen in procuring ice, cold storages, insulated boxes, boat construction, supply of machine made twines and nets etc.

#### 1.1.10.5. Infrastructure facilities

Along with introduction of improved boats, gear etc. steps have also been taken to assist the fishermen by improving, adding, adequate infrastructure facilities like berthing and landing, ice & cold storages, service stations etc. The World Bank Integrated Marine Fisheries Project for Gujarat at the total cost of Rs.341.7 million is being implemented since 1978-79 for five years to bring about radical accelerated progress in above infrastructure development programmes, in the coastal villages of Veraval and Mangrol of Gujarat State. As far as inland fisheries is concerned motorable approach roads have been essential to have streamlined marketing and distribution channels from the place of landing to the place of consumers. At certain developed reservoirs the existing road facilities of the Public Works Department all around the dam site have been of some help in this regard. Still the rural inland fisheries development faces certain basic difficulties since these places are not easily accessible and local population are averse to fishing activities.



#### 1.1.10.6. Marketing facilities

Majority of the fish catch is transported to Bombay, Delhi, Ajmer, Calcutta etc. through cooperatives, merchants and small traders. Ice and insulated boxes are mostly carried by fishermen going for long fishing trips in offshore waters while in case of inland fisheries ice is provided at the landing collection centre by the marketing agency. Short and long term marketing loans to cooperatives are being paid by the Government. There were projects in Second/Third Five Year Plans, when generous subsidies on construction of fish markets, sheds etc. by local bodies (like Municipality, Panchayat) have also been given.

#### 1.1.10.7. Fishermen welfare

In order to upkeep the fishermen and fish farmers about the latest developments in various sectors, schemes have been in operation for providing recreational items like radio-sets to fishermen cooperative societies. Other welfare activities like supply of potable waters, medical aid and sanitation are yet to be taken up on strong footing.

1.2. Schemes for fishermen community taken up <sup>by</sup> departments other than fisheries department (Applied Nutrition, Adult Education, Integrated Rural Development etc.)

Supply of shark liver oil tablets, capsules, fish fillets and dry fish to undernourished and backward tribals, fishermen etc. forms a part of applied nutrition programme, adopted in certain underdeveloped pockets and draught affected areas. Approved projects of adult education, under the Ministry of Education, has also been in force in rural and urban areas. However, response of socially, educationally and economically backward fishermen to these programmes has not been encouraging.

But efforts in implementing integrated rural development programmes under which fish culture activities in inland waters have been undertaken have met with success in selected districts and blocks. Besides usual financial facilities by way of subsidies by fisheries department, additional subsidies have been made available to fish farmers under the integrated rural development programmes. Special programmes for assistance to fishermen and fishfarmers under D.P.A.P., S.F.D.A. etc. have also been in force.

#### 1.2.1. Implementing Agencies

Above quoted programmes have been implemented by the local district panchayat bodies, receiving financial assistance from Development Commission at State level, while technical fisheries officials working at district level either on deputation or in department have been playing a key-role in advising fishermen and fish farmers in disseminating technical details and economics of developmental schemes in fisheries fold.

#### 1.2.2. Programmes and Impact

#### 1.2.3.

Shark liver oil capsules have been supplied to expectant mothers and undernourished children from tribal and backward communities under the A.N.P., while fishing boats, gears, fishery requisites have been supplied to fishermen and fish farmers under other rural upliftment programmes mentioned in earlier description. These programme have been of some help in bringing up the health and hygiene, besides improving the socio-economic conditions of the affected people.

#### 1.3. Fisheries Cooperatives

Cooperative movement started in fisheries since 1951 onwards has taken momentum in the first Five Year Plan period (1951-1956).

Fishermen cooperatives have been established by concentrated efforts of the dedicated officials of the fisheries department which has got a special official from State Cooperative Department to advise in formation and well being of the cooperative society of fishermen. Apex cooperative body under the title Gujarat Fisheries Central Cooperative Association Ltd., Daxina Vahanvatu Sangh, Valsad, Kheda District Fisheries Cooperative Federation, Kheda and several taluka level and district level cooperatives in fisheries have been providing useful assistance to fishermen and fish farmers to procure their needs of boats, gear, fishery requisites, marketing of fish catch etc.

#### 1.3.1. Structure of Fisheries Cooperatives

Structure of a fisheries cooperative is as per norms and regulations accepted under the Gujarat Cooperative Rules 1961. Fishermen and fish farmers directly connected with fishing activities can come together with common motive and form a cooperative society. The district level officials of the department help the society in getting its registration and assist in availing various financial and technical facilities offered by State Fisheries Department. Each society is governed by a managing body consisting of nine members, including Chairman and Secretary. The district fisheries official is always in constant touch with affairs and activities of the society. At times, the official pass on due advice and guidance for streamlining the activities of the fishermen cooperative society.

The apex cooperative body, Gujarat Fisheries Central Co-operative Association Ltd. have various primary fishermen cooperative societies affiliated to it. The Chairman of this organisation is Head of the State Fisheries Department. Board of Directors formed of membership of representatives from primary cooperatives active fishermen, representatives from concerned

Government department like Deputy Secretary, Financial Adviser, Gujarat State Financial Corporation, Industries, Cooperatives etc. Board of Directors advises in various affairs and activities of the Association.

1.3.2. No. of fisheries cooperatives as per 1.3.1.

The total number of fishermen cooperatives existing as on 30.6.80 is 168, which includes 108 cooperatives from inland and tribal areas, while 60 cooperatives are working in marine fisheries.

1.3.3. Financial outlay in cooperative sector

This has been varying from year to year depending upon the needs of individual cooperatives functioning in particular area.

1.3.4. Functions

As detailed in earlier paras, major function of cooperatives covers supply of fishery requisites, assistance in marketing of fish catch, providing additional transport facilities, godown facilities, arranging subsidies from Government, establishment of consumers diesel pumps, ice-cold storages etc.

1.3.5. Performance

The performance of all the cooperatives, by and large, has remained satisfactory except some societies which remained dormant. The department also depute technical officials or have officials from cooperative Department to strengthen the activities and financial help is provided under the projects financed by Government apex organisations or/and National Cooperative Development Corporation.

1.3.6. Management

All the cooperative societies are managed by experienced and trained secretary and enthusiastic chairman who have been carrying out various activities in accordance with directives

from the managing body - an elected body - from the members of the society.

#### 1.3.7 Programme of revitalisation

Under the cooperative fold revitalisation of the fishermen cooperative societies has been taken on hand on small scale basis depending upon the area and potentialities for fisheries development. To cite an example it is stated that in Kheda District of Gujarat, where potentialities of inland fisheries development exist, the departmental efforts in revitalisation of small cooperatives and forming a Federation has been an unique achievement. This federation, first of its kind in inland fisheries, will cater to the needs of fishermen, fish farmers and fisheries cooperatives in handling, marketing and channelising their fish catch hauled out from various rural ponds and watersheets.

#### 1.4. Education and Training

##### 1.4.1. Education programmes and facilities

The fisheries department runs three primary fisheries schools in coastal villages of Bhadboot, Umarsadi and Kolak, where children from fishermen and other backward communities have been taught primary education in fisheries besides usual subjects of general importance.

##### 1.4.2 Training programme and facilities

###### 1.4.2.1. General in service training

Department of Fisheries runs staff training centre at Veraval, where basic all-round training is imparted to new entrants in the fisheries department. Short duration refresher courses for fisheries staff of various cadres have also been conducted

at regular intervals. Certain number of technical staff/officers are regularly deputed for training at All India Institutes like CIFE, CIFNET, CIFRI, CFETC, CMFRI, CIPT, etc.

#### 1.4.2.2. Extension staff training

No specialised extension staff training is planned. However, a few of the staff are deputed for short term training programmes in extension organised at Anand (Kheda district), under the Gujarat Agriculture University extension wing.

#### 1.4.2.3. Cooperative staff training

There are no separate training facilities available in cooperatives. However, this topic is taught at staff training centre and at C.I.F.E., Bombay where departmental staff and official undergo training.

#### 1.4.2.5. Non-formal education

Such facilities are lacking in fisheries in the State at this juncture.

### 1.5. Information and communication service

#### 1.5.1. Type of information regularly provided to fishermen

Since 1970, the department is publishing a bimonthly magazine covering developmental steps taken by department in various fields of fisheries. Besides short informative and illustrative pamphlets on survey-exploratory work of off-shore waters, experimental work on trash fish utilisation, conversion of trash fish into edible products like edible protein concentrate, fish Khima, fish fillets etc. are also being published to disseminate experimental work at research/technological laboratories for the benefit of entrepreneurs and fishermen.

1.5.2. Modes of communication

Modes of communications include publication of pamphlets, booklets, arranging exhibitions, discussion and deliberations with entrepreneurs, cooperatives etc.

1.5.3. Impact of the services on fishermen

There has been encouraging results due to built-in extension activities in various developmental schemes. More and more number of fishermen, tribals and entrepreneurs are coming forward to take up fishing as profession. However, looking at the available resources and scope for development in order to boost up fish production and generate employment in various fish based industries, extensive coordinated extension programme is badly needed.

1.6. Linkage with other organisation on fisheries extension

- 1.6.1. Linkage with centre (Department of Agriculture,  
to  
1.6.7. Fisheries Division, Extension Directorate of Union  
Ministry etc.)

The Central Institute of Fisheries Technology and the Central Marine Fisheries Research Institute have established their sub-centres at Veraval, where research and technological work on fisheries aspects pertaining to gear, boat, storage, transport etc. have been undertaken. And the department is constantly in touch with these organisations. Laboratory results are disseminated to fishermen and entrepreneurs, adopting LAB-to-LAND theme given by the Government. Gujarat Fisheries Central Cooperative Association Limited; Gujarat Agro-Marine Products Ltd, and other state owned organisations have been associated with the department as and when state level or national level exhibitions are held.

1.7. Organisational set up for fisheries

1.7.1. Organisational set up (in chart form) upto grass root.

Extension set up for the fisheries department existing to day, is as under:

S.No.	Designation	No. of post	Headquarters
1	Supdt. of Fisheries (Extension) GFS Class-II	3	One each at Ukai, Ahmedabad and Okha
2	Fisheries Officer (Extension) GFS Class-III	15	One each at Valaad, Surat, Ukai, Bharuch, Vadodara, Godhra, Anand, Prantij, Ahmedabad (2) Porbandar, Veraval, Bhuj, Jafraabad & Jamnagar.
3	Photographer-cum- Cameraman Class-III	2	One each at Okha & Ahmedabad
4	Head Clerk Class-III	1	Ahmedabad
5	Operator-cum-Supervisor Class-III	1	Ahmedabad
6	Clerk-cum-typist Class-III	1	Ahmedabad
7	Driver Class-III	3	Ahmedabad (2) Okha (1)
8	Peon Class-IV	1	Ahmedabad



1.7.2. Number of extension personnel in each cadre

As detailed in 1.7.1.

1.7.3. Location of extension centre and their jurisdiction

There has been no hard and fast demarcation of the location of extension centre and obviously its jurisdiction is quite wide looking to the necessity of work and programme.

1.8. Constraints and problems in fisheries extension

1.8.1. Technological

Various technological improvement and research studies are being carried out at various all India Technological Institutes related to fisheries. However, its steady dissemination to common users of the technology needs considerable improvements. Though much is being achieved at the laboratory level it does not have matching use at field level.

1.8.2. Inadequacy of personnel at different levels

This is a common problem, when any new field is to be developed. Careful and judicious usage of instinct in the available personnel, may relieve the difficulties to some extent. These selected staff are required to be trained in various advanced extension techniques.

1.8.3. Lack of training facilities

At present except the training institute at Hyderabad, there is no other training institute engaged in imparting training in extension fields in fisheries sector. Besides routine long term training programmes, efforts to have short duration courses may be explored.

#### 1.8.4. Technological gap

Technological & research results should be made available to users through quick communication methods, besides publishing various illustrative pamphlets etc. on the topics. The technology once adopted by an entrepreneur should be provided with all available details, pertaining to process, marketing and other relevant information.

#### 1.8.5. Financial constraints

. It is of general view that extension programmes are not having any productive results, though extension helps in inducing fisheries development and increasing fish production. Adequate financial provision is lacking, for procurement of various extension materials like audio-visual aids, charts etc.

#### 1.8.6. Performance gap

Performance or result of a particular scheme achieved in a particular locality or place, should be required to be published in wider coverage so as to attract and induce other under-developed areas. Due to paucity of funds visits of fishermen to various developmental projects demonstrating technological results are not practised. This may have to be arranged at regular intervals so as to keep up the tempo of fishermen in adopting modern techniques in fisheries.

#### 1.8.7. Social

In Gujarat most of the Hindu communities in major part of the State are averse to fisheries development programme owing to the fact that they usually believe in non-violence and have profound faith in religious principles of non-killing and non-harming as prescribed in Hinduism and Jainism.

#### 1.8.8. Economic

Economic viability of some schemes is not convincing to the entrepreneur . Besides, backwardness, illiteracy, lack of capital etc. amongst the fishermen, do not allow them to take up new venture in fisheries.

#### 1.8.9. Policies and priorities

Depending upon the response of local public to particular development scheme, policies about floating sufficient fund for the particular area, have to be decided. Geographical position, local religious sentiments etc., especially in inland fisheries sector, have to be taken into account while formulating any developmental project in such area.

### 2. Fisheries Development Programmes envisaged in the VI Five-Year Plan (1980-85).

Gujarat has an excellent marine, inland, estuarine, brackish-water potential resources for fisheries development. Concentrated and coordinated efforts initiated after Independence in 1947, and especially after the formation of separate Gujarat State since May 1960, have resulted in achieving the annual fish production of 2.23 lakhs tonnes in 1979-80 and the inland fish production is 0.16 lakh tonnes. Attracted by the excellent results in mechanisation and other developmental programmes, the World Bank has accepted a Gujarat Fisheries Project at a total cost of Rs. 3417 lakhs, through which Veraval and Mangrol harbours will be developed during the period 1977-1982, besides providing mechanised boats, fisheries sheds, ice & cold storages and other shore facilities.

An outlay of Rs. 2150 lakhs have been proposed for the Sixth Five Year Plan 1980-85, to achieve the following main targets:

- Interest-free loan to trawlers of 11.5 metre size and above fully mechanised with inboard marine diesel engines
- interest free loan to canoes fitted with outboard motors
- subsidy for inboard motors
- subsidy for outboard motors
- subsidy for non-mechanised vessels
- establishment of brackish water fish farming
- subsidy for improvement of village tanks
- establishment of fish seed farms .
- reservoir fisheries development
- increase in fish production
- to generate employment in rural and semi-urban areas
- to further integrated rural development programme involving tribal and weaker sections in fish farming alongwith cropping, animal husbandry, poultry, floriculture, duckery, apiary and piggery.

The Sixth Five Year Plan is having on hand the following fitted schemes for fisheries development in the State:

1. Direction and Administration - strengthening of supervision, planning and statistics
2. Extension-publicity
3. Survey, investigation and exploitation
4. Training of departmental personnel
5. Training of fisher-youths
6. Fish seed production, and augmentation of inland fisheries resources
7. Exploitation of inland fisheries resources
8. Deep sea fishing

9. Marketing of fish through cooperatives
10. Processing and preservation facilities
11. Infrastructural facilities and fish based ancillary industries
12. Mechanisation of fishing crafts, supply of fishery requisites, establishment of service stations
13. Strengthening of cooperatives
14. Construction of buildings, quarters etc.

Besides the Gujarat Fisheries Project aided by World Bank will be implemented till 1982. Thus by the end of VI Five Year Plan, it is envisaged that adequate landing and berthing facilities, transport facilities, increased fish production, trained fishermen and many other developmental projects will lead to bringing up fisheries and fishermen in Gujarat.

3. Fisheries Extension needs for effective implementation of the VI Plan (1980-1985)

3.1. The organisational set up presently existing in the state fisheries extension wing is limited. Hence, in order to have coordinated extension programmes, proposal to have a centralised extension officer of Class-I rank is under consideration.

3.2. Technological needs: The Gujarat Fisheries Aquatic Science Research Institute at Okha having its sub-station at Sikka and the Inland Fisheries Development Station at Ukai have been engaged in devising various technological methods for improving fish catching techniques and to convert trash fish into edible products, and also for rational utilisation of space, time and money in integrated aquaculture activities in inland fisheries. These have been done on laboratory scale and hence this technology is to be transferred to fields by organising and setting up small scale production units and demonstration units.

### 3.3. Linkage required with various organisations

A close and coordinated linkage is absolutely essential with various organisations like C.M.F.R.I., C.I.F.T., C.I.F.R.I. and other organisation like M.P.E.D.A., G.F.C.C.A., and G.A.M.P. The technology and methods developed by other state fisheries departments should also be made known to their counterparts in other states, so as to have inter-state exchange programmes of developmental work. State-wide extension programmes extending over a particular period of the year may have to be implemented in effective manner.

### 3.4. Fisheries educational needs

Presently state fisheries department runs three primary fisheries schools in coastal villages of Kolak, Umarsadi and Bhabhut. Due to limitations of finance, it is impracticable to have fisheries schools in all the coastal villages. However, it is quite possible that introduction of fisheries subject (optional) at primary and secondary school level will bring impressive results in expanding the fisheries education activities in rural areas.

### 3.5. Training of extension personnel and type of training

#### 3.5.1. State level officers

At present there is no programme for having extension training in fisheries at state level except that available in the field of Agriculture. Hence such facilities should be opened in Western Region, comprising the states of Gujarat, Maharashtra, Rajasthan, and Madhya Pradesh. In absence of such facility, the department is deputing the staff to the Central Fisheries Extension Training Centre at Hyderabad.

#### 3.5.2. District/Regional level of officers

#### 3.5.3. Block-level officers

#### 3.5.4. Village-level workers

Presently there is no programmes in fisheries extension in the state.

### 3.6. Training of fishermen

#### 3.6.1. Diversification course in Fishermen Training Centres

In view of the increasing demand of skilled workers in processing units, the department introduced short term training courses for fishermen at the Fishermen Training Centres at Veraval and Porbundar. Besides, operative training programmes in shore mechanic, fishing gear, fishing second hand, etc. have also been introduced. In the field of Inland Fisheries, 2 weeks intensive training programme in Integrated Aquaculture, has been arranged for tribal people with facility of hostel in the vicinity of training centre at Integrated Aquaculture Centre at Ukai,

#### 3.6.2. Training in additional vocations

Training programmes in reservoir fisheries, rural aquaculture, composite fish culture etc. have been arranged at Inland Fisheries Development Station at Ukai for the benefit of rural and tribal population.

#### 3.6.3. Training in fish farming

This is available at the Inland Fisheries Development Station, Ukai, Fishermen Training Centre, Vansada and various fish farms located at Linda (Kheda District), Prantij (Sabarkantha District), Godhra (Panchmahal District) etc.

#### 3.6.4. Training in cooperative management

No specialised training is available at present for fisheries cooperative management. However, general cooperative training units are functioning at various districts to facilitate training in cooperatives.

### 3.6.5. Non-formal education

Excursion-cum-educational tours for fishermen, fish farmers and entrepreneurs, within and outside the state, have been a regular affair. T.V. Programmes on Inland Fisheries have been arranged during the year 1978-79 in certain selected districts, having T.V. coverage.

### 3.7. Improvements in Extension Methods

#### 3.7.1. Demonstrations of technologies

Departmental efforts in this line are presently restricted to exhibitions and publication of pamphlets, through which technology evolved by the research efforts are being demonstrated to interested public, by way of charts, illustrative models and informative dialogue with entrepreneurs. Radio talks by senior officers on specialised field of fish culture and capture techniques, have also been arranged at random.

#### 3.7.2. Fisheries Information Service

The bimonthly magazine of the fisheries department is having a regular feature of "Question-Answers" wherein people and fishermen engaged actively in fishing are posing their problems of general nature in the form of questions. These are being promptly answered by techno-experts, scientists, and administrators etc.

depending upon the type of question. This feature though initiated in recent years, is required to be popularised amongst fishermen, fish farmers, and entrepreneurs to have wide propaganda. Besides, special supplementaries of the local newspapers in local and English languages, should be brought out wherein programmes/progress in the field of fisheries be described for the benefit of local population and to induce them for taking up fishing as a vocation.



Documentaries, film shows and radio programmes exclusively for fisheries should be arranged through Directorate of Audio Visual & Publicity, All India Radio and Doordarshan authorities. A news bulletin for fisheries, on the line of Agricultural News Bulletin being broadcast from All India Radio, be introduced atleast once in a week or so, detailing about fishing season, fish availability, gear to be employed, export market trend, Government assistance etc. An entertainment programme evolved from cultural and social set-up of fishermen-community should also be introduced on All India Radio, which presently broadcast such programmes for agricultural farmers, tribals etc.

### 3.7.3. Audio-Visual aids

The district-offices of the fisheries department in Inland Fisheries Sector, have been supplied with 8 mm portable projectors and a few films. More projectors and fisheries films in local languages, if introduced in all the remaining districts may have a better impact on fisheries development.

### 3.7.4. Proper utilisation of Mass Media

Illustrative big posters, advertisement through banners and educative talk on AIR and T.V. net work should be introduced.

### 3.7.5. Collection, Transmission and utilisation of feed back information

Extension educators and workers should contact the fishermen regularly and try to locate various problems coming in their way. They should also, if possible, try to solve these problems or transmit them to proper authorities for expeditious solutions. Alternatively the extension staff should have ready details about various aspects which can be promptly disseminated to fishermen.

### 3.7.6. Creation of fishermen forum

Though efforts in this line are restricted to certain areas in marine fisheries, it is worthwhile to form fishermen forum at each fishermen dominated village.

### 3.7.7. Monitoring and Evaluation

Any developmental work, if not properly monitored, may not be successful in the long run. At the sametime each type of extension activity like radio-programmes, pamphlet publication, fishermen forum, educative talk etc. should be evaluated at regular intervals so as to find out the lacuna in the programmes; thereby improvement, addition etc. in implementing the programmes in future period can be thought of. Socio-economic survey, educational survey, boat and tackle management survey etc. should be arranged regularly by the statistical wing of the fisheries directorate.

(Paper Drafted by U.L. Wadekar,  
Superintendent of Fisheries (Extension),  
Fisheries Department, Gujarat State,  
Ahmedabad).

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SEMINAR ON FISHERIES EXTENSION

8-10 December 1980, Cochin  
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STATUS OF FISHERIES EXTENSION IN KARNATAKA

Department of Fisheries, Karnataka, Bangalore 560001

1. Present Status of Fisheries Extension

There are no separate and independent schemes in the State as "Fisheries Extension Schemes". However, the extension work in the State is carried out as integrated part of Fisheries developmental activities. There is a post of Assistant Director of Fisheries (Extension) attached to the Directorate of Fisheries, who with the assistance of an artist under him produces Fisheries Wall Posters, charts, display panels and similar items for exhibitions in and outside the State. He also arranges Fisheries film shows in rural areas and, on request, in institutions. There is another post of Assistant Director of Fisheries (Information and Education) attached to the Directorate of Fisheries who arranges various types of training in and outside the State for the departmental staff as well as specialised training with Central Institutes for the marine fishermen boys.

1.1. Fisheries Extension Schemes undertaken

1.1.1. Title and Scope of each scheme

A. Applied Nutrition Programmes

As an extension activity, the State has taken up Fisheries Extension work in propagating and popularising fish consumption as a food for nutrition in 82 Applied Nutrition programme blocks. Fish is raised locally and supplied for feeding purposes to the selected public. In each block there is one Fisheries Extension Officer incharge of the programme. This programme is taken up under the initiation and participation of the Central Government and the UNICEF.

B. Fish Farmers Development Agency

Fish culture extension work is carried out by establishing independent agencies called Fish Farmers Development Agency in 3 districts in the State. (Two are under sanction). This is a Central Government scheme implemented by the State Government. Under this scheme, minor tanks are made available to private fish farmers for fish culture with assistance from Commercial Banks and subsidy from the Agency. Training is arranged by the Agency for intending farmers and necessary technical know-how and guidance are provided for successfully undertaking fish culture on Commercial Scale.

- 1.1.2. -
- 1.1.3. -
- 1.1.4. -

1.1.5. Fishermen Welfare Programmes

Fishermen Welfare schemes are planned and executed as and when required. The major welfare schemes formulated and carried out are Fish Famine Relief Schemes, Rehabilitation and Colonisation schemes, Fishery approach roads, Fishermen Distress relief grant, subsidy and loan schemes for fishing etc. In addition, permanent welfare schemes for the fishermen are also being carried out like the Fishermen Cooperative Societies, Training etc.

1.1.6. Brief descriptions

a) Fish Famine Relief Scheme

In years of fish famine on the coast, schemes are formulated to rescue the fishermen from distressed conditions by providing short term, interest-free, relief measure loans. During the years 1972-73 and 1977-78, relief loans amounting to Rs. 25 lakhs each year were given to fishermen to tide over difficulties created by fish famine during those years.

b) Rehabilitation and Colonisation Schemes

Scheme to rehabilitate poor fishermen by providing financial assistance for construction of houses, procurement of house sites, supply of drinking water etc. in addition to assistance for the purchase of fishing nets and crafts had been implemented from time to time. About 300 fishermen families have been benefitted by these schemes at a total cost of Rs. 8.61 lakhs.

A massive colonisation and professional rehabilitation scheme for 800 poor fishermen families at Tadri in the North Kanara District under Indo-Danish Fisheries Project has been almost finalised. It is expected to start implementation during 1980-81.

c) Fishery Approach Roads

Fishermen in remote fishing hamlets, scattered on the coast were living almost cut off from highways and markets. Fishing centres were not connected with motorable roads. This formed great handicap for the fishermen for marketing their catch and to bargain for better prices. During the past years, the State have constructed 77 fishery approach roads at a total cost of Rs. 32 lakhs. This scheme is being continued depending on budget availability.

d) Distress Relief Grant

A fund has been raised from public and from Government contribution, to give grant to fishermen families which are under distress conditions due to calamities like death, fire or accidents at sea. About 142 fishermen have been benefitted under this scheme to a total amount of Rs. 51,000 so far.

e) Subsidy and Loan Schemes

1. Grant of subsidy on marine diesel engines at 25% of the cost of the engine is given.
2. 25% of the cost of purse seine net subject to a maximum of Rs. 20,000/- per net is given as subsidy.
3. For diversification of fishing, the Rampani operators are encouraged to take up purse seining by granting subsidy of Rs. 30,000 on marine engine, Rs. 30,000 on purse seine net and Rs. 30,000 soft loan through the Fisheries Development Corporation.
4. Subsidy to Gill net units at 25% of the total cost of the boat, engine and nets subject to a maximum of Rs. 12,500 per unit is granted.
5. Subsidy-cum-loan for procurement of fishery requisites subject to a maximum of Rs. 750 per person and Rs. 1500 for groups of fishermen are granted and released through Fishermen Cooperative Societies concerned.

f) Scheme for Infrastructure Development

It is a Centrally Sponsored Scheme for providing infrastructural facilities to fishing villages, like ice plant, water supply, fish drying units, community hall, roads etc. The scheme is implemented at Shiroor in South Kanara District and at Alvekodi, Tengingundi in North Kanara District at a total cost of Rs. 29.65 lakhs.

- 1.1.7. -
- 1.1.8. -
- 1.1.9. -
- 1.1.10. -

1.2. -

1.3. Fisheries Cooperatives

1.3.1. Structure of Fisheries Cooperatives

Cooperative movement in the Fisheries sector in the State is popular and 75% of the marine fishermen are covered under this. A two-tier structure has been formed

in the cooperative movement in the State, that is, primary cooperatives and at district level, Cooperative Fish Marketing Federations.

1.3.2. No. of fisheries Cooperatives

There are 165 primary cooperatives and 4 District Cooperative Fish Marketing Federations in the State with a total membership of 34,280.

1.3.3. Financial outlay

Working capital of these societies totals upto Rs. 28.1 lakhs and Government share capital has totalled to Rs. 10.1 lakhs.

1.3.4. Functions

The State Government provides assistance by way of share capital for increasing the borrowing capacity, in addition to subsidies for the purchase of fishery requisites and marine diesel engines. The two Federations at Mangalore and Karwar have obtained financial assistance from the Agricultural Refinance Development Corporation and the State Government to the extent of Rs. 190.00 Lakhs. This fund was made use of for establishing boat building yards, ice plants, freezing plants, cold storages, canning plants and for construction and launching of 340 mechanised trawling boats. Some societies have raised funds from National Cooperative Development Corporation for diversifying their activities.

1.3.5. -

1.3.6. Management

At the initial stages of growth of the cooperatives managerial assistance is provided by the Government by providing managerial cost. Two Federations at Mangalore and Karwar have been provided with experienced departmental officers to function as General Managers.

Other societies are managed by locally elected members. To coordinate and control the cooperative activities, an Assistant Registrar of Cooperative Society and his staff are attached to Directorate of Fisheries.

#### 1.4. Education and Training

##### 1.4.1. Educational programmes

Specially for the fishermen boys the department was running schools upto the levels of Pre-University Education. There were altogether 53 fishery schools with a total strength of 12,500 students. Later these schools were handed over to the Education Department.

##### 1.4.2. Training Programmes and Facilities

###### 1.4.2.1 General Inservice Training

Inservice training is arranged for the departmental staff at the Fisheries College at Mangalore, Central Institute of Fisheries Education at Bombay, Central Training Institutes at Agra and Barrackpore.

###### 1.4.2.2. Extension Staff Training

Training in Extension service is arranged with the General Extension Training Institute at Hyderabad for the departmental staff.

###### 1.4.2.3. Cooperative Staff Training

Training in Cooperative movement for the departmental staff is arranged by the Central Cooperative Training College at Bangalore, occasionally.

###### 1.4.2.4. Fishermen Training

Poor Fishermen Training Centres are run by the Department in the State, out of which three are for inland fishermen. Formerly there were four marine Fishermen Training Centres in the State. So far 2805 marine fishermen and 1500 inland fishermen have been trained in these centres.



In addition, fishermen boys are selected and sent for specialised courses in fishing at the Central Institute of Fisheries, Nautical and Engineering Training at Cochin and Madras. So far 64 fishing secondhands and 37 engine drivers in addition to a few in other fields have been trained at these centres.

1.5 Information and Communication services: -

1.6 Linkages with other organisations on Fisheries Extension: -

1.7 Organisational set up for Fisheries Extension:

1.7.1 &

1.7.2

Assistant Director of Fisheries  
(Extension)  
; (1 post)

Fisheries  
Extension  
Assistant  
(1 post)

Artist  
(1 post)

1.7.3. The Unit is attached to the Directorate of Fisheries at Bangalore, attending to works assigned from time to time.

1.8 Constraints and Problems in Fisheries Extension:

2. Fisheries Development Programmes envisaged in the VI Plan

(Brief notes on all Fisheries Schemes)

2.1. Construction of Fish Farms:

One of the prime objectives of the department is to become self-reliant in the production of fish seed, a basic requirement for the overall development of inland fisheries in the State. The production of fish seed serves as an index of fisheries development. The physical infrastructure (fish farms) so far built up is totally inadequate to produce the requisite quantity of fish

seed for bringing under fish culture most of the suitable water sheets. Hence, greater importance and priority is attached to the construction of fish farms, both for production and rearing, during the Sixth Plan.

Budget provision - Rs. 96.00 lakhs

2.2. Fish Seed Production, Rearing and Distribution:

Fish seed (spawn) produced in the production farms are reared to fry and fingerling stages in the rearing farms and nurseries constructed at Taluk Headquarters and then transported to various places for stocking in suitable water-sheets. Expenditure on farm equipments, fish feed, manure, packing materials, transportation, vehicle maintenance, cost of petrol etc., are met under the scheme. Budget provision is made taking into consideration the requirement of funds for both the existing farms as well as those proposed to be constructed during the Sixth Plan.

It is proposed to construct 2 more units of the Industrial Estate for Fish Seed Production and let out to unemployed fisheries graduates on hire-purchase basis for self-employment. This measure is expected to augment seed production besides generating ample employment opportunities.

In order to bridge the gap between the actual level of fish seed production and the ultimate requirement for the increased coverage of resources under fish culture, it is proposed to revamp the existing farm set up by the creation and provision of technical officers in the cadre of Assistant Director of Fisheries to some of the potential fish farms so that the fish seed production is stepped up considerably by the adoption of improved management practices.

It is also proposed to sanction 25% subsidy limited to a maximum of Rs. 15,000 per unit for 50 units during the Plan Period. The scheme envisages encouraging private entrepreneurs and fishermen co-operative societies to take up seed production, an economically viable proposition.

Budget Provision - Rs. 100.00 lakhs.

2.3. Development of Reservoir Fisheries:

As per the recommendations of the State Level Reservoir Fisheries Committee constituted by the Government, development of reservoir fisheries will be taken up in Rakaskop, Thonnur Major Tank, Linganamakki, Bachanki and other selected reservoirs. There is vast scope for stepping up employment opportunities and increasing production of fish on an economically sound basis by bringing under intensive fish culture large number of potential reservoirs.

Budget Provision - Rs. 15.50 lakhs

2.4. Development of Riverine Fisheries:

With a view to evolve a suitable strategy for systematic development of riverine fisheries in the 6,000 km stretch of the riverine resources with greater emphasis on the generation of employment for the fishermen folk depending entirely on this as a source of livelihood, the Riverine Survey Unit has already completed the survey of fishery potential of the rivers flowing in Shimoga and Chitradurga Districts and is currently engaged in the survey of the rivers of Mysore, Mandya, Hassan and Kodagu Districts.

Another Riverine Survey Unit sanctioned during May, 1980 is going to take up the survey work in respect of the rivers flowing in Dharwar and Belgaum Districts.

Budget provision - Rs. 7.00 lakhs

2.5. Sports Fishing:

There is vast scope for promoting sports fishing in the hill streams of the State and this will also serve to attract large number of tourists from outside. It is programmed to stock the seeds of sport fishes viz. Trout, Mahaseer, etc., in the selected locations of the rivers and hill streams identified as suitable for the purpose. It is also proposed to construct Boulder dams across hill streams to create conducive conditions for the sport fishes to settle and be available for the anglers.

Budget provision - Rs. 4.00 lakhs

2.6. Construction of Tanks for fish culture:

The existing tanks, both major and minor, have been constructed to cater to the irrigational needs of the surrounding places. Apparently, there are no tanks exclusively for fish culture and the irrigation tanks do pose problems for intensive fish culture or composite fish culture involving supplementary feeding, manuring etc. In order to encourage private entrepreneurs, small and marginal farmers to construct tanks exclusively for fish culture and to promote intensive fish culture practices in the State, it is proposed to sanction subsidy at 25% of the cost of construction of tank limited to Rs. 3,000 under the scheme.

Budget provision - Rs. 5.00 lakhs.

2.7. Assistance to fishermen for procuring fishing requisites, fish seed etc.:

Since the inland fishermen are poor and unable to purchase costly fishery requisites like nylon nets, coracles, etc. they will be given fishery requisite loan through the Fishermen Co-operative Societies to purchase them and a subsidy of  $33\frac{1}{3}\%$  is allowed when the loan is repaid in time. It is also proposed to release  $33\frac{1}{3}\%$  subsidy to the Commercial Banks who have advanced loans to the fishermen for the purchase of fishery requisites.

A large number of small water sheets like village ponds, Kuntas, Gokattes, Kalyanis, etc., are available all over the State and if they are brought under fish culture by the owners or the local bodies, production of fish will increase and sizeable revenue could be realised. To encourage local bodies, Fisheries Cooperatives and private small and marginal farmers to take up fish culture, subsidy on fish seed or renovation of tanks is proposed.

Budget provision - Rs. 15.00 lakhs.

MARINE FISHERIES:

2.8. Mechanisation of fishing craft:

Under the programme of diversification of fishing, it is proposed to sanction subsidy to 35 Rampani units during 1980-81 and 1981-82 to enable them to acquire purse-seines with financial assistance from Commercial Banks. As per the pattern of assistance,

the Rampani units are eligible for subsidy to the extent of Rs. 30,000 on purse seine nets and Rs. 30,000 on marine diesel engines fitted to the purse-seine boats. The Karnataka Fisheries Development Corporation will advance soft loan of Rs. 30,000 per unit and the remaining cost will be met by the Commercial Banks.

It is also proposed to sanction 25% subsidy limited to Rs. 20,000 on purse-seines and subsidy to the extent of 25% of the cost of the cheapest marine diesel engines fitted to the mechanised shrimp trawlers. This measure will serve to increase the coverage of fishermen under the umbrella of mechanisation and boost foreign exchange earnings to the State exchequer.

Budget provision - Rs. 46.00 lakhs.

2.9. Assistance to traditional fishing:

As in the case of inland fishermen, the coastal traditional fishermen, constituting a major fishing force, will be assisted by way of sanctioning fishery requisite loan, 25% of which will be treated as subsidy. With this assistance, being released through fishermen cooperative societies, the poor fishermen will be able to purchase fishery requisites like nylon nets, out board engines, sails, ropes, hooks, sinkers, dug-out canoes, etc.

It is also proposed to sanction 25% subsidy limited to Rs. 12,500 on gill net units in order to encourage fishermen to exploit the highly priced column fishes like seer and pomfret. It is expected that large number of fishermen will take to column fishing augmenting production of quality fish from the marine waters.

Budget provision - Rs. 15.00 lakhs.

2.10. Deep-sea fishing:

With the commissioning of an all-weather fishing harbour at Malpe, it would be possible to operate deep-sea trawlers of 20 metres and above and exploit the hitherto unexploited deep-sea fishery resources. Especially the declaration of 200 mile Exclusive Economic Zone has given impetus to the deep-sea fishing sector.

It is contemplated to pay increasing attention to this potential sector during the Sixth Plan and sanction subsidy at 25% of the cost of the engine to private entrepreneurs so as to enable them to operate the vessels of 20 metres and above.

Budget provision - Rs. 31.00 lakhs.

2.11. Mariculture:

It is proposed to set up a pilot project for brackish water fish and prawn culture with a view to demonstrate the economic viability and the techniques of fish and prawn farming in the kharland areas. Technical know-how will be extended to the needy prawn farmers. This scheme aims at increased adoption of prawn farming techniques to increase the foreign exchange earnings.

In this direction, 16 hectares of Government land has been taken over and acquisition of 70 acres of private land is under way for the construction of a 50 ha brackish water fish farm at Kanasgiri near Karwar. The detailed survey of the brackish water resource potential in the state to help the development of large scale prawn and fish farming is under contemplation.

Budget provision - Rs. 25.00 lakhs.

2.12. Provision of landing and berthing facilities:

Under the Centrally Sponsored Scheme, about 19 landing centres have been constructed in the yester years to provide landing and berthing facilities for fishing boats. Most of them have become obsolete and require maintenance for which Central Assistance is not forthcoming. Hence provision has been made for the same under the scheme. In view of the increasing nature of the fishing fleet year after year the existing landing and berthing facilities are not sufficient and hence, it is proposed to construct new jetties in suitable places along the coast.

Budget provision - Rs. 24.00 lakhs.

2.13. State Fisheries Corporation:

To enable the Karnataka Fisheries Development Corporation to pursue its multifarious programmes in deep-sea fishing, diversified fishery activities, etc., it is proposed to sanction share capital contribution to the corporation.

Budget provision - Rs. 22.00 lakhs.

OTHER SCHEMES

2.14. Processing, preservation and marketing:

Loan-cum-subsidy on 50:50 basis limited to Rs. 50,000 will be given to Taluk Development Boards, Town Municipal Councils, Panchayats and Fisheries Co-operatives who come forward to construct fish markets so as to facilitate the fishermen to market their catches at important centres having considerable market potential.

Budget provision - Rs. 15.28 lakhs.

2.15. Research, Education, Training and Extension:

The Research Unit established during 1979-80 at Bhadra will continue its research activities in respect of breeding and culture of prawns in fresh waters. The proposed Biological Research Station to be established on a sharing basis between CADA and the department will undertake research on several aspects of fish farm management, fish culture etc.

Expenditure in respect of the inland training centres at K.R. Sagar and H.B. Halli will be met under the scheme. Both inservice personnel and private candidates will be deputed outside the state for various training programmes. Inservice fisheries graduates will be deputed to the College of Fisheries, Mangalore, for training leading to M.F.Sc.

Provision is made to publish handouts, posters and booklets on fish culture practices, fish seed production, brackish water fish and prawn culture etc., under the extension scheme.

Budget provision - Rs. 54.00 lakhs.

2.16. Fisheries Administration:

The ministerial staff sanctioned to the Zonal Offices at Shimoga and Karwar will be continued. It is proposed to establish a Technical inspection cell at the Directorate to conduct periodical technical inspection of the sub-offices at all levels so as to bring about qualitative improvement in the Fisheries Administration.

Provision is made for the construction of office buildings at District and Taluk headquarters for the District and Taluk level offices and also for the creation of the posts of Superintendents (Ministerial) for the district level offices in a phased manner. In view of streamlining administration at Zonal levels and to have uniformity in the distribution of jurisdiction, the proposal for the creation of a separate Zonal office for Mysore, Mandya and Hassan Districts is under consideration of the Government.

In addition, it is also proposed to create the posts of Technical Assistance for the District and Zonal offices in order to assist the respective officers in technical matters.

Budget provision - Rs. 35.00 lakhs.

2.17. Tribal Sub-Plan:

Under the special schemes the following programmes are proposed:

A. Inland Fisheries

- a) Training of inland tribal candidates for 3 months in inland fisheries. The trainees will be paid stipend, equipment allowance, subsistence allowance plus T.A.
- b) Supply of fishery requisites worth Rs. 1,200 per group of two trained candidates to seek self-employment.



- c) Assistance to Tribal Co-operative Societies for tank fisheries development at Rs. 200 per acre in the form of fish seed or feed.
- d) Construction of Dormitory at Kabini for providing accommodation facilities to the trainees.
- e) Establishment of a Training Centre exclusively for training tribal candidates.

B. Marine Fisheries

- a) Training of marine tribal candidates for 6 months.
- b) Supply of fishery requisites worth Rs. 6,000 per group of two trainees to help them to pursue the fishing profession.

Budget provision - Rs. 59.00 lakhs.

2.18. Assistance to Fisheries Cooperatives:

Since the financial condition of the Fisheries Co-operatives is not sound, the department proposes to provide financial assistance to the co-operatives in the form of Government share capital contribution limited to Rs. 5,000 per society and managerial subsidy limited to Rs. 1,000 per society.

Provision is also made under the scheme to enable the fisheries cooperatives to purchase transport vehicles, acquire purse-seines and boats etc. under N.C.D.C. Scheme.

Budget provision - Rs. 28.44 lakhs.

2.19. Infrastructural facilities to coastal villages:

This scheme has been transferred to the state for implementation under state plan provision. Hence, provision is made under the scheme towards the various infrastructural facilities being provided in Shiroor and Alvekodi - Thenginagundi coastal villages. The staff sanctioned for the execution of the works will be continued.

Expenditure in respect of the proposed additional staff for the maintenance of ice plants, fish curing yards and service station will be met under the scheme.

Budget provision - Rs. 20.00 lakhs.

2.20. Indo-Danish Project:

The Scheme of international importance proposed to be implemented at a total cost of Rs. 8.0 crores with assistance from the Danish Government is in the final stages of approval by the Government of India. The scheme envisages development of an integrated fisheries project including the activities such as distribution of boats to fishermen groups, diversified mechanised fishing, diversified fish processing and marketing of fish along with colonisation of fishermen families at Tadri in the project area.

Budget provision - Rs. 140.00 lakhs.

2.21. Fishery link roads:

In view of the new landing centres that have come up recently, more number of roads are proposed to be laid along the coast to ensure quicker movement of fish from landing centres to the marketing centres. Similarly, it is proposed to build roads in inland areas, especially in remote fishing centres and villages which will be linked with the highway.

Budget provision - Rs. 29.00 lakhs.

2.22. CENTRALLY SPONSORRED SCHEMES:

A. Minor fishing harbours (Budget provision - Rs. 144.28 lakhs)

a) Minor fishing harbours at Malpe and Honnavar:

These harbours are expected to be completed by March 1981. The staff sanctioned under the scheme will be continued.

b) Fishing Harbour at Mangalore

The work on construction of wharf at Mangalore Port at a total cost of Rs. 45.00 lakhs will be taken up during 1980-81 soon after clearance of the scheme by the State Government.

c) Fishing Harbour at Karwar:

It is proposed to take up the construction of II stage of the Fishing Harbour at Karwar.

B. Fish Farmers Development Agency:

As per the latest revised pattern of assistance of the Central Government, 50% cost of the scheme is to be borne by the State Government from 1979-80 onwards. Hence, provision has been made for meeting the State's share in respect of Fish Farmers Development Agencies of Mysore, Shimoga and Dharwar Districts.

Budget provision - Rs. 18.00 lakhs.

3. Fisheries Extension needs for effective implementation of the VI Plan Schemes

3.1. -

3.2. -

3.3. -

3.4. Fisheries educational needs

To gain technological competency for implementation of Fisheries schemes at different levels and for effective interpretation and application of research results for field execution, professional Fisheries Education is an inevitable must. This is what is critically lacking in the Fisheries sector.

A policy decision at national level on professionalising fisheries education on lines of Agricultural, Engineering and Medical Education is required. This is a pre-requisite for considering any national plans for Fisheries Extension schemes.

3.5. Training of Extension Personnel and Type of Training:

- 3.5.1. ¶ Extension personnel should be well directed,
- 3.5.2. ¶ coordinated and thoroughly informed. For this,
- 3.5.3. ¶ extension personnel must be in a separate set up attached
- 3.5.4. ¶ to the Directorates of all States. So training is required for extension personnel at all levels from State level to Village level workers.

3.6. Training of Fishermen

- 3.6.1. ¶ For all these requirements, the present
- 3.6.2. ¶ facilities available in the country have to be
- 3.6.3. ¶ enlarged and suitably programmed to serve the needs of
- 4.6.4. ¶ the State.

3.7. Improvements in Extension Methods

Basically, planned extension activities do not exist at State Level. A thorough study at National level as well as State level has to be initiated to identify a proper set up required at State level with a resourceful coordinating Central agency for feeding information and appropriate technologies. Monitoring and evaluation must be from a centralised or regionalised source. To achieve effective impact by a purposeful extension service, there must be well-knit coordination in this respect between State and the Central Research Institutions.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980  
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STATUS REPORT ON FISHERIES EXTENSION  
IN ANDHRA PRADESH

By Department of Fisheries, Andhra Pradesh, Hyderabad.

1.1.1. Title and scope of each scheme.

The Fisheries Extension Programme.

1.1.2. Period of implementation.

The Fisheries Extension work was started in Andhra Pradesh for the first time in 30 blocks during 1962-63. It is now being implemented in 51 blocks in the State.

1.1.3. Technology-based Scheme.

The Fisheries Extension work mainly involves technical advice to the fishermen in the use of improved gear etc. and to private pisciculturists, fishermen cooperative societies, in taking up fish culture.

1.1.4. Services-based schemes.

N I L.

1.1.5. Fishermen Welfare Programmes.

Craft and tackle are being supplied at subsidised cost and also help is given in obtaining loans and subsidies under different schemes and from Banks.

1.1.6. Brief description of 1.1.3., 1.1.4. and 1.1.5.

Brief description under 1.1.3.

The Panchayat Samithies can be broadly classified as Inland and Marine with reference to the nature of their water resources. The most important among them is to survey the resources in the samithies to determine the potentialities to plan for their proper utilisation and development.

A. Samithies with Inland water resources:

- (1) Survey of tanks in the blocks and assist the seed requirements.
- (2) Survey of seed resources in the block area and estimate the seed that can be collected locally, and work out the seed that has to be imported from outside for meeting the deficiency in the samithy area.
- (3) To obtain indents of seed required by private parties and arrange to supply the required seed.
- (4) To collect the data of fish production of the selected tanks which have been intensively stocked.
- (5) To guide in the exploitation of the deep waters, when the local fishermen are not able to exploit.
- (6) Establishment of fish farms in the block areas for breeding culturable species in the farms to meet the seed requirements of the area.
- (7) Training programme for fishermen in improved methods of fish preservation and marketing.
- (8) To conduct training programmes for pisciculturists.
- (9) Training programme for village level workers in Fisheries Extension work.

B. Samithies with Marine water resources:

- (1) To work out requirements of crafts and tackles with reference to active fishermen.
- (2) To arrange for the supply of catamarans and boats and nylon and cotton yarn to the fishermen in the block area.

Brief Description under 1.1.4.

N I L.

Brief Description under 1.1.5.

- (1) ~~Recommend for the organisation of viable cooperative societies of the fishermen in the area.~~
- (2) To arrange the running of transport vans, if necessary, and for providing marketing facilities for the fish produced in the block in good marketing centres for ~~getting fair returns for~~ fish.
- (3) To assess the needs like laying of feeder roads, establishment of fish curing yards, cold storages and ice plant etc.,
- (4) Participation in village festivals, fairs and melas.
- (5) Giving loans to fishermen cooperative societies for enabling them to transact business in fishing requisities or marketing of fish.
- (6) Assist the fishermen in obtaining Bank loans.

1.1.7. Source of technology for 1.1.3.

The technical officers of the department of fisheries are posted as extension officers to ~~pass on the technology to the~~ field.

1.1.8. Physical targets and achievements of schemes:

The concerned Assistant Director of Fisheries will fix

the physical targets in each Panchayat Samithy under his jurisdiction under Fisheries sector depending upon the resources available in the samithy. It varies from block to block.

1.1.9. Financial targets and achievements of schemes:

Strictly no financial targets are being fixed.

1.1.10. Impact of schemes on development:

1.1.10.1. On production means (Craft and Gear):

Both on Inland and Marine side fishermen used to depend only on the gear manufactured with organic materials like cotton yarn, jute etc. After the introduction of synthetic twines the fishermen initially resisted in using this material in the fabrication of their nets. Through extensive demonstrations carried out by the extension staff and through supplying of the materials at subsidised cost the traditional materials used in the manufacture of their gear have been now completely replaced by synthetic materials.

The use of mechanised boats was also initially objected to by the traditional fishermen. Through the training programmes conducted and extension work carried out by supplying the mechanised boats at subsidised cost the fishermen have at last got convinced of the need for introduction of mechanised boats in fishing operations. Now there is a great demand both for training and for the supply of mechanised boats.

1.1.10.2. On production:

With the introduction of improved craft and gear as mentioned above the production has improved both qualitatively and quantitatively.



1.1.10.3. Socio-economic conditions:

The introduction of the improved craft and gear resulted in the improvement in the production both in quantity and quality and it has resulted in improving the economic conditions of the fishermen. Prior to the introduction of these improved crafts and gear the fishermen were living mostly in thatched huts. Now in most of the fishing villages we can see both tiled and terraced houses. There is a definite improvement in their mode of living.

1.1.10.4. Service to society:

Schemes introduced in different fields improved the condition of the fishermen. They are forming into cooperative societies and obtaining loans and subsidies under different schemes, and from commercial banks.

1.1.10.5. Infrastructure facilities:

With the improved technology both in methods of fishing and marketing there arose a need for establishment of fishing harbours and processing facilities. These are being attended to under various schemes.

1.1.10.6. Marketing facilities:

The increased production and the consumers demand for fish in fresh condition necessitated in increasing and improving the marketing facilities. These facilities include formation of feeder roads, running (insulated and uninsulated) of quick transport vehicles and establishment of ice and cold storage facilities at selected places.

1.1.10.7. Fishermen Welfare:

On the welfare side nothing much is done by the Fisheries Department, except in arranging some subsidies and loans under different schemes. There are a few fishery elementary schools for imparting education to the fishermen children. There is a need to make substantial provision in the budget of the Fisheries Department or Social Welfare Department to attend to the welfare of fishermen.

1.2. Schemes for fishermen community taken up by departments other than fisheries department (Applied Nutrition, Adult Education, Integrated Rural Development etc.)

N I L.

1.3. Fisheries Cooperatives.

1.3.1. Structure of Fisheries Corporation: (Apex body, District Federation, Primary Societies etc.)

There is no Apex body at State level. However there are two central societies namely (i) Andhra Fishermen Central Cooperative Society Ltd., and (ii) Telangana Fishermen Central Cooperative Society Ltd., including district societies as members of Central societies. The Andhra Fishermen Central Cooperative society with an elected Board headed by Collector, East Godavari district as Chairman is functioning. The Telangana Fishermen Central Cooperative Society is also functioning with an elected Board with a non-official chairman.

1.3.2. No. of Fisheries Cooperatives as per 1.3.1.

Number of Fisheries Cooperatives as per 1.3.1. are as follows:-

1. Central Societies.	2
2. District Societies.	4
3. Primaries.	1343
Total:	<u>1349</u>

### 1.3.3. Financial outlay in Cooperative Sector.

No much head way was made for the development of cooperative fisheries during 1st and 2nd Five-Year Plans. But from 3rd Five-Year Plan financial assistance was sanctioned in the shape of loan and share capital and subsidy to the primary fishermen cooperative societies, District and Central Cooperative societies under various schemes. Being the weakest section of the Society, the fishermen are not in a position to contribute sufficient amount of share capital. Government with the assistance of National Cooperative Development Corporation are strengthening the share capital structure of the societies. The total financial outlay of the societies (paid up share capital) in the State is Rs. 2,51,606/-.

### 1.3.4. Functions:

Central Societies are generally catering the needs of the affiliated primary fishermen cooperative societies and also fishermen in the area as to the supply of nylon yarn and other fishery requisities. Andhra Fishermen Central Cooperative Society is running H.S.D. oil pump and manufacturing A & D vitamin capsules. Telangana Fishermen Central Cooperative Society is supplying fishery requisities and conducting retail fish canteen.

The District societies have undertaken marketing activities. Most of the Primary Fishermen cooperative societies are availing lease facilities on priority basis, over Panchayats etc.

### 1.3.5. Performance:

Most of the societies are not functioning well due to several reasons.

1.3.6. Management:

As already stated one Central Society is functioning at Kakinada managed by the Managing Director of the cadre of Deputy Director of Fisheries and the District Collector, as its Chairman. The other society at Hyderabad is managed by the Managing Director of the cadre of an Inspector of Fisheries and a Board of the Management headed by a non-official Chairman. Both the societies have 3 to 4 nominees of Government in their respective boards, while the rest of the Directors are elected from the Society members.

The Managing Committee members of the Primary Fishermen cooperative society are elected by the General Body and the management is looked after by the Managing Committee headed by President. In case where elected bodies are not existing the management is being attended to by the Person-in-Charge appointed under section 32 (7) of Andhra Pradesh Cooperative Societies Act.

1.3.7. Programme for revitalisation:

Various institutions have come forward to assist fishery development in the State. The National Cooperative Development Corporation, New Delhi, during the year 1976-77 have come up with several schemes for development of fisheries in the country for various purposes such as share capital, purchase of transport vehicles, construction of godowns and purchase of Navas etc. So far a sum of Rs. 42.34 lakhs has been sanctioned by National Cooperative Development Corporation towards share capital, loans and subsidy. The details of financial assistance

sanctioned to various societies are under:-

Share capital	Rs 16.90 lakhs.	for purchase of transport vehicles, navas, oil tankers and insulated vans and for construction of godowns.
Loan	Rs 20.47 lakhs	
Subsidy	Rs 4.97 lakhs	
<hr/>		
Total:	Rs 42.34 lakhs	

Like wise the A.R.D.C., Bombay has also come forward to assist the Andhra Fishermen Central Cooperative Society by sanctioning 45 (10'Mts) mechanised boats fitted with suitable engines under a phased programme. It has also financed a scheme for Rs. 141.25 lakhs for development of fisheries by way of construction of 70 tanks in Kolleru lake area with a total outlay of Rs. 209.26 lakhs, through the Agricultural Development banks. 10% of the total outlay viz. Rs. 20.90 lakhs is met by SC & BC Corporations and remaining Rs.47.08 lakhs is Government contribution.

1.4. Education and Training:

1.4.1. Educational Programmes and facilities (Fisheries Schools etc.)

There are 3 Fisheries elementary schools in the State. They were originally run by the Fisheries Department. Now they have been transferred to the control of the Panchayat Samithies.

1.4.2. Training Programmes and facilities:

1.4.2.1. General in-service training:

In service training facilities are provided in the Fisheries Training Institute, Kakinada. The course is for 6 months.

1.4.2.2. Extension Staff training:

There is no course specially run by the State Fisheries Department. The Central Institute of Fisheries Education, Bombay is running a branch at Hyderabad. Whenever untrained candidates are available they are being deputed by the State Department to this institute,

1.4.2.3. Cooperative Staff Training:

There is a regular course of Higher Diploma in Cooperation for a period of 9 months conducted by the Cooperative Training Course, Rajendranagar, Hyderabad run by the National Cooperative Union of India. The Fisheries Departmental officers are also being deputed to this Training.

1.4.2.4. Fishermen Training (Fishermen Training Centre etc.)

There are 2 Marine Fisheries Training institutes run by the State Department of Fisheries. Training is for 12 months. During the period of training candidates are paid a stipend of Rs. 75/- p.m. 75 candidates in the F.T.I., Kakinada and 20 candidates in the F.T.I., Machilipatnam are being trained annually.

There are 3 Inland Fisheries Training centres run by the Department of Fisheries, Government of Andhra Pradesh. In each training centre 3 batches are trained during the period of one year. The period of training is 3 months. There is a provision to admit 20 candidates on stipendary basis and 20 candidates on non-stipendary basis in each batch of each institute. During the period of training candidates admitted on stipendary basis are paid at the rate of Rs. 75/- per month.

1.4.2.5. Non-formal Education:

N I L.

1.5. Information and communication services:

At present this is attended by personal contact only.

1.6. Linkages with other organisations on fisheries extension:

There is no separate extension wing in the Department of Fisheries except the Extension Officers working in selected blocks. Hence there is no centralised linkage of Fisheries extension with other organisations. The Director of Fisheries will get the information on different aspects and communicate to the Extension Officers for their guidance and implementation.

1.7. Organisational set-up for fisheries extension:

There is no separate Fisheries extension set-up in the Department. The extension officers assisted by one fieldman and two fishermen appointed in the block look after the fisheries activities within the block limits.

1.8. Constraints and problems in Fisheries extension:

A separate fisheries extension wing should be established in the department of fisheries to look after the extension programmes in the State. There should be a separate, extension wing attached to the Directorate of Fisheries. There should be special budget to meet the expenditure on the staff and on the publicity and extension material. Each extension officer should be provided with a good library to keep himself in touch with the development in different fields. Frequent seminars should be conducted for exchange of views and for laying down procedures of pattern of extension to be undertaken.

At present the Extension officers are working under the technical control of the Assistant Directors of Fisheries and Administrative control of the Block Development Officers. Instead it is desirable that the extension officers work under Assistant Director of Fisheries both for administrative and technical purposes. In certain blocks there may not be full time work for the fisheries extension officer; in such cases we may keep one extension officer in charge of 2 or 3 blocks according to the necessity.

2. Fisheries development programmes envisaged in the Sixth Plan schemes:

An outlay of Rs. 25 crores is projected under fisheries schemes in Sixth Five Year Plan. List of schemes with outlays proposed is given below:

SIXTH FIVE YEAR PLAN SCHEMES AND ALLOCATIONS

S.No.	Name of the Scheme	Outlay (Rs in lakhs)
1	2	3
1.	<u>World Bank Aided Projects:</u>	
	a. Fishing harbours	257.000
	b. Fishing vessels	18.700
	c. Roads	326.700
	d. Sea Food Processing plants.	30.000
2.	Fishing harbour at Bhavanapadu (Centrally Sponsored Scheme)	74.517
3.	Fishing Harbour at Krishnapatnam.	
	a. Fishing harbour	115.000
	b. Roads	150.000
	c. Fishing vessels	15.000
	d. Processing facilities	30.000
	e. Marketing	26.610



S.No.	Name of the Scheme	Outlay (Rs in lakhs)
1	2	3
4.	Konaseema Project (S.I.D.A)	
	a. Roads	100.000
	b. Others (inputs, Processing plants etc.)	40.000
5.	Fishing Harbour at Machilipatnam.	14.000
6.	Revival of Canning Plant at Kakinada.	0.500
7.	Out-board Motor servicing facilities.	1.000
8.	Share capital contribution to A.P. Fisheries Corporation for Deep Sea Fishing trawlers.	100.190
9.	Supply of Nylon yarn to Marine fishermen.	15.000
10.	Adoption of active fishermen (traditional fishermen families)	170.000
11.	Net fabrication units	1.000
12.	Fisheries Training Institute, Machilipatnam	18.507
13.	Provision of Guide lights.	11.250
14.	Share capital assistance to A.P. Fisheries Corporation for acquiring trawlers from Gujarat.	20.000
	<b>Marine Fisheries Total:</b>	<b>1534.974</b>

**II. INLAND FISHERIES:**

1.	Improvements to Departmental fish seed farms	262.158
2.	Construction of new fish seed farms.	83.250
3.	Staff for fish seed farms (Mylavaram, Gajuladinne and Chittoor).	12.970

1	2	3
4.	Training facilities to encourage fish farmers in private sector.	1,800
5.	Establishment of Fisheries Training Institute at Badampudi.	3,250
6.	Assistance to private pisciculturists.	37,260
7.	Establishment of Fish Farmers Development Agencies (Centrally Sponsored Schemes)	
a.	Existing Fish Farmers Development Agencies.	36,400
b.	New five Fish Farmers Development Agencies (Srikakulam, Guntur, Medak, Nizamabad, Chittoor Districts).	64,400
8.	Supply of Nylon yarn to Inland Fishermen (Medak district).	1,450
9.	Deputy Director of Fisheries (Lakes and Reservoirs)	2,000
10.	Development of Reservoirs (Nizamabad district)	0,500
	Inland Fisheries Total:	505,438
<b>III. BRACKISH WATER FISH FARMING:</b>		
1.	Joint Director of Fisheries	3,135
2.	Brackish Water Fish Farming including survey staff (Centrally sponsored scheme)	168,520
3.	Assistance to Andhra Pradesh Fisheries Corporation for Brackish water fish farming	6,600
	Brackish Water Fish Farming Total:	178,255

1	2	3
<b>IV. OTHERS:</b>		
1.	Strengthening of Fishermen Cooperative Societies (N.C.D.C)	22.920
2.	Supply of transport vans.	29.320
3.	Supply of vehicles to the Departmental officers.	26.000
4.	Publicity	10.000
5.	Appointment of Fisheries Extension Officers	57.263
6.	Additional staff at Head office.	2.250
7.	Ice plants and Cold storages	27.800
8.	Staff for Hyderabad Urban and Vijayanagaram districts.	12.280
9.	Improvements to office accommodation at Head office	30.000
10.	Installation of Inter-tele-communication	0.500
11.	Strengthening of Share Capital of A.P. Fisheries Corporation	60.000
12.	Scheduled Castes and Scheduled Tribes schemes.	3.000
	<b>Total:</b>	<b>281.333</b>
	<b>Grand Total:</b>	<b>2500.000</b>

3. Fisheries extension needs for effective implementation of the VI Plan schemes.

3.1. Realistic organisational set up for fisheries extension at different levels and coordination:

It is desirable to keep the extension officers under the administrative and technical control of the Assistant Directors instead of Block Development officers. But in certain blocks there may not be full time work for a Fisheries Extension Officer. In such cases it may be considered to make the Extension officer responsible for 2 or 3 blocks according to the needs.

3.2. Technological needs:

The Officers engaged in extension work should be frequently exposed to the latest development through seminars etc.

3.3. Linkages desired with various organisations:

As the Fisheries programmes are closely associated with agriculture, animal husbandry and cooperation, it is desirable to maintain a linkage with these organisations also.

3.4. Fisheries Educational Needs:

As far as aquaculture programmes are concerned every farm must be able to impart training to the farmers in the aquaculture programmes.

3.5. Training of Extension personnel and type of training:

3.5.1. State level officers

3.5.2. District/Regional level officers.

3.5.3. Block Level Officers.

3.5.4. Village level workers.

At present only Block level officers exist in the State. It is desirable to create an extension wing with all the levels of officers indicated from 3.5.1. to 3.5.4.

3.6. Training of Fishermen:

3.6.1. Diversification course and fishermen training centres.

There is scope to improve these courses.

3.6.2. Training in additional vocations:

Training in additional vocations does not exist in the State.

3.6.3. Training of fish farmers:

2 Fish Farmers Development Agencies have been established under the centrally sponsored scheme. The Inland fisheries training Institutions aim at imparting training to the fish farmers.

3.6.4. Training in Cooperative management:

At present the Director of Fisheries is Ex-Officio Registrar of Cooperative Societies; the Deputy Director of Fisheries is Ex-Officio Joint Registrar and the Assistant Director is Ex-Officio Deputy Registrar. Cooperative Sub-Registrars and Junior Cooperative Inspectors are taken on deputation from the Cooperative Department.

3.6.5. Non-formal Education:

Does not exist in the State.

3.7. Improvement in extension methods:

3.7.1. Demonstrations of technologies:

It is being done on small scale both on inland and marine side.

3.7.2. Fisheries information service:

Fisheries information service needs improvement.

Departmental Inspectors are taken on deputation from the Cooperative Department.

3.7.3. Cooperative extension:

Cooperative extension is being done on small scale.

3.7.4. Cooperative extension:

3.7.3. Audio-visual aids:

It is being attended to on a small scale.

3.7.4. Proper utilisation of mass media:

N I E.

3.7.5. Collection, transmission and utilisation of feed-back information:

To be organised.

3.7.6. Creation of Fishermen Forum

To be created.

3.7.7. Monitoring and evaluation:

To be set-up.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980

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STATUS REPORT ON FISHERIES EXTENSION IN ORISSA

BY M. M. MOHANTY, I.A.S.,

Director of Fisheries, Orissa, Cuttack

1. Present status of fisheries extension

1.1. Fisheries extension scheme undertaken

1.1.1. (i) Fisheries Extension Programme (F.E.P.)

This is the main scheme implemented by the Fisheries Department covering mostly the inland sector of the state. Data on brackish water and marine sectors are also collected through its personnel as and when need arises. Basic work is also done for other loan and assistance schemes by the Fisheries Extension Officers.

(ii) Survey in brackish water (S.B.W.)

The scheme aims specifically at identifying the brackish-water areas available in the state and drawing up plan and programmes for the development of these areas through private sector. In fact, the dissemination of information is done through the F.E.P. personnel though the individual schemes are prepared and sponsored through this.

(iii) Development<sup>of</sup> marine fisheries

The main object is to survey the marine fishing prospects in the sea adjoining the state and then invite private entrepreneurs to get into marine fishing with mechanised boats. It helps

them in preparing feasibility reports and drawing bank loan.

(iv) Assistance to Traditional Inland Fisheries (A.T.I.F.P.)

The scheme aims at raising the economic conditions of inland fishermen by arranging loan from financing institutions and subsidising the same from its own budget for the reclamation of tanks and providing inputs for pisciculture. Boats and nets with loan and subsidy are also arranged for those doing fishing in rivers, reservoirs and tanks.

(v) Assistance to Traditional Marine Fishermen (A.T.M.F.)

The scheme is to assist the needy marine fishermen with loan from banks and subsidy from the department to acquire boats and nets for taking up fishing in river mouths, estuaries and sea.

(vi) Marine Fisheries Development under A.R.D.C.

Specific marine fishing co-operative schemes with A.R.D.C. refinance are covered under this. Schemes are prepared, sponsored and monitored from the Directorate though for each scheme one Project Officer of middle order administration is posted.

(vii) Construction of fishery Jetty and Harbours

This extension biased scheme is prepared, sponsored and executed by the Directorate in collaboration with other works departments of the State Government.

(viii) Infrastructure to fishing villages

The Directorate takes up the responsibility of constructing approach roads, ice-plant, jetty, fish landing platforms etc. in important marine fishing villages for the expansion of mechanised fishing in that sector.



(ix) Survey and Investigation

It is confined to survey and investigation of suitable water areas for converting them in to fish farms.

1.1.2. (i) Fisheries Extension Programme 1961-62

In fact, it is the continuation of the scheme "Village Reclamation Scheme" operating since the formation of separate Directorate in 1955 to help the G.P.s to procure fry and net-out their tanks. The scheme has been strengthened from 1978-79 with more budgetary allotment and posting of staff to cover almost all the areas which are of importance from fisheries point of view.

(ii) Survey in Brackish Water 1978-79

(iii) Development of Marine Fisheries 1957-58

(iv) Assistance to Traditional Inland Fisheries 1970-71

(v) Assistance to Traditional Marine Fishermen 1970-71

(vi) Marine Fisheries Development under A.R.D.C. 1972-73

(vii) Construction of fishery jetty and harbour 1972-73

(viii) Infrastructure to fishing Village 1972-73

(ix) Survey and investigation 1955-56.

1.1.3. From serial no.(i) to (vi) and (ix) covered under 1.1.1. and 1.1.2.

1.1.4. Serial nos. (vii) and (viii) described under code nos. 1.1.1. and 1.1.2.

1.1.5. No Fishermen Welfare scheme is being implemented now. But, two schemes in collaboration with Norway and U.K. are under processing.

1.1.6. Already given under code No. 1.1.1.

1.1.7. Source of technology

For crafts and gear we depend on the designs and specifications recommended by C.I.F.T. For inland and brackish water extension schemes, our departmental information acquired through findings in laboratories and field along with the recommendations of C.I.F.R.I. form the base.

1.1.8. Targets and achievements vary from period to period under and different schemes depending on the sectoral demand that arises from time to time.

1.1.10. Impact of Schemes

1.1.10.1. Now mechanised fishing vessels run by individuals for marine fishing is around 500. But, the same was nil even till 1972-73.

Almost all the traditional fishermen of the state are using nets made of synthetic twine. The owners of mechanised boats are not only using synthetic twine but also have adopted the design and specifications given by the department for all the gears and their accessories.

1.1.10.2.	<u>Year</u>	<u>Total fish production</u>
	1964-65	20,000 M.T.
	1978-79	61,000 M.T.

1.1.10.3. The fishermen whether by birth or by profession are no more prepared to accept every thing by lying low. He has now amassed courage to demand his right. This confidence in him to fight the establishment is certainly due to the enhanced economical conditions achieved through our extension schemes.

- 1.1.10.4. Now the high ups in socio-economic strata have come forward to take up fishing/pisciculture as means to raise their financial condition.

In fact, the bunch of qualified young boys in fishing/pisciculture/trade is no more considered as a prodigal son of a rich/influential father.

- 1.1.10.5. Infrastructure facilities have already been extended to fishing bases located at Kirtania, Chandipur, Adhuan, Dhamara and Paradeep. Development of facilities in Kasafal, Chaumukh, Balitutha, Astarang and Gopalpur is in the offing.

- 1.1.10.6. The middlemen are still dominant in the marketing field even though the department has done a lot through its Co-operative and infrastructure schemes. The marketing facilities provided have in fact helped the traders in line to expand their activities.

But, the "man" in fishing is at least getting a better price for his "catch" because of nearness to the competitive market flooded by outside merchants.

- 1.1.10.7. Fishermen Welfare: Though nothing tangible is noticed, in certain pockets the traditional and professional fishermen are forming themselves into groups and are trying to help the weaklings among them. The groups are also trying to avail the facilities offered by the Government through other departments like Works, Public Health, Education and Family Planning etc.

- 1.2. Scheme for fishermen community taken up by departments other than fisheries department:

- 1.2.1. A.N.P. - Through C.D. and Welfare Department and B.D.Os.

Adult education - Education department.

I.R.D. - CADA, S.F.D.A., I.T.D.P., D.P.A.P. & F.F.D.A.

Tribal Fishermen Development - I.T.D.P.

E.R.R.P. - B.D.Os. and District level Fisheries Officers.

However, for all the aforesaid fisheries schemes technical advice is given/utilisation checked up by the fisheries personnel posted in block, district and state level. Even a portion of the budgetary allotment is placed with this Directorate to implement specific schemes needing high technical know-how.

- 1.2.2. Excepting the A.N.P. and Adult Education Programmes which are "Welfare - biased" all others aim at raising the economic condition of fishermen community through higher production.
- 1.2.3. All these have helped in raising the socio-economic conditions of the weaklings of the community who were striving hard for much needed finance to replace/remodel their crafts and gear.

### 1.3. Fisheries Co-operatives

- 1.3.1. Apex body - Only one is functioning for the development of Chilka - fisheries alone.

District Federation: None has yet been formed.

Primary Societies: Only Primary Fishermen Co-operative Societies are functioning formed for specific schemes either covering a vast inland water (tank/reservoir) or a marine base. P.F.C.S. are also formed for specified areas covering one or more fishery-sairats given on lease for one or more years by the Revenue Department.

1.3.2. Apex body - Only one for Chilka Lake.

District Federation - Nil

Primary Societies - 441 nos. registered.

1.3.3. At present the total outlay under Co-operative Sector is only Rs. 4.0 lakhs per annum which shoots up depending on Co-operative Societies for meeting their managerial and other requirements. For Sixth Plan we have proposed an allotment of Rs. 164.0 lakhs.

1.3.4. Only 286 out of 441 P.F.C.S. are functioning and the rest are in moribund state. All of them are primarily for capture fisheries and their fisheries activities are confined to fishing operations either in specified marine or inland sectors.

1.3.5. Only 286 of 441 P.F.C.S. registered are functional. But the performance of almost all the Societies settled with fishery sairats is not satisfactory. They just continue fishing without any will or programme for the development of the fishery leased out to them. The societies formed for the development of tank fisheries with intensive pisciculture have started showing some encouraging results. The Societies formed for the mechanised fishing in sea though functioning well are yet to come up to our expectation.

1.3.6. The P.F.C.S. are managed by a Board elected by the members. One of the members acts as Secretary of the Society.

The Societies sponsored by the department for some specific schemes are provided with a technical man to function as Project Officer and he also acts as the Secretary and works under the guidance of the elected board.

Registration, evaluation, monitoring and audit etc. of fishermen Societies are controlled from the Directorate through one Deputy Registrar of Co-operative Societies who assists the Director who has been vested with the power and functions of Additional Registrar of Co-operative Societies by the Government for the purpose of the management of Fishermen Co-operative Societies.

- 1.3.7. For better management and supervision of P.F.C.S.s, the District Level Fisheries Officers would be vested with the powers of A.R.C.S. and would be provided with S.A.R. for assistance. The Co-operative cell at the Directorate is also being strengthened to cope up with the increased activities and powers. Our VI Plan projected requirement is Rs. 164.0 lakhs.

1.4. Education and Training

- 1.4.1. Educational programmes Nil at present.
- 1.4.2. Training programmes
- 1.4.2.1. Fisheries Training Institute, Balugaon for Fishery Extension Officers and Deputy Superintendent of Fisheries.  
F.T.I., Cuttack - For Village level field workers.
- 1.4.2.2. Extension staff training: F.T.I., Balugaon.
- 1.4.2.3. Cooperative staff training: Co-operative training institute, Bhubaneswar, managed by the Co-operative department.
- 1.4.2.4. Fishermen Training: Chandipur, Dhamara, Paradeep and Ganjam for fishermen from marine sectors. All the F.F.D.A.s train up fishermen from inland sector for the management of tank fisheries.
- 1.4.2.5. Non-formal education: Village leader training camps and Adult Education centres arranged by B.D.Os.

1.5. Information and communication services

- 1.5.1. Type of information: Generally recent findings in inland pisciculture is regularly provided to tankowners through different agencies.

Our communication with the fishermen in marine and reverine fisheries sectors is very weak. Coverage of fishermen in brackish water fish farming is only of recent origin. We are attempting to popularise culture of brackish water fishes and prawn culture amongst this fishermen living in estuarine areas.

- 1.5.2. Mode of communication: Popular literature in form of attractive pamphlets and brochures.

Film-shows in melas, exhibitions and fishing bases.

Radio-talks on different topics in Rural Forum.

Demonstration plots and intermittent/final nettings in presence of local fishermen and Officials.

- 1.5.3. Impact: Tank fisheries has become a craze with the tank owners/ lease holders.

Marine fishing with improved gears and mechanised vessels has also become popular.

Brackish water fish farming is yet to take-off.

1.6. Linkages with other organisations

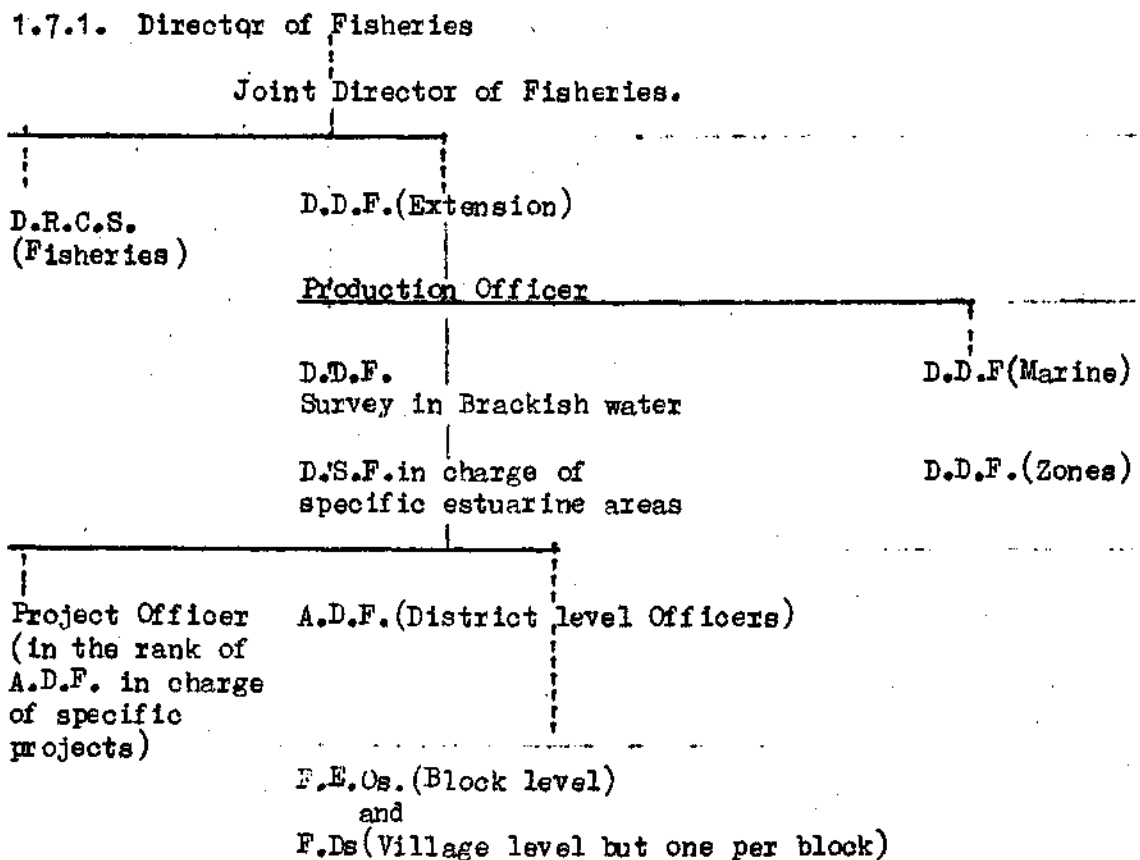
- 1.6.1. With Central Organisations: Nil at the present

- 1.6.2. With Research organisations: K.V.K. and T.T.C., Kausalyagang, Puri District.

C.I.F.R.I., Cuttack and Barrackpore.

C.I.F.T., Cochin.

- 1.6.3. With Fisheries Educational institutes: C.I.F.E., Bombay;
- 1.6.4. With Training institutes: C.I.F.N.E.T., Cochin;  
F.T.C., Agra/Hyderabad.
- 1.6.5. With Financing institutions: N.C.D.C., A.R.D.C., L.D.B.S.,  
Co-operative Banks and Nationalised Banks.
- 1.6.6. With Cooperatives: N.C.D.C.
- 1.6.7. With other organisations: Revenue, Gram-panchayat, Irrigation  
and Urban Development Departments of the state.
- 1.7. Organisational set-up for fisheries extension:





1.7.2. No. of extension personnel in each cadre:

- 228 - F.D.S, one in each block.
- 228 - F.E.Os, one in each block.
- 13 - A.D.Fs., one in charge of a district.
- 4 - Project Officers in charge of 4 Marine fishing Projects.
- 3 - Zonal Deputy Directors.
- 2 - One each in charge of Marine and Brackish water schemes.
- 1 - D.D.F. (Extension) attached to D.F. (0).
- 1 - Joint Director attached to D.F. (0).

1.7.3. Location and jurisdiction: One F.E.O. in each block looking after the fisheries interest of the whole of the block.

The A.D.F. in charge of the district supervises the activities of the F.E.Os posted in his district.

The Project Officers look after the functioning of the particular project.

The Deputy Director (Zonal) looks after the progress of F.E.P. in the districts of his zone.

The Deputy Directors, Brackish water and Marine placed at headquarters level monitor the progress made in their respective disciplines.

The Deputy Director(Extension) evaluates and monitors the progress made under Fishery Extension programmes and other extension-biased schemes of mainly inland sector.

The Joint Director at the Directorate level supervises all the extension-biased schemes in operation in all the sectors. The Joint Director is directly responsible to the Director of Fisheries.

1.8. Constraints and problems in fisheries extension:

- 1.8.1. Technological: Our knowledge in recent development and achievements in brackish water fish farming is next to negligible. So we cannot advise the fish farmers of this sector with confidence even though vast low-lying saline areas are available in the state.

The resources of sea around this state have not yet been surveyed in detail and the State Government with its limited resources cannot afford to get into this heavy capital based programme. Some central organisation should come up to fill up these technological know-how gaps.

- 1.8.2. Inadequacy of personnel: We have posted 228 F.&Os in 314 blocks and are contemplating to post 30 Sub-divisional extension officers in 30 out of 57 Sub-divisions. But, there is no training institute in the state to cope up with the demand for training such a vast number of middle order extension workers within a short time. In one session of 10 months only 40 of them can be trained up in our state institution.

For imparting refresher course to in-service extension workers the state Fisheries Department offers no facility.

The Centre should come out to help in training the extension workers.

The middle order officers of supervisory capacity have of course been trained at C.I.F.E., Bombay/C.I.F.R.I., Barrackpore.

Difficulty is also faced in recruitment and training of village level extension workers.

1.8.3. Already given in 1.8.2.

1.8.4. Already given in 1.8.1.

1.8.5. Financial constraints: There is no dearth of funds as the State Government is laying stress on extension services for effective implementation of all the bankable schemes financed/subsidized by different banks/Agencies.

1.8.6. Performance gaps: Because of dearth of extension workers at block and village level we are not able to reach the physical targets fixed for the development of water bodies even though there is plenty of it available and financing the same being no problem.

1.8.7. Social: Fishermen by birth are socially backward and need a lot of persuasion and man-to-man dialogue to cast off their inferiority complex.

But, where is the manpower to tackle the teeming mass of fisherman?

1.8.8. Economic: Economically, the fishermen community as a whole is below poverty line. Because of that the financing institutions are reluctant to finance the traditional fishermen though they come forward to cover the ones from upper socio-economic strata willing to take up fishing/pisciculture as profession.

1.8.9. Policies: The Government has taken some policy decisions with a view to help the poor fishermen from all sectors.

But, because of some flaw in the executive order the ones who are socio-economically strong are debarring the needy and poor members of fishermen community from the benefits.

The amendment of G.P. act allowing fishermen to take G.P. tanks on long-term lease or the executive order allowing settlement of fishery sairats with F.C.S. and many other decisions of the Government intended to help the poor fishermen have not produced the expected results.

Everything can be put back on the right track if the fishery personnel, specifically the F.E.O., is allowed to have a greater say on the matter and is granted status in terms of pay, power, facilities and ability.

Now the time is ripe to consider if the F.E.O. can be allowed to act independent of the B.D.O. in his area of operation.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980

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PROGRESS OF FISHERIES EXTENSION SERVICE IN ORISSA

By J.C. Roy

Fisheries Department, Cuttack-7, Orissa

Orissa being a maritime State in the eastern sea-board of India, transfer of technology is possible in all the three sectors of fishery development, i.e. Inland fresh water, Brackishwater and the Marine sector. But before dealing on it at length, it would be appropriate to relate the genesis of extension set-up in Orissa State vis-a-vis, the Central Organisation. In 1928, the Royal Commission on Agriculture (RCA), being aware of the backwardness in agriculture production, recommended that modernisation of fishing was to be brought about by research, extension and greater co-ordination of various departments dealing with agriculture and development of co-operative institutions. In 1950, the development of fisheries was included under integrated production programme for production of subsidiary food for the nation. The Krishnamachari Committee on Grow More Food enquiry recommended in 1952 setting up a country-wide extension service organisation.

2. According to the National Commission on Agriculture (NCA), the net profit per tank was the highest in Orissa. But most of the tanks and other water bodies are revenue-owned. After the formation of Community Development Organisation in Orissa in October 1952, it was observed that the Gram Panchayats do not possess adequate non-taxable income source. In cognizance of this fact, the Revenue Department transferred the fishery right of all the tanks and small reservoirs (locally called Kata or Munda) to the Gram Panchayats for the purpose of piscicultural development. But that poverty cannot be removed by mere distribution of wealth or assets to those ignorant of production technique, soon became clear. To that was added, lack of funds for resource development. Therefore, in the

concluding year of 2nd Five-Year Plan and through the 3rd Five-Year Plan period, Rs.3 lakhs was allotted as out-right grant to each Block for shaping the tanks. Apart from this, a sizable amount was sanctioned to a large number Panchayats out of Kendu Leaf grant to take up pisciculture. To assist the Panchayats to improve the tanks, 52 Fishery Extension Officers were posted to important Blocks of the State in 1961 under the Scheme, "Supervision" though there are in all 314 Blocks with 3830 Gram Panchayats. Evidently, in the first stage, the extension coverage was far from adequate and there was no centralised organisation to monitor the progress.

3. Besides this extension support, three projects (Pipili, Dighahandi and Barpali) belonging to the Panchayats in three Revenue Divisions of the State were reclaimed and put to pisciculture out of a scheme "Village Reclamation Service", as a demonstration measure before handing them over to the concerned Panchayats. Although the entire expenditure was borne by Govt., it failed to whip up extrinsic motivation, except in the case of Dighahandi Panchayat.

4. Meanwhile, research continued to be conducted on improving the methodology of spawn, fry and fish production by both Orissa State Fisheries and ICAR.

5. A hold step was then taken to strengthen the Extension Service in the State during the annual plan period of the post Fifth Five-Year Plan when the result of Indo-Canadian intensive programme implanted intrinsic motivation among the individuals though the Panchayats, in general, as per the observation of NCA, failed to respond to the specific tasks assigned to them. Therefore, the need arose to feel the pulse of the individual entrepreneurs. An appraisal of the rural consciousness towards pisciculture revealed the following four categories of attitude:

- i) With intrinsic desire but unaware of the technology.
- ii) Sitting on the fence and bidding time.
- iii) Requiring lot of pin-prick to be brought to pisciculture fold.
- iv) Apt to mishandle pisciculture programme though major portion of water bodies are with them.

6. Against this background, Fisheries Department considered the report of the Royal Commission on Agriculture, 1928, which pointed out that "a country in which illiteracy is widespread as it is in India, ocular demonstration is the best method to convince the cultivating class". In the year 1958, Nalagarh Committee recommended the creation of technical group in every district to assist the District Agricultural Officer in formulating crop production programme. Subsequently the National Commission on Agriculture observed that the technical group in the district had very little involvement in the field programme. They further observed that the extension work in India did not have adequate effect of demonstration among the people and that Extension Directorate in the Centre was functioning in isolation.

7. Fisheries Department kept all these observations in view before launching a proper and massive extension programme in 1979. But prior to that, in pursuance of the recommendation of NCA, the Fisheries Department started demonstration of intensive fish production in Govt. tanks but it could not have the desirable effect on the mass as they were recalcitrant to visit the department farms. As such, these demonstration spots turned out to be the show piece for Programme Administrators.

8. Therefore, from 1978, the demonstration programme providing free inputs was adopted in the private tanks, to which there has been sufficient response from the pisciculturists. Thus, as a promotional programme, this type of demonstration proved much successful.

9. But to match with the emotional upsurge of the people, it was observed that the private pisciculturists did not have adequate water bodies to take up pisciculture. To combat this problem, Govt. of Orissa at the instance of State Fisheries Department, amended clause 86 of the G.P. Act by which the tanks in possession of the Panchayats can be given on long-term lease up to ten years to the private individuals. In response to this, 4728 tanks spread over all the 13 districts of the State were identified in 1979 for

the purpose, by which about 2400 ha of tanks could be selected for intensive pisciculture to raise the production of freshwater fish by 4000 tonnes.

10. One hurdle in the way of improving pisciculture is the adequate financial resource. Meanwhile, Fish Farmers Development Agency (FFDA) has been established in 7 Districts of the State out of Central Assistance and 2 out of State Govt. budget. Besides these, a Fish Seed Corporation has been established with IDA assistance. Though the mechanics of formation of these autonomous bodies is based on an all-India Strategy, Fisheries Department refashioned their modus operandi to suit the regional needs. Engineering personnel and Extension Officers provided in the FFDA prepared estimates both for the improvement of the tanks and for input requirements. In non-FFDA districts, the Extension Officers themselves prepared the estimates on both the aspects and submitted them to the financing institutions for sanction of loan.

11. By any standard, this is a crucial job requiring a closely-woven extension net work with an alert Central organisation to have proper monitoring. To achieve that, a scheme, "Fisheries Extension Works" was introduced in 1979 and 228 highly qualified Fishery Extension Officers were appointed. At the Directorate level one Senior Class I Officer was posted to monitor the progress. Besides him, the Director of Fisheries and the Zonal Dy. Directors rather too frequently conducted field supervision. A monthly review of progress made by Extension Officers is conducted in the District Offices. Since for efficient functioning of extension machinery a good lot of co-ordination is necessary with other Departments, Collectors of the District are at times requested to attend the monthly FEOS conference where inter-departmental problems are sorted out.

12. Each FEO is assisted by two Village Level Fishery workers who are constantly in the field to assist and advise the pisciculturists. Thus right from the pisciculturist up to the Directorate level, no strata gets the chance to lament in isolation.



13. Though ICAR advocates a production of up to 9 tonnes of fish per ha, it goes without saying that proper psychic built-up of the pisciculturist aided with high cash flow, training etc. are sine qua non to maximise production. In a wide ranging circumstance, it is fantastic to expect them. Hence, in spite of a world of logic-knowledge, it had cold response from the mass. Therefore, the Fisheries Department, by intensive applied research, developed a low-cost technology to attain a threshold level production of 1.5 tonnes of freshwater fish at a maximum investment of Rs.5000 per ha. On an adaptive scale, this technology, tried in different agro-climatic conditions of the State, yielded a production of 2 tonnes of fish per ha depending on site factor. Case histories of a large number of tanks are now under compilation and will be circulated among all State Fisheries Departments. In fact, one issue of experience paper of research workers of this Department has already been circulated. More are in the pipe line. Since the low-cost technology advocated by Orissa State Fisheries is associated with high BC ratio and IRR, it has received enthusiastic response from the pisciculturists. Though the production is less, it is encouraging as it has propensity for growth.

14. Out of the estimate prepared for pisciculture, 25% of expenditure is awarded as subsidy to the Small Farmers while Marginal Farmers and Agricultural labourers are entitled to  $33\frac{1}{3}$  % subsidy. The quantum of subsidy to the Tribals is 50%.

15. Fisheries Department did not fail to consider the case of those with extrinsic motivation, since the task before the Department is to bring 26,000 ha of water bodies under intensive pisciculture of which, in the primary phase, barely 3000 ha has been tackled. More of those sitting on the fence should be subjected to intrinsic motivation. Hence the demonstration programme requires expansion for which the entire input cost and management will be the responsibility of the State Fisheries Department. In fact, for the entire Sixth Plan period, there is a provision of Rs.30 lakhs for the purpose of which the plan allocation in 1980-81 is Rs.4 lakhs

only to cover 80 ha. In the subsequent years, it will be on distribution equity basis to have multiplier effect to cover different agro-climatic conditions.

16. For the purpose of soil testing, 14 Soil Testing Laboratories have been established, of which one is at State Fisheries farm at Kausalygang and the other 13, one each at the District Headquarters. In addition to these, 10 laboratories have been established in the Brackishwater sector.

17. At the initial stage, in spite of some degree of energy dissipation and information loss, participation in the Exhibition besides the audio-visual facilities offered by TV, Radio Rural forum and Krushi Suchana were availed of to disseminate knowledge on pisciculture. Slowly such system of spreading non-formal education helped to ingrain the idea that, like in agriculture, to enhance fish production, a cultural technique has to be adopted. The active and constant rapport of the extension workers with the mass coupled with the simplicity of technique has created such an impact that the people at large are more keen on pisciculture than on agriculture which is more labour-intensive and is subjected to vagaries of nature. The very fact that net profit per hectare of paddy land comes to Rs.2200 compared with double of it from pisciculture, as has been shown in our demonstration tanks of private individuals, has caused such brain washing among the agriculturists that some have started converting paddy fields to piscicultural tanks with the loan from financing institutions and subsidy from FFDA, Command Area Development Authority, Integrated Tribal Development Agency, DPAP or State Fisheries Department. To that is added the improvement of existing tanks.

18. As is well known, some growth was attained during the early Plan period but social justice was not adequately taken care of. But, in 1980-81, for economic resuscitation of the rural poor, arrangement is being made to give them long-term lease of tanks with provision for free supply of craft and tools for fishing in the rivers, tanks and sea will be made to the rural poor. ..7

with provision for free supply of inputs. Besides this land-based Scheme, free supply of craft and tackle for fishing in the rivers, tanks and sea will be made to the rural poor. This programme will be continued during the entire VIth plan period at an outlay of Rs.3.91 crores to benefit 60,000 people below the critical consumption level.

19. Orissa being a fish eating State, fish has a tempting position in the dietary budget of the people. But the biggest fish consuming market, Calcutta, being next door, allures the fish produced in the State with high price. Therefore, instead of fish marketing being a problem, fish-drain causes political insomnia. The actual need was to create fish harvesting units in production pockets which are being added through groups of people, basing on the recommendation of Extension Officers. Such units avail the facility of credit-cum-subsidy scheme.

20. Proper training and education are integral part of extension. To this end, the interested pisciculturists are given short course practical-oriented training in the Departmental farms on stipendiary basis by the FFDA's.

21. Considering the various plans and programmes, a few of which have so far been stated, it can be said that Orissa State Fisheries, besides being a research, development and service organisation, is quick enough to bridge the communication gap between the scientist and common man through the Extension Organisation in which the Fishery Extension Officers play the pivotal role.

22. On behalf of the staff of the Fisheries Department, my deep gratitude is due to Shri G.N.Mitra, Ex-Director of Fisheries, Orissa who built the nucleus of extension matrix and to Shri M.M. Mohanty, present Director of Fisheries who expanded and geared it up to move with the wind of time.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980  
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THE SAGA OF FISHERIES EXTENSION IN  
WESTERN ORISSA

BY M. K. AHMED

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INTRODUCTION

The modern pisciculture technology of India owes its glory to Orissa. The first induced breeding of Indian major carps, the idea of polyculture, the success of intensive fish farming are all land-marks of fisheries research achieved in the Pond Culture Division of Central Inland Fisheries Research Institute located in Orissa. But curiously the development of pisciculture has not kept pace with fisheries research in the land of its origin. The following is an account of efforts made in the field of fisheries extension in a part of State commonly known as Western Orissa.

FISHERIES EXTENSION SCHEMES

The history of fisheries extension in Orissa is as old as the history of scientific pisciculture. Serious effort at popularising pisciculture programme began in 1961-62 when special posts of Fisheries Extension Officers were created. Several schemes aiming at developing Socio-economic conditions of the region through inland fisheries have been sought to be

introduced. At present the schemes in operation fall into two categories:-

1. Technology-based schemes
2. Service-based schemes

Technology-based schemes

The Department has been trying to promote development both in capture and culture fisheries through several technology-based schemes. Some of the more important ones are:-

1. Production of quality spawn (P.Q.S)
2. Demonstration & Development of Inland Fisheries (D.D.I.F.)
3. Demonstration of Intensive Fish Production (D.I.F.P.)

The Scheme for production of quality spawn aims at demonstrating the hypophysation technique in production of quality fish seed (spawn) of Indian major carps and exotic carps. It is executed in major fish farms mainly as a means to obtain induced bred spawn, though in this progress it draws the attention of the fish farmers and pisciculturists to the technology to some extent. Though technology-based, it serves more as a service-oriented scheme and provides an infrastructure base. There is a thinking at the moment to disseminate the technology further inducing active participation and involvement of the pisciculturists by providing attractive subsidies and market for the spawn produced.

The scheme for Demonstration and Development of Inland Fisheries, another technology-based scheme, which while employing the advanced knowledge in fry production also provides the main wherewithal for fish culture namely the fry and fingerlings.

Like the previous scheme this is implemented in Government owned fish farms and is more of infrastructural value than an instrument of technological dissemination.

The scheme of Demonstration of Intensive Fish Production, on the other hand, aims at greater involvement of private pisciculturists in the modern technology of fish farming. Fish ponds belonging to private farmers are selected and inputs like manure, fish seed, feed etc. are supplied free of cost by the Department, for application as per strict technological schedule under the guidance of the Block Level Fisheries Extension Officers.

#### Service-based schemes

Compared to the technology-based schemes, the service-based schemes are many. Most important of them are:-

1. Fish Farmers Development Agency (F.F.D.A.)
2. Long Term lease of G.P. Tank (L.T.L.)
3. Integrated Rural Development (I.R.D.)
4. Command Area Development (C.A.D.)
5. Integrated Tribal Development (I.T.D.)
6. Assistance to Traditional Inland Fishermen & Pisciculturists (A.T.I.F.P.)
7. Economic Rehabilitation of Rural Poor (E.R.R.P.)

#### Fish Farmers Development Agency

An agency to look after the pisciculture needs of individual pisciculturists, called the F.F. D.A., operates in Sambalpur, Bolangir & Dhenkanal districts of Western Orissa. The needs it caters are:-

1. Survey of tanks
2. Preparation of estimates for development of pisciculture
3. Arranging loans from financial institutions for excavation of new tanks and renovation of existing ones and supply of inputs.
4. Releasing subsidies on renovation and input loans sanctioned by banks.
5. Training of villagers in modern fish farming.

#### Long Term Lease of G.P. Tanks

In Orissa, by far the largest number of ponds exist with village level development units called the Gram Panchayats, which were previously unavailable to individual pisciculturists for development. An amendment in the Orissa Gram Panchayat Rules in 1979 now enables individuals to take them on long term lease for a period up to 10 years, The Chief Executive Officers of the F.F.D.A. districts and the Assistant Directors of Fisheries in other districts process lease applications and obtain bank finance for the applicants.

#### Integrated Rural Development

In order to generate rural economy in an integrated manner, a programme called Integrated Rural Development has been introduced in parts of Sambalpur, Bolangir, Dhenkanal and Keonjhar districts. The respective technical departments at the district level work out schemes for development in the area while the Block Development Officers(B.D.O) functions as the programme executives. The schemes essentially loanbased are forwarded to the banks by the B.D.Os and the Project Director, Small Farmers Development Agency at the district level, releases matching subsidies against sanction of loan, which is normally 33 1/3% in case of individuals but as high as 50% in case of Cooperative societies

or tribals. The programme aims particularly at helping the economically backward classes.

#### Command Area Development

Another parallel programme broader in perspective but limited in the area of operation is the Command Area Development. Like the I.R.D. it is executed at the Block level only in 11 Blocks in Sambalpur and 3 Blocks in Bolangir district, which come under Hiraikud Command area. The benefits of the programme, unlike the I.R.D., are open to all economic classes. The district level Officers as in the previous programme provide the technical know-how, prepare loan-based schemes, while the Block Development Officers execute them. The Project Director, Hiraikud Command Area Development Authority acts as the Coordinator and releases subsidies against loan sanctions. The subsidies in this case is 25% to individuals but 50% in case of cooperative societies and tribal. Hiraikud Command Area holds a greater prospect for pisciculture development in that the problem of water scarcity that is so prevalent in the Western Orissa is almost non-existent in this area.

#### Integrated Tribal Development

This programme aims at improving the economy of the people in the tribal dominated regions, the whole of Sundargarh district, Keonjhar & Champua sub-divisions in Keonjhar district & only Kuchinda Sub-Division in Sambalpur district. Functionally it is like I.R.D. & C.A.D. The Project Administrator, I.T.D., one for each sub-division, coordinates the programme and releases subsidies.

#### Assistance to Traditional Inland Fisheries and Pisciculturists

While the Fish Farmers Development Agency caters to the needs of the pisciculturists following modern technologies,



the Department has not lost sight of those who for one reason or the other still choose to follow traditional practices either in capture or culture fisheries. The schemes A.T.I.F.P. executed departmentally provides subsidies to the extent of 25% on loan sanctioned by the banks amounting Rs. 925/- for purchase of boats and nets and Rs. 1,000/- for piscicultures.

#### Economic Rehabilitation of Rural Poor

Recently introduced and yet to make a beginning is the scheme E.R.R.P. where the most economically backward class of people whose per capita income does not exceed Rs. 1,200/- are sought to be given an out-right grant of Rs. 750/- in shape of inputs for pisciculture per acre and Rs. 10,000/- for fishing in reservoirs to a group of 7 fishermen. The object is to ensure that each one of the poor individuals selected gets a minimum annual income of Rs. 1,500/- after all expenses by operation of the scheme.

#### Targets and Achievements

Targets for different departmental schemes are prescribed by the Directorate, whereas in the case of extra-departmental schemes and programmes, it is the District Development Committee which sets the targets. In the following table the achievement of targets under different schemes is expressed in terms of percentage since absolute figures would not make ready assessment possible. The progress relates to the financial year 1979-80.

Sl. No.	Name of Scheme	Achievements in									
		Sambalpur		Bolangir		Sundargarh		Keonjhar		Dhenkanal	
		Finan- cial	Phy- sical	Finan- cial	Phy- sical	Finan- cial	Phy- sical	Finan- cial	Phy- sical	Finan- cial	Phy- sical
1	POS	100	109.6	100	49.5	100	71.9	100	100	100	55
2	DDIF	100	47	100	32.3	100	96	100	50	100	50
3	DIFP	34	57	50	61	110	78.5	34	81	80	70
4	FFDA									12	18
5	LTL		10		3.7		45		13.6		45
6	IRD	21.6	40	40	16.6			2.3	3.4	23.5	
7	CAD	8.5									
8	IMD	100	100	Nil	Nil	80	80	95	100	Nil	Nil
9	ATIFP	100	100	100	100	nil	nil	nil	28	100	100

Three pictures emerge from a review of the table.

1. Departmental schemes are better executed than extra-departmental ones.
2. Progress of the loan based schemes, even that of Fish Farmers Development Agency, is not rapid.
3. Financial targets in most cases are more easily achieved than the physical targets.

#### Impact on Development

Reviewing the impact of Fisheries Extension programmes of Western Orissa as a whole, it can be said without a shadow of doubt that as means of infrastructure development they have more than served their purpose. Schemes like D.I.F.P. and L.T.L. have also generated ample production means like increase in area under pisciculture. But as a measure of ultimate production like increase in fish yield, increase in per capita income, with the lone

exception of the scheme A.T.I.F. wherever it has been successful, Fisheries Extension has not been able to make a significant impact.

#### Organisational set-up

A question that arises at this juncture is how far the Fisheries Extension Organisation is geared to tackle the task it performs. The fisheries extension organisation of the state is headed by the Director of Fisheries, who is assisted by a Deputy Director of Fisheries (Extension). At the zonal level the regional Deputy Director of Fisheries looks after the monitoring and evaluation of extension programmes. The District level officers namely the A.D.F. and the Chief Executive Officers of the F.F.D.A. are the main executives. The community development Blocks serve as the field executive units. The Block Development Officers are assisted by the Fisheries Extension Officers, in principle one for each Block. At the moment however there are 71 Fisheries Extension Officers in 95 Blocks in western Orissa.

#### Inter and Intra Departmental Linkages

The success of the extension programmes depends largely on effective inter and intra-departmental linkages both horizontal at the district level and vertical at zonal, state and national levels. The complexities of fisheries extension demand that a proper understanding among Fisheries and Gram Panchayat, Revenue, Irrigation, Cooperation, Social, Education, Public Relation departments and various financing institutions is maintained. At the Block level it is the Fisheries Extension Officer who is supposed to keep link with the respective departments through their extension officer and other field unit officers, while at the district level it is the District Officers who try to maintain contact through District Level Officers of other departments. It is the District and Block level linkages that are vital for the performance of the fisheries programmes.

But it can be easily seen that much of the malaise of Fisheries Extension arises out of serious lack in this area. Contacts are feeble and sporadic. Most often different departments assume rigid and uncompromising stand leading to faux pas in execution of programmes. This lack of empathy perhaps also stems from ignorance of different departmental functions. Within the department, however, contacts are frequent among and between district zonal and state level officers and periodic meetings reviews, conferences and seminars are held for the feed and feed-back on the problems of fisheries extension. A national seminar on Fisheries extension as the present one was certainly a long felt need.

#### Training and Educational Programme

Manning a well-knit fisheries extension organisation is one half of the problem; providing a thorough training and educational base at different levels is the other half. Officers at the district level are sent to Bombay for two-year Diploma course in Fishery Science. Periodic short duration training abroad is another attempt at providing the latest in technology to officers at the helm of execution. Fisheries Extension Officers are trained for a period of 10 months either at Trainers Training Centre of the I.C.A.R. at K.Ganga or the Department's own Fisheries Training Institute at Balugaon.

The role of the central and state level Research Organisations is paramount in the matter of Fisheries Extension. Common field problems of immediate nature are tackled by the district laboratories, which have come up since last two years. While problems which have far reaching value are fed into the zonal laboratory at Sambalpur.

It is vital to consider how much of the modern scientific knowledge from training and research organisations percolates down to the common man and in what form. Besides what the Fisheries Extension Officers tell them in the field, the Fish Farmers Development Agencies organise regular short training course for the farmers

to educate them on modern fish farming. Pisciculturists are also trained by demonstration of technologies in their own tanks and by way of fisheries fairs and exhibition organised by the District level officers. Summer camps and Lab-to-Land programmes of the I.C.A.R. also help educate the farmers. Both I.C.A.R. and state Fisheries Directorate (as also the Fish Farmers Development Agencies) distribute publicity materials among the public. Popular topics on fisheries are also broadcast regularly from the Rural Forums of the All India Radio and are telecast from Doordarshan for the benefit of the listening and the viewing public.

#### Problems of Fisheries Extension

It would be pertinent at this stage to enumerate certain important field problems of fisheries extension. Pisciculture programmes, particularly the high-yielding technology, do not seem to be a saleable commodity among the common mass. Even the fully subsidised demonstration programme does not induce the beneficiary himself to follow the technology on his own in subsequent years. A survey into the causes conducted by the author revealed the following:-

1. Tedious schedule of operation.
2. Pollution of water caused by regular application of organic and chemical fertilisers.
3. Third party rights over the tank.
4. Frequent poaching menace.
5. Non-availability of fingerlings in right stocking ratio at the beginning of the season.
6. Seasonal nature of tanks compelling pisciculturists to harvest the stock in March and April.
7. Primary emphasis on agriculture compelling premature harvesting to let the tanks irrigate drying crops in case of drought.

8. The Fish Farmers Development Agencies additionally meet with problems of rural indebtedness the willing pisciculturists are defaulters to one financial institution or the other.
9. Bankers are overly cautious about financing pisciculture schemes.
10. Rural poverty restrains beneficiaries under long term lease programme from paying the lease value of tanks and registration fees.

#### Constraints in Fisheries Extension

Although there has been significant fisheries development in western Orissa during last twenty years, the message of fisheries extension has not yet reached the common man in its entirety. The constraints are due to:

1. Technological gaps,
2. Inadequacies of fisheries education, and
3. Lack of sense of priority.

#### Technological gaps

Technological gaps are perhaps the greatest hurdle in delivering the message of fisheries extension to the people. Fisheries Science comes up from time to time with technologies that would not sell with the public. The very Scheme of intensive pisciculture which is sought to give rural economy a massive face-lift is unfortunately unacceptable to the common man, for several social and hygienic reasons. There are also the economic reasons. The raw cattle dung and the chemical fertilisers are in short supply. Even the agricultural operations feel the pinch for them. Then again is the advocacy of Mahua Oil cake treatment, a commodity required in huge quantities and accounting for nearly 1/3 of the cost of operation to be dumped in one instalment for just eradicating

unwanted fish. Pisciculturists and even the department experience difficulties in getting it in adequate quantity in season. People often ask for cheaper and readily available substitute or at least a method by which the hazards from unwanted fish can be minimised without compromising on the yield. There is again the question of fish seed supply. Meeting the pisciculturists' demand for fish seed in right species composition is becoming increasingly difficult. Even supplying catla in sufficient quantity is posing a problem. Common carp, one of the species required for composite fish culture is not possible to be bred in sufficient number during monsoon. Supply of grass carp and silver carp fingerlings to pisciculturists remains a distant dream. Pisciculturists often press for fingerlings instead of fry. Technology has not yet developed a container that can transport fingerlings without the attendant risk of mortality during transit and yet cut on the cost of transport. Intensive pisciculture technology does not fit in to the rhythm of rural life in Western Orissa. Many feel that the idea of intensive pisciculture is conceptually wrong or at least premature on the face of multitudes of village tanks lying fallow, and the capital being perpetually scarce.

Another instance of technological gap is the advance of framed nets in Hirakud Reservoir. The fishermen just would not accept them despite lab-to-land programme and free gifts of nets to the fishermen.

The crux of the problem is that all our technological innovations are not based on feed-and-feed back system, and not on what the situations in the field have prompted fishery scientists to evolve but what is possible to achieve under ideal conditions. Needless to say that most of the present day technologies are untranslatable into the realities of rural Orissa.

Personnel Inadequacies

Quite a few gaps in performance arises out of inadequacies of extension personnel either due to lack of sufficient number of extension staff or due to inability of the extension personnel to deliver the goods. The present band of Fisheries Extension Officers posted in blocks is a qualified group with sound scientific base. But most of the young set of Officers use their posts as mere stepping stones to get other more lucrative assignments elsewhere. Consequently, they are not able to establish rapport with the masses. The pay scale of Fisheries Extension Officers is one of the lowest. A suitable revision commensurate with their qualification would make them stay content in the Department. Upgrading the post of the Block Level Fisheries Extension Officers from the ranks of Inspector of Fisheries to D.S.F. would be another way to handle this problem.

That the fisheries extension organisation in Orissa is inadequately staffed is obvious. It is nowhere near the organisational set up of Agricultural Extension. Manning each Block with a Fisheries Extension Officer is the most urgent and the primary need. Besides, for an effective implementation, monitoring and evaluation of fisheries extension programmes, it is imperative that the fisheries extension wing of the Directorate is strengthened, headed by a Joint Director. To assist him in the field at the zonal level would require an A.D.F. Similarly at the subdivisional levels subdivisional fisheries extension officers of the rank of Superintendent of Fisheries would lighten the burden of the district officers in execution of programmes.

Much of the delays in sanction of loan cases at the banks is due to lack of technical officers. The technical officers are usually senior Departmental Officers deputed to the banks.



Wherever they are posted the disposal of loan, cases has been spectacularly rapid. If the loan based schemes are to make headway it would be necessary to man each financing bank in the field with a technical officer.

#### Inadequacies of Fisheries Education

Performance gaps in fisheries extension programmes also result from inadequacies of fisheries education. The training facilities available in the State and outside to the District level and Block level officers are the very best; and the systematic training that is imparted to them keeps them well-informed in fisheries technologies. But the knowledge acquired by them does not trickle down to and gets assimilated by the masses. The language that the extension officers speak is a lot of bookish technical jargon. Efforts to interpret the technical language into ideas and concepts that the common man understands through popular articles in regional languages are few and far between.

Inadequacies in extension also develop when facilities to translate ideas or knowledge acquired in training do not exist or are not developed in one's sphere of work. Two instances can be cited in this connection. The technique of induced breeding of Chinese carps as practised in People's Republic of China and the bundh breeding of Indian major carps which has been perfected in Madhya Pradesh and West Bengal are two major areas which could develop infrastructure to meet an important aquaculture need.

Fisheries education as it exists today is a oneway traffic leading from administrative officers, training institutions and research centres to the villages. There is no feedback from the field. The result is that the knowledge imparted is difficult to implement in the field and the farmers find it hard to accept and profit by their training. Regular and periodic seminars of the

field officers and research scientists with major participation of the farmers would be a step in solving the problem. The problems that the farmers and the field executives bring should form the basis for future scientific investigations and training.

Fishery Science is a fast growing subject. The training acquired once tends to grow stale as years roll by. To up date knowledge in Fishery Science it would be necessary to send officers to refresher course at an interval of, say, five years, a facility that does not exist either in the state or elsewhere now.

There is much to be expected from the Publicity section. In fact, it needs strengthening in par with Agriculture Department. Already there is a thinking along this line in the Directorate and a move to create an independent publicity unit at the Zonal level is afoot. It would be worthwhile to club the publicity wing with Extension wing of the Directorate headed by one and the same Joint Director.

#### Lack of Sense of Priority

The slow pace of Fisheries Development perhaps owes it to the lack of a sense of priority towards fisheries sector, both at the National and State level. At the Centre, fisheries is tagged to the Agriculture Ministry and only a Joint Commissioner is at the helm of fisheries affairs. In the state it is clubbed with Forest and Animal Husbandry Department. There is not even mass consciousness for fisheries. In the country based on agriculture economy, fisheries assumes a subordinate position. The primacy the Agriculture Sector enjoys is apparent from the allocation of funds both by the Centre and the State. Agriculture technology has reached a saturation point. The land mass, as is too well known, is limited.

The agriculture development having reached its zenith, the only hope of national development in the food sector is in what lies beyond the land mass, the water, both inland and marine, where both the level of production and technology are still low and the prospects for development are sky-high. Only a switch over in National and State priorities to this virgin sector will bring a sea-change in fisheries extension and development. The sixth Five-Year Plan has not yet been finalised. Would this seminar on Fisheries Extension take the onerous task of recommending the possibilities to both the Central and State Governments at this critical juncture?

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980  
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ROLE OF FFDA BALASORE IN EXTENSION OF  
INTENSIVE PISCICULTURE

BY R.K. DAS

Fisheries Directorate, Orissa, Cuttack - 7

In Balasore District of Orissa State, the traditional home-spun technology adopted by the pisciculturists over the years, results in a production of around 150 kg of fish per ha per year. The production figure of 10 tonnes/ha/year by ICAR has failed to whip up intrinsic motivation among the pisciculturists. Even the production possibility of 1500 kg per ha advocated by the State Fisheries Department with low-cost technology involving an expenditure of Rs. 500/- per ha could not melt the ice. To add to the problem, the financing institutions were hesitant to advance loan for pisciculture even under low-cost technology in the absence of production-oriented result in the district. The extension net work of the district was too inadequate to have an effective dialogue with neither the pisciculturists nor the bankers on the issue.

2. Against this background, the Fish Farmers Development Agency (FFDA), Balasore was created in 1977-78 with the ambition of expanding intensive pisciculture in at least 60% of the water bodies. A rational analysis of the position indicated the following procedural approach to make the massive programme successful.

i) Barring very few, almost all the tanks are Gram Panchayat (G.P) owned from whom issue has to be taken by the intending pisciculturists. The lease should be covered for at least 10 years though according to the existing G.P. Act, the maximum period of lease is up to 5 years.

ii) The lease of the tanks has to be ratified by the Collector, who should have a free hand in the matter.

iii) The time gap between assessment of financial requirement and sanction of loan by the financing agencies has to be shortened.

iv) The next process of project channel is close supervision of operation, finally leading to harvesting and marketing.

3. The above procedural system envisages a close knit cooperation and liaison among the various agencies such as G.P., District Fisheries organisation, FFDA, Revenue authorities, Banks and the most important stratum, the beneficiary. None of the above steps can be considered in isolation. But prior to the institution of the FFDA, there was not a single agent responsible for the job, though it is so essential to bring about a psychic transformation among the various agents of the project channel as all of them were ill-responsive to the new approach. Hence the entire task devolved on the FFDA, manned by only four Technical Officers including the Chief Executive Officer, which made the job sufficiently steep.

4. The programme planners of the Government, right from the State Fisheries organisation upwards, on being sensitive to the need, took the following actions:

i) Against only five Fishery Extension Officers (FEO) posted for all the 19 Blocks of the District, in 1978-79, 19 were posted. They acted as much-needed liaison officer, besides being

directly involved in the various operations in the project channel.

ii) These FEOs are Science Graduates or Post-graduates of the University and were given some exposure prior to deployment. A full scale training was not possible as the demand for posting of FEOs was very imminent. However, after a few years of field experience, they will be recycled back to our departmental Training Institute for a full-dress training.

iii) In order to motivate the pisciculturists and the Bankers, private tanks with 100% expenditure by the State Government were taken up in the rural areas under intensive pisciculture for ocular demonstration in widely dispersed areas of different blocks of the district. The tank owner was involved in it ab initio. These tanks served as growth centres for propagation of intensive pisciculture creating confidence among pisciculturists, Bankers and others.

iv) Government in Community Development Department amended article 86 of the G.P. Act in 1979, whereby, Collectors of the district were authorised to lease out the G.P. owned tanks to private pisciculturists for a period up to ten years.

v) The constant rapport maintained by the FEO with the beneficiary, and the local people created confidence among the rural folk. The net result of such policy orientation is perceptible in the progress of FFDA Balasore (Table 1.)

TABLE 1. Progress of FFDA Balasore since inception.

	1977-78	1978-79	1979-80	1980-81 (Upto 10/80)	Total Up- to date.
1	2	3	4	5	6
<b>1. Water Area surveyed.</b>					
No.	77	335	951	213	1576
Area in Ac.	71.52	178.78	822.60	144.75	1227.65
<b>2. Water area recommended to Banks</b>					
No.	61	167	417	435	1080
Area in Ac.	44.49	87.33	363.67	337.11	832.60
<b>3. Estimated amount recommended (in lakh Rs.)</b>					
	2.10	3.64	20.50	19.79	46.00
<b>4. Proposals sanctioned by banks</b>					
No.	1	109	126	188	524
Area in Ac.	1.00	61.80	86.04	256.64	405.48
<b>5. Amount of loan sanctioned (in lakhs Rs.)</b>					
	0.04	2.87	3.47	16.38	22.78
<b>6. Tanks Completed</b>					
No.	1	24	146	264	435
Area in Ac.	1.00	18.45	103.58	219.40	341.43
<b>7. G.P.tanks settled on long term</b>					
No.	-	-	432	166	598
Area in Ac.	-	5	-	-	623.00
<b>8. Lease tanks completed.</b>					
No.	-	-	40	76	116
Area in Ac.	-	-	43.18	77.71	120.89

5. The above table shows that in 1977-78 only one tank out of 77 surveyed, could be put to intensive pisciculture. But it showed substantial increase in 1978-79, so much so that 24 tanks were covered under intensive pisciculture. Through 1979-80 and 1980-81 (upto date) there is constant increase in the number of tanks entering into the operational phase. The phenomenal rise in bringing more of tanks under intensive pisciculture has been principally due to the effective dialogue which the FEOs posted in 1978-79 could have with various strata connected with this programme to create motivation, among not only the pisciculturists but all the different agencies connected with the process. That, there was a marked rise in confidence even among the Bankers is reflected in the flow of loan in 1980-81 for Rs. 16.38 lakhs to the pisciculturists as against Rs. 0.04 lakhs only in 1977-78.

6. Table 1 shows that the survey coverage till date (1980-81) has been but only 1227.27 acres against the World Bank projection of 5000 acres. Hence barely one fourth has been covered but it is presumed that if the present tempo proceeds, it will not be difficult even to exceed the target within the next 5 years.

7. At the present stage of operation, the following hurdles are required to be removed:

i) At present a long-term lease has to be supported by a G.P. resolution. This veto power of the G.P.s is a major set back in settling a tank on long-term lease, since they are unwilling to part with the temporary titular right over tanks even though they have miserably failed to respond to the task assigned to them in expanding pisciculture, a fact which has been highlighted by the National Commission on Agriculture in their report in 1976. It is high time that a tank, found suitable by Fisheries organisation for pisciculture, but free from third party right, should be straight away settled by the Collectors with the lessees.



ii) Our Extension Officers though are highly qualified are not being adequately paid even if the Extension Officers of other departments enjoy better emolument and official status. The net result has been that these Extension Officers are not able to press their viewpoint with authority before the different agencies connected with the Project channel. Further, the hard work and lack of mobility ill-commensurate with their emolument.

iii) Since the FEO is to be keenly connected with the project, right from the survey upto harvesting and in a very scattered area of the Block, his operational jurisdiction should be reduced to few G.P.s of the Block for effective implementation of the programme. It is too much to expect 18 FEOs to cover 270 G.Ps of the District.

iv) In Balamore District, a soil testing Laboratory has been opened which cannot possibly analyse the soil and biotic conditions of all the tanks covered under this programme to suggest input manipulation in each of them. Therefore, every Extension Officer should be provided with mini soil testing kit, microscope etc. to study the condition of the tanks in situ. This, ipso facto, will certainly convince the beneficiary and people of the locality about the scientific approach associated with the cultural practices.

v) The extension wing in the middle order should be supported with subject matter specialists at least in the disciplines like reservoir fisheries, soil chemistry, fish breeding expert (Exotic and indigenous) and weed control expert, like fish culture expert and a prawn culture expert in maritime areas, at least at district level.

vi) The fishery extension wing at block level should be allowed to act independent of Block Development Officer or any other such controlling officer in the area, with the proper 'Status' coupled with authority, suitable 'mobility' and be made responsible only to the district level/zonal Fisheries Development Officer.

8. I am thankful to Sri M.M. Mohanty, I.A.S., Director of Fisheries for his encouragement in the work and to Sri J.C. Roy, Senior Research Officer in making the paper presentable.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980

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STATUS OF FISHERIES EXTENSION IN  
PONDICHERRY STATE

By Director of Fisheries, Pondicherry

At present 21 Fisheries Development Schemes are implemented in Pondicherry State for the development of marine and inland fisheries and to improve the socio-economic conditions of fishermen community. Out of the 21 schemes the following are considered to be connected with the development, technology, services and welfare programmes:

1. Setting up of fisheries Development Corporation
2. Information and publicity
3. Establishment of brackishwater shrimp experimental farm
4. Establishment of sewage fish farm
5. Inshore Fishing Survey Station
6. Training of fishermen and fisheries personnel
7. Setting up of Fish Seed Farm
8. Assistance to fish farmers for the development of shrimp culture
9. Improvement to Arasalar river
10. Establishment of shore based facilities
11. Development of infrastructural facilities in coastal fishing villages
12. Setting up of Ice Plant cum Cold Storage Unit
13. Improvement of fish market
14. Transport facilities to fishermen
15. Mechanisation of fishing boats

16. Introduction of fibre glass reinforced plastic boats (FRP) fitted with outboard or inboard engines.
17. Service cum Maintenance Unit
18. Supply of fishery requisites and salt to fishermen
19. Housing and Colonisation for fishermen
20. Assistance to Fishermen Cooperative Societies.

All the schemes mentioned above will be implemented during the plan period 1980-85.

1.1.1. Title and scope of Developmental and Technology based schemes

1. Setting up of Fisheries Development Corporation

In the absence of autonomous financing agency, the fishing industry in the Union Territory of Pondicherry has not developed to a great extent. In order to promote fishing industry it has been proposed to set up a Fisheries Development Corporation at Pondicherry with necessary financial assistance from Government. The Corporation will be set up during the year 1980-81. The proposed outlay for the five year period 1980-85 is Rs.50 lakhs.

2. Establishment of brackishwater shrimp experimental farm

Shrimp constitutes 90% of India's sea food export. While there is an all our effort for shrimp trawling, there is no proportionate increase in catches and several areas are showing over-exploitation. To avoid over-exploitation, it is necessary to find out alternative methods. Shrimp farming has shown good results in other areas. It is therefore proposed to set up Brackishwater Shrimp Experimental Farm at Chinnaveerampattinam (Pondicherry) on experimental basis. The outlay proposed for the five year period 1980-85 is Rs.5 lakhs.

3. Establishment of Sewage fish farm

Utilising sewage discharged by Pondicherry works at Karuvadikuppam, one sewage fish farm will be established to augment the inland fish production. The farm will be set up with the coordination of Public Works Department and Central Fisheries Research Institute. The outlay proposed for the five year period 1980-85 is Rs. 1 lakh.

4. Setting up of fish seed farm

To set up Fish Nurseries and Induced breeding centres to meet the demand for quality fish seeds. It is also proposed to improve the existing farms, nurseries and tanks by desilting, strengthening of bunds etc. The Commune Panchayats will be given 50% subsidy for the renovation, repairs and desilting of tanks with a view to increase inland fish production. The proposed outlay for the five year period 1980-85 is Rs. 7 lakhs.

5. Establishment of shore based facilities

To establish shore based facilities in connection with the construction of Fishing Harbour at Pondicherry. Under this scheme necessary technical personnel required for the execution of the Harbour project will be appointed. Fisheries terminal office to maintain auction hall and marketing of fish will also be established under this scheme. The proposed outlay for the five year period 1980-85 is Rs. 1 lakh.

6. Mechanisation of fishing boats

To increase the marine fish production by covering the inshore and offshore waters of this Union Territory of Pondicherry by means of mechanised fish boats. Mechanised boats will be procured directly by the Fisheries Department and distributed to fishermen on hire purchases basis with 12 $\frac{1}{2}$ % subsidy, for the above

said purpose. Similarly mechanised boats will also be purchased and distributed to fishermen with institutional finance from Agricultural Refinance Development Corporation, Bombay. Necessary subsidy and share capital contribution will be paid to the Federation. The outlay proposed for the five year period 1980-85 is Rs. 100 lakhs.

7. Introduction of fibreglass reinforced plastic boats fitted with outboard or inboard engines for the development of small scale marine fisheries

To develop small scale marine fishing by introducing fibre glass reinforced plastic boats fitted with outboard or inboard engines. At present, the fishermen are mostly engaged in traditional catamaran fishing except a few supplied with mechanised fishing boats by the department. As the cost of the mechanised boats is high, bulk of the population cannot be satisfied. In addition to the above, conflicts exist between catamaran fishermen and mechanised boat operators. The introduction of fibre glass reinforced plastic boats may solve the above problem to a certain extent. As an incentive, it has been proposed to grant 12½% subsidy on the cost of the hull and engine. The outlay proposed for the five year period 1980-85 is Rs. 20 lakhs.

8. Development of infrastructural facilities in coastal fishing villages

It is proposed to provide basic infrastructural facilities in the fishing villages. The absence of infrastructural facilities may limit the development of fishing industry. Provision has also been made for 25% share of the centrally sponsored scheme. Financial outlay proposed for the five year period 1980-85 is Rs. 5 lakhs.

1.1.4. Title and scope of service schemes

1. Information and Publicity

To conduct exhibitions, film shows, publication of booklets, leaflets, to educate the Fishermen and Public. Outlay for the five year period 1980-85 is Rs. 0.25 lakhs.

2. Inshore Fishing Survey Station

To locate fishing grounds besides determining the suitability of various fishing gear for different seasons and grounds in the areas off the coast of Pondicherry and Karaikal. The results thus obtained will be circulated among fishermen for their benefit. Outlay proposed for the five year period 1980-85 is Rs. 8.40 lakhs.

3. Training of fishermen and fisheries personnel

In order to cope up with the increasing demand for trained fishermen, due to the introduction of more numbers of mechanised boats, eligible fishermen candidates will be sent to various training centres in large numbers. Inservice personnel will also be deputed to various training courses. Stipend will be paid to the trainees at the rates prescribed by the respective institutions from time to time in addition to dressing allowance, sea allowance and caution deposit. Outlay financed for the five year period 1980-85 is Rs. 8.65 lakhs.

4. Assistance to fish farmers for the development of shrimp culture

To develop shrimp culture by granting necessary 50% subsidy for the construction of shrimp farm, purchase of farm equipment, prawn seeds etc. Shrimp culture is given importance as shrimp constitutes 90% of India's sea food export and earning valuable foreign exchange. It is therefore now proposed to grant 50% subsidy

for the construction of new farms, ponds and tanks subject to a limit of Rs. 5,000/- per hectare on the estimate made by Government approved engineers. The above subsidy will also include the cost of farm equipment. Outlay for the five year period 1980-85 is Rs.1 lakh.

5. Setting up of Ice Plant cum Cold Storage Units

To establish Ice Plant cum Cold Storage Units to render assistance to fishermen by providing cold storage facilities and supply of ice at cheaper rates to preserve their catches. It has been proposed to set up two units one each at Yanam and Mahe. Outlay proposed for the five year plan period 1980-85 is Rs. 5 lakhs.

6. Improvement of fish market

In order to provide hygienic fish markets, it is proposed to grant 75% subsidy and 25% loan subject to a limit of Rs. 25,000/- in each case to the local bodies for improving/remodelling the existing fish markets maintained by them or for constructing modern and hygienic fish markets as per Indian Standard Institute standard. The outlay financed for the five year period 1980-85 is Rs. 2.05 lakhs.

7. Transport facilities to fishermen

To provide quick transport facilities to fishermen for transporting their catches from landing centres to marketing places. Fish vans are hired out to fishermen at concessional rates through fishermen Cooperative Societies. This scheme has been declared as a "Service scheme" by Government of India. At present two vehicles one each at Mahe and Yanam are maintained under this scheme. The outlay proposed for the five year period 1980-85 is Rs. 1.50 lakhs.

8. Service cum Maintenance Units

To provide repair and servicing facilities to mechanised fishing boats and supply of spares etc., by the setting up of Service cum Maintenance Units. Outlay proposed for the five year plan period 1980-85 is Rs. 2 lakhs.



1.1.5. Title and scope of welfare schemes

1. Supply of fishery requisites and salt to fishermen

To render necessary assistance to fishermen in the form of 20% subsidy for purchase of synthetic fish nets, trawl nets, twine, floats, sail cloth and salt. On account of increase in the cost of fishing implements these will be purchased and distributed to fishermen through Pondicherry State Fishermen Cooperative Federation, Pondicherry and Karaikal Fishermen Cooperative Marketing Union, Karaikal. Outlay for the five year period 1980-85 is Rs. 1.50 lakhs.

2. Housing and Colonisation for fishermen

Under this scheme 25% loan to the extent of Rs. 925/- and 75% subsidy to the extent of Rs. 2,775/- will be given to each fisherman possessing patta for the construction of house as the living conditions of fishermen on the sea shore are poor. The loan will be interest free and will be repayable within a period of 10 years. The proposed outlay for the five year period 1980-85 is Rs. 36 lakhs.

3. Assistance to Fishermen Cooperative Societies

The objective of the scheme is to propagate the cooperative movement among fishermen and to keep them away from the clutches of middleman and moneylenders who extend credit facilities at abnormal rate of interest. Under this scheme, the existing fishermen cooperative societies will be strengthened by the provision of necessary short term loans, managerial subsidy, subsidy for the construction of godowns and share capital. The outlay proposed for the five year period 1980-85 is Rs. 13.65 lakhs.

1.1.7. Source of Technology

The scientists of Central Marine Fisheries Research Institute, Cochin, have conducted detailed survey of brackish water areas of Pondicherry and submitted a project report to Government of Pondicherry. Based on the project report, action is being taken by the Fisheries Department to set up a Brackishwater Sewage Experimental Farm at Chinnaveerampattinam.

Similarly assistance is being availed from Central Inland Fisheries Research Institute for the setting of sewage fish farm. As regards, designs for various crafts and gear, the assistance of Central Institute of fisheries Technology, Cochin and Integrated Fisheries Project, Cochin, is useful to this department.

1.1.8. Physical targets and achievements of schemes

By the virtue of various schemes, so far 212 mechanised boats have been distributed and more than 300 fishermen were trained at the Fisheries Institute in Cochin and Nagapattinam. Thirty fishermen cooperative inclusive of one apex institution and a marketing union are functioning. Eight vans are maintained for transportation of fish catches from shore to the market. Three service-cum-maintenance units for repairing and replacing the spares of mechanised vessels, two ice Plant cum cold storage units and one fish curing yard are functioning effectively.

1.1.9. Financial targets were indicated in the schemes listed above.

1.1.10. Impact of schemes on development

By the implementation of various development schemes, the annual fish production has been stepped up from 900 m. tons to 15,000 tons. So far 212 mechanised boats have been distributed to

fisherman. More than 300 fishermen have been trained in advanced fishing methods. 31 fishermen cooperative societies are working inclusive of one apex institution and one central society for the welfare of the fishermen community to advance short term loan, supply of fishery requisites and other essential commodities. 3 Service cum Maintenance Units are rendering assistance to mechanised boat owners to repair and service their mechanised boats. Two Ice Plant cum Cold Storage Units are maintained at Pondicherry and Karaikal to preserve the fish in good condition before sale. One more Ice Plant is being set up at Yanam. One Fish Curing yard is also functioning at Mahe to cure surplus fishes, and thus enable the fishermen to get additional revenue. 14 fish markets were constructed by commune pandharyats by availing assistance from Fisheries Department thereby making the fishermen to sell their product in hygienic condition.

The Inshore Fishing Survey Station is conducting survey off the coast of Pondicherry with 4 vessels. The survey results are made known to fishermen community to increase their catches.

8 fish vans are run by the Department at concessional rates to transport fish from landing centres to marketing places.

Two fish landing jetties have been constructed for the safe anchoring of mechanised boats.

#### Infrastructural facilities

Infrastructural facilities like community building, Flake ice plant, fish curing yard, approach road, bath rooms and latrines are being provided at Periaveerampattinam fishing village. Besides the above it has been proposed to construct a fish drying platform at Pannithittu fishing village.

### Fishermen welfare

Materials like nylon nets, twine, floats, sail cloth and salt are sold at 20% subsidised cost. Loans with free interest are being given to the fishermen for the construction of houses. So far 1200 houses were constructed.

#### 1.2. Schemes for fishermen community taken by departments other than Fisheries Department

##### Applied Nutrition Programme

Applied Nutrition programme is being implemented by Community Development Blocks. Under this programme, fish is distributed to Balwadies and Mathar Sangams to nourish school going children and expectant mothers. In selected 3 tanks, pisciculture is practised to meet the demands of the programme. An amount of Rs. 0.96 lakhs has been earmarked in the five year plan period 1980-85.

##### Adult Education Programme

To organise Adult Education Programme for illiterate persons in the age group 15-35 as well as to provide instructions in Non Formal Education for the age group, 11-14 with a view to provide them skills for self directed learning leading to self reliance and development of their own environment. The scheme is being implemented by the Education Department with an total outlay of Rs. 11.00 lakhs for the five year period 1980-85. At present 148 centres are functioning. It is expected that 86,600 persons will be benefited during the above period.

### 1.3. Fisheries Cooperatives

#### Structure of Fisheries Cooperatives

There are 31 fishermen cooperative societies in this Union Territory of Pondicherry including one Apex Fishermen Cooperative Federation at State level and one Fishermen Cooperative marketing Union at district level. At the primary level, there were 29 fishermen cooperative societies functioning at the end of the year 1979-80.

#### Financial outlay in Cooperative Sector

The Government of Pondicherry is assisting the primary Fishermen Cooperative Societies by providing medium term loan and share capital contribution, to the societies for issue of loans to their members etc.

A scheme viz. Assistance to Fishermen Cooperative Societies, has been formulated with an outlay of Rs. 13.65 lakhs for the purposes mentioned above.

#### Functions and performance

To meet the short term credit needs of the fishermen, the societies are advancing cash loans to the extent of Rs. 250/- per member. These societies are supplying the fishery requisites such as nylon twine, cotton yarn, ropes, nets, floats etc. received from the Pondicherry State Fishermen Cooperative Federation and Karaikal Fishermen Cooperative Marketing Union at subsidised rates to the members. Essential commodities like sugar, rice, kerosene etc. are also being distributed through some of the primary cooperative societies. Certain societies had utilised the quick transport facilities of the Government and are running fish vans to market their daily catches at normal rates. The Housing scheme of the Fisheries Department is being implemented through these societies for distribution of cash loan, grant and supervision of construction works.

In short, these societies are considered to be the nerve centre of the fishermen community in their socio-economic activities. The performance of all the societies are satisfactory.

### Management

Except the Apex and Central Institution, all the fishermen cooperative societies are run by elected Executive Committee members. The committee members are assisted by the cooperative staff employed in the Fisheries Department.

### Programme of revitalisation

A revitalisation programme has already been conducted during the year 1978-79. In view of the above, 39 fishermen cooperative societies which existed previously, were reduced to 29 either by amalgamation or liquidation.

#### 1.4. Education and Training

No Fisheries School or Fisheries Training Centre exists in the Union Territory of Pondicherry. As such selected fishermen are deputed to various central/state training Institutes to undergo training in modern fishing methods. The candidates are given stipend and other allowances as admissible in the respective institutes. An amount of Rs. 8.65 lakhs has been earmarked under the scheme "Training of fishermen and fisheries personnel" in the draft five year plan 1980-85. So far more than 300 candidates were trained in various institutes.

Inservice personnel are also deputed to various advanced Fisheries training courses run by Central/State Institutes. So far 42 persons were trained in inland fisheries, fish processing, marine fisheries, prawn farming etc. Some members of the staff were also trained in cooperatives in the Cooperative Staff Training Institutes of the neighbouring states.

1.5. Information and communication services

Weather warning telegrams and other matters connected with fishermen welfare are being circulated among fishermen. The survey results of Inshore Fishing Survey Station, Pondicherry, are also communicated to fishermen to improve their catch by issuing periodical pamphlets, leaflets etc. and also during the group discussions and meetings. Films on fisheries are regularly exhibited to fishermen in their respective villages to arouse their interest in modern fishing and scientific cultural practices for their advantage.

Impact.

On receipt of weather warning messages from Fisheries Department, the fishermen are taking appropriate action to safeguard their craft and gear and other belongings.

The results of the department survey are well received by the fishermen by adopting modern and improved method of fishing to increase their fish catches to earn more.

1.6. Linkages with other organisations on Fisheries Extension

1.6.1. A regular link is established with the Ministry of Agriculture and Irrigation (Fisheries Division). The plan schemes of this department are being formulated as per the guidelines of the Ministry of Agriculture and Irrigation. Being a Union Territory, approval for pattern of assistance involved in various plan schemes has to be given by the Ministry of Agriculture.

1.6.2., 1.6.3 and 1.6.4

This department is having linkages with various central research and training Institutes like Central Marine Fisheries Research Institute, Cochin; Central Inland Fisheries Research Institute,

Barrackpore; Central Institute of Fisheries Education, Bombay; and Central Institute of Fisheries Nautical & Engineering Training, Cochin. As and when required, the expertise of the research institutes is utilised for the preparation of project reports, workshope etc. Their guidance is taken for the implementation of various schemes to increase fish production and also to improve the socio-economic conditions of the fishermen in general.

Likewise, link is established with the various training institutes. Fishermen candidates are regularly sent to Central Institute of Fisheries Nautical and Engineering Training, Cochin. Inservice personnel are being sent to training courses offered by Central Institute of Fisheries Education, Bombay and Central Inland Fisheries Research Institute, Barrackpore, and also deputed to attend seminars and workshops organised by various agencies in the field.

1.6.5. Agricultural Refinance Development Corporation, Bombay has extended its activity to Pondicherry region also. The Pondicherry State Fishermen Cooperative Federation has distributed 34 mechanised boats to fishermen availing institutional finance from A.R.D.C., Bombay, Pondicherry State Cooperative Bank, Pondicherry and assistance from State Government in the form of share capital contribution and 12<sup>1</sup>/<sub>2</sub>% subsidy.

#### 1.6.6. Linkages with Fisheries Cooperatives

The National Cooperative Union of India has selected Pondicherry as one of the Centros for implementing Member Education Programme. Accordingly, a unit consisting of Project Officer and three Educational Instructors are working in Pondicherry to educate fishermen on cooperative principles with much success. So far 1500 fishermen were benefited by this scheme.



1.6.7. Linkages with other organisations

The Marine Products Export Development Authority, Cochin, has extended its activity to Pondicherry Region also. It has extended assistance for the construction of two fish landing platforms in Karaikal region. Necessary guidance is being issued by Marine Products Export Development Authority, Cochin, for the development of shrimp culture in the Union Territory of Pondicherry.

1.7. Organisational set up of Fisheries Department

It is furnished in the chart enclosed herewith. At present Extension unit is manned by one Sub-Inspector of Fisheries. The Extension Centre is located in Villiamur and its jurisdiction is Pondicherry region.

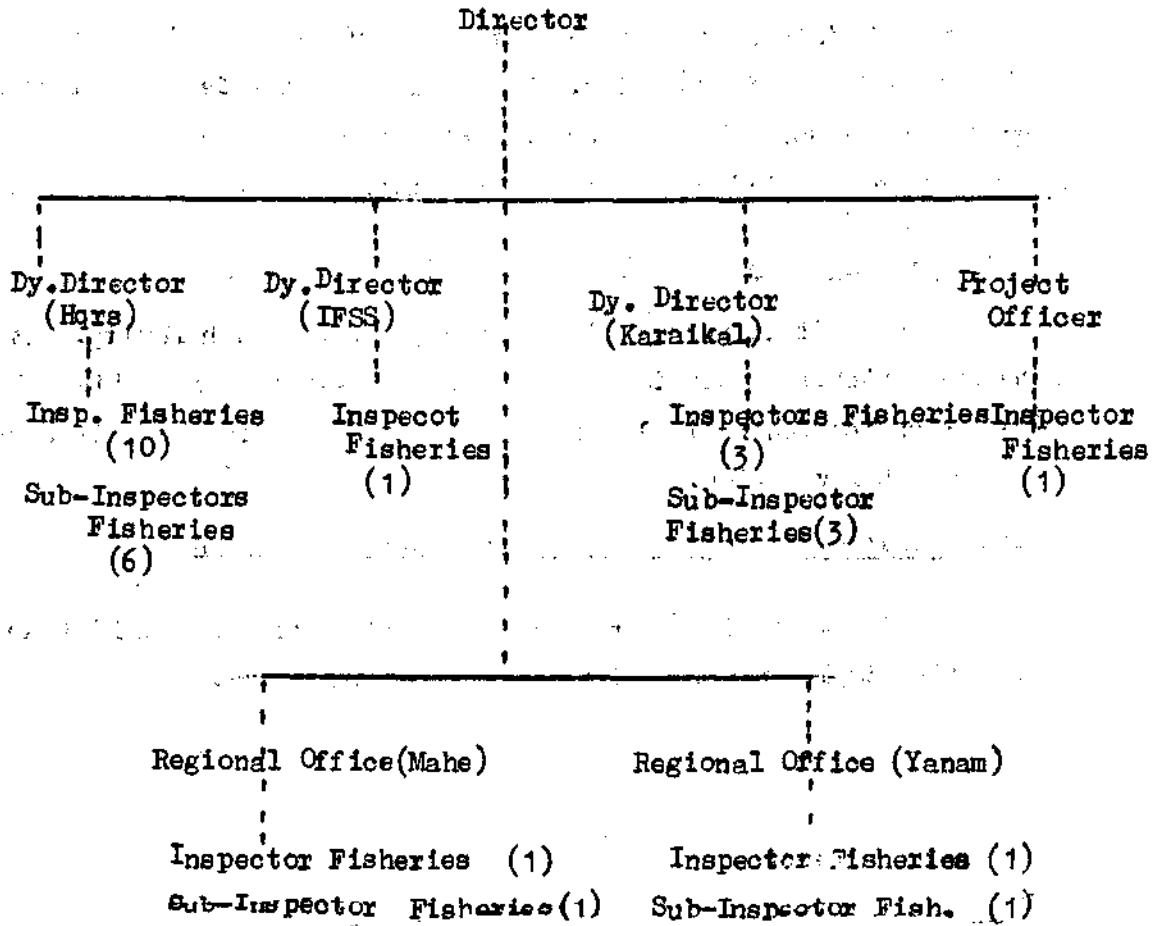
1.8. Constraints and problems in Fisheries Extension

Sufficient funds and adequate staff are required for the effective implementation of various extension works.

ORGANISATIONAL CHART

OF FISHERIES DEPARTMENT, PONDICHERRY

(Upto level of Sub-Inspectors)



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SEMINAR ON FISHERIES EXTENSION

8-10 December 1980, Cochin  
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STATUS OF FISHERIES EXTENSION IN THE  
UNION TERRITORY OF LAKSHADWEEP

GEORGE VARGHESE

Director of Fisheries, Kavaratti-673555

1. Present status of fisheries extension

1.1. Fisheries extension schemes undertaken

1.1.1. Title and scope of each scheme

We have no specific extension programmes.

However, on the following fields we have done extension work:

- (a) Demonstration fishing.
- (b) Introduction and improvement of fishing gear.
- (c) Mechanisation and improvement of fishing crafts.
- (d) Fish processing, preservation and marketing.
- (e) Introduction of infrastructure facilities.

1.1.2. Period of implementation : 20 years

1.1.3. Technology-based schemes :

(See 1.1.1. (a), (b), (c) and (d))

1.1.4. Services-based schemes:

See 1.1.1. (e).

1.1.5. Fishermen welfare programmes:

In Lakshadweep there is no fishermen community in the normal meaning of the word. As such, no separate fishermen welfare schemes are undertaken.

1.1.6. Brief description of 1.1.3, 1.1.4 and 1.1.5.

(1.1.3) (a) Demonstration fishing

When schemes on fisheries development started in Lakshadweep in 1959, there was no organised fishing in these scattered islands. Except Minicoy where pole and line tuna fishing was in existence, fishing in other islands was primitive and was confined to mostly harpoon fishing with small reef crafts and lagoon fishing with small shore seines. Though skipjack tuna shoals were seen in abundance around all the other islands it was not caught at all by any fishing method.

(1) Pole and line fishing: It was popularised in all the islands by demonstration fishing with the help of tuna fishing instructors from Minicoy. Within a period of about 10 years pole and line fishing has become popular in all the islands and major fishing centres have already emerged as a result.

(ii) Trolling: For tuna and other surface swimming varieties of fish like Seer, Caranx, Bill fishes etc. trolling is an effective method of fishing. Experimental troll fishing was conducted by the department with mechanised fishing boats and the same was demonstrated to fishermen in all the islands. This method picked up so fast and in all the islands this is the popular fishing.

(iii) Long line fishing: Besides surface swimming varieties of tuna and other fishes, Lakshadweep waters are rich in sub-surface tuna species and sharks. The most effective fishing method for these varieties is long lining. Exploratory work with the departmental boats has been conducted and when the operation was found successful it was demonstrated to the fishermen. Now long line fishing has become popular and a considerable quantity of shark is landed as a result.

(iv) Gill net: Gill netting was an unknown fishing method in the islands prior to 1960. Gill net fishing operations were conducted both within the lagoon and outside. Though this did not prove effective for tuna, large quantities of Gar-fish, Caranx and even shark are caught from both within the lagoons and outside.

(v) Hand lining: Even the simple hand line fishing method was not known in the islands, though shallow areas of submerged reefs are available for fishing operation. This method was demonstrated and is now popular in the fishing for Rock-Cod, Red-snapper, Sharks, etc.

(b) Introduction and improvement of fishing gears.

Improvements were made in respect of pole and line fishing gears and the fishing gears operated in the lagoons. In the case of live bait fishing nets in pole and line fishing, knotless nylon fishing nets were introduced in place of the traditional cotton ones. In the case of traditional live bait storage tanks made from local twigs, reservoirs with wooden planks and G.I. sheet were introduced and the same are now used in all the islands. For pole and line fishing the line used was mainly cotton and steel wire, Replacement of steel wire by monofilament was found very suitable and this was demonstrated to the fishermen and was accepted very fast. In place of tinned iron pole and line hooks locally made, which require repeated tinning, stainless steel hooks have been introduced which is found more effective. The local fishing nets, including cast nets, which were made of cotton was replaced by nylon, due to the efforts and assistance made by the Fisheries Department.

(c) Mechanisation and improvement of fishing crafts:

The only fishing crafts in operation in Lakshadweep were the 'Mas Odies' in Minicoy for pole and line tuna fishing and the small reef crafts in other islands for harpooning mainly. These vessels being rowing boats had only limited range of operation and required a large number of crew. In place of 'Mas Odies', mechanised fishing boats designed for tuna fishing with fishing platforms, live bait tanks, etc. were introduced by 1963. The mechanised boats were found very efficient in comparison with the rowing boats. Overcoming the initial resistance from the fishermen, the local crafts are now entirely replaced by mechanised boats. Improvements were made several times on the original mechanised boat designs and now suitable 25' and 30' boats are designed and are in operation. In order to meet the requirements of the boats in the islands 2 Boat Building Yards have been established in two of the islands in the Union Territory and are functioning efficiently.

(d) Fish processing, Preservation and Marketing

The main methods of fish processing in vogue in Lakshadweep were 'Mas' making from tuna and sun-drying of other fish without salt. While 'Mas' has market on the mainland the other products are locally sold. With the starting of fisheries fisheries development programme fish processing methods were improved particularly in dried fish products. Salt curing of fish was introduced and made popular even by issuing salt at subsidised cost. Changes were also introduced in the improvement in 'Mas' making.

For sophisticated market tuna canning was started and the first factory exclusively for tuna in the country was inaugurated in Minicoy in 1969. The production in the factory continues and the products are sold in the country as well as exported.

(1.1.4) Introduction of infrastructural facilities

Almost all the islands have lagoons which are safe anchorages, being protected by reef. However, the entrance to these lagoons in many islands is shallow. But improvements have been made in this respect under the General Harbour development scheme of the Government of India. For the special requirements of fisheries, Jetties were provided in important fishing centres to facilitate fish landing and berthing of the vessels. In Kavaratti Island a slip-way which can handle small and medium size boats has been constructed and is in use. For the maintenance and repairs of fishing boats there are 10 workshops i.e. one each in all inhabited islands. All these islands are self-sufficient in this respect. The percentage of idle boats due to repairs in Lakshadweep is negligible.

(1.1.5) Fishermen welfare programmes.

As already mentioned, there is no fishermen community in Lakshadweep as one finds on the mainland. Welfare schemes taken up by the Administration are applicable in the case of the population engaged in fishing also. Education facilities are available in almost all the islands up to Secondary level. After secondary education children are sent to College education in Kavaratti and beyond that in different centres on mainland. Lakshadweep has a high literacy rate and has sixth place in the country. Free medical facilities are available in all the inhabited islands from the Primary Health Centres. There are two hospitals also in the Union Territory, one in Kavaratti and the other in Minicoy. Housing and other social welfare schemes are also very actively implemented in this area. Electricity is provided in all the inhabited islands and also wireless stations. Trunk telephone facilities are presently available in Kavaratti through both by radio telephone and satellite communication while local

telephone facilities are available in Kavaratti, Minicoy, Ameni and Androth islands. Few more islands will now be connected with mainland by trunk service.

1.1.7. Source of technology for 1.1.3.

The Department of Fisheries, Lakshadweep has a well trained staff trained in the C.I.F.E., C.I.F.N.E.T. and other fisheries institutions in the mainland. They form the main source of technology. However, in the field of boat building, boat designs have been supplied by the C.I.F.T.

1.1.8. Physical targets and achievements of schemes

As already mentioned there are no separate fisheries extension schemes and no targets were fixed as such.

1.1.9. Financial targets and achievements of schemes

Same as under 1.1.8.

1.1.10. Impact of schemes on development

1.1.10.1. On production means (gear/craft)

There are 191 mechanised fishing boats now under operation in Lakshadweep doing pole and line, long line, trolling line and hand line fishing. A large number of pole and line, long line, trolling line and hand line fishing gears are now under operation besides large number of fishing nets under operation in lagoons.

1.1.10.2. On production

The fish production in 1979 has been 3845 tonnes against 573 tonnes in 1960 which is a 700% increase. Lakshadweep now stands first in the country in the per capita availability of fish with nearly 100 kgs.

1.1.10.3. Socio-economic conditions

There has been spectacular improvement in the socio-economic conditions of people in Lakshadweep since 1960. The literacy rate has increased to one of the highest in the country. Health conditions have considerably improved. The



The per capita annual income from fishing alone comes to Rs. 2612/- for the population engaged in fishing (including occasional and part time fishermen).

1.1.10.4. Services to Society

Nothing special has been done by Fisheries Department on this, as the same is under general welfare schemes by the Administration.

1.1.10.5. Infrastructure facilities

Jetties	: 8	(Both of Fisheries and Harbour which are used by fishing boats also).
Slip way	: 1	
Workshops	: 10	
Boat Building Yards	: 2	
Cold Storages	: 3	
Ice Plant	: 1	
Canning Factory	: 1	
Fish Curing Yards	: 10	

1.1.10.6. Marketing facilities

A Marketing Section under an Assistant Director of Fisheries has been established in Cochin for the marketing of canned tuna and other fishery products. In the islands fresh fish is sold at different jetties and landing places. In Androth a fish market has been established.

1.1.10.7. Fishermen welfare

178 mechanised fishing boats have been issued to fishermen on subsidy ranging from 100% on engine and 25% on the hull to 50% subsidy on the engine and 25% subsidy on the hull. Fishery requisites like materials for fishing gear, construction, salt for fish curing, etc. have been issued at subsidised cost.

Diesel and lub. oil are brought from mainland by the department and issued to fishermen; so also spare parts for engines. Subsidy of 15 ps. per litre of diesel oil is given to the fishermen.

1.2. Schemes for fishermen community taken up by departments other than fisheries department (Applied Nutrition, Adult Education, Integrated Rural Development, etc.)

1.2.1. Implementing agencies

Department of Medical and Health;  
Department of Social Welfare;  
Social Welfare Board; and  
Block Development.

1.2.2. Programmes

Adult education, organisation of Mahila samajams, handicraft centres, supply of special diet under the child development programme, supply of special diet for pregnant women and children, integrated child development services, etc.

1.3. Fisheries Cooperatives

1.3.1. Structure of Fisheries Co-operatives (Apex body, District Federation, Primary Societies, etc.)

Primary societies only.

1.3.2. No. of fisheries co-operatives as per 1.3.1.

Two.

1.3.3. Financial outlay in co-operative sector.

Rs. 69,000/-

1.3.4. Functions

Only fishing.

1.3.5. Performance

Not satisfactory.

1.3.6. Management

By Department of Co-operation.

1.3.7. Programme for revitalisation

No programme.

1.4. Education and Training

1.4.1. Educational programmes and facilities (Fisheries Schools, etc.)

There are no separate Fisheries Schools in Lakshadweep. But fisheries science has been introduced in two High Schools as elective subject.

1.4.2. Training programmes and facilities

1.4.2.1. General in-service training

The staff of the fisheries department are trained in different fisheries institutions on mainland like C.I.F.E., C.I.F.N.E.T., Integrated Fisheries Project, etc.

1.4.2.2. Extension staff training

Nil.

1.4.2.3. Co-operative staff training

Nil.

1.4.2.4. Fishermen training (Fishermen Training Centre, etc.)

Fishermen Training Centre: 1

1.4.2.5. Non-formal education

Nil.

1.5. Information and communication services

1.5.1. Type of information regularly provided to fishermen  
&

1.5.2. Modes of communication

Information to fishermen is passed through the fisheries officials in each island.

1.5.3. Impact of the services on fishermen

Nil.

1.6. Linkages with other organisations on fisheries extension.

Nil.

1.7. Organisational set up for fisheries extension

1.3. Nil.

1.8. Constraints and problems in fisheries extension

Nil.

2. Fisheries development programmes envisaged in the VI Plan.

(Please give brief notes on all the fisheries schemes envisaged for the VI Five Year Plan)

Scheme No. 1: Construction and issue of mechanised fishing boats to fishermen on subsidy

The proposal is to construct/procure and issue 150 nos. of 25'/30' mechanised fishing boats to the island fishermen at 33 1/3% subsidy on the cost of the engine and 20% subsidy on the cost of the hull during the VI Five Year Plan period 1980-85. The additional fish catch anticipated out of the fishing with these boats is 2,000 tonnes. The introduction of these boats will generate direct employment for 1500 people and indirect employment for 1000, besides employment on regular basis for 80 persons in the construction of the boats. The annual income anticipated out of the boats proposed for introduction will be Rs. 60 lakhs which will add to the per capita income for the union Territory by Rs. 158.

The Department of Fisheries maintains two Boat Building Yards for construction of mechanised fishing boats in Kavaratti and Chetlat Island Islands. For the efficient running of these two Boat Building Yards and to achieve the target it is found necessary to have the services of an Assistant Director of Fisheries to be in overall charge of the two Yards. As such, post of an Assistant Director of Fisheries and minimum necessary staff are proposed during the plan period.

Scheme No. 2: Supply of inboard and outboard engines to the fishermen at subsidised cost.

There are many indigenous fishing crafts in different islands which do fishing within the lagoons and the near vicinity of the islands in the sea. Being rowing boats, the range of operation of these vessels is very limited and hence the fish landing is also limited. The efficiency of operation of these vessels will improve in case they are provided with outboard engines of suitable power. Therefore, provision for the issue of 40 nos. of outboard engines for mechanisation of the indigenous crafts to be issued to fishermen is included.

Presently boats installed with engines are issued to fishermen. But there are fishermen who are capable of building boat hulls in case engines are issued to them on subsidised cost. The issue of engines will speed up the introduction of boats as well as improve the indigenous boat building capacity which will make the people self-sufficient in boat construction in due course. Therefore, it is proposed to make a start in this direction during the VI Plan period by issuing a total of 10 inboard engines of the range of 10-15 HP and provision is accordingly made in the Plan. The idea is to issue both the inboard and outboard engines at 33 1/3% subsidy on its cost for recovery in instalments.

Scheme No. 2 A: "Arabushi" Processing Centre

"Arabushi" is a cooked and smoked product of skipjack tuna popular in Japan. We had proposed to start an Arabushi Processing Centre in Lakshadweep, hoping it could be possible to get technical know how from Japan either by getting experts from that country or by training people there. On preliminary enquiries with the Japanese Embassy in India it was found the training or import of know-how as suggested was rather difficult. Further, the demand for Arabushi in Japan was understood to be not so encouraging as to start a Production Unit. Hence the scheme is proposed to be dropped and provision is not made for the last 4 years of the VI Plan.

Scheme No. 3: Exploratory and Demonstration Fishing

The Lakshadweep waters is rich for its fishery resources, the main being tuna, shark, bill-fishes followed by snappers and seer fish. But most of the fishing activities are now concentrated on the pelagic tuna resources. While pelagic resources like skipjack and other similar species of tuna are seen by naked eye, the sub-surface resources of tuna and other fish resources are not known yet, as pretty little has been done by way of exploratory fishing. The Lakshadweep Fisheries Department have been doing long line fishing in this respect and good fishing grounds have been located in certain areas and the results have been encouraging. However, considering the vast area, it is necessary that this operation is intensified and properly managed by competent staff with suitable vessels. The present fleet of boats for this purpose is only three numbers of 38' boats which are quite insufficient. Therefore, the expansion of the fleet is

necessary and the introduction of 3 medium size vessels mainly for long lining is proposed during the Plan period and provision made. Besides, two of the existing boats need replacement of engines and provision for this also is made. In order to manage the fishing operation with proper management and efficiency, it is necessary that this is done under the direct supervision of an Assistant Director of Fisheries. Therefore, provision is made for Assistant Director of Fisheries and necessary staff also.

Scheme No. 4: Issue of fishery requisites to the fishermen

Hook and line fishing by different methods is the most popular in Lakshadweep, the main being pole and line and trolling line. Due to the experimental fishing conducted by the department shark fishing grounds have been located and local fishermen are impressed by this fishing. However, materials for long line being costly, the administration has been giving these materials to the fishermen at subsidised cost as an incentive during the V Plan period. It is proposed to continue this during the VI Plan period also, by giving 33 1/3% subsidy on the cost of the gear materials.

The other fishery requisites required by the Fishermen are fishing hooks of different size, nylon monofilament lines and nylon twine. In the absence of any dealers in the islands it will be necessary to sell these materials to the fishermen through the department. This scheme will be continued during the VI Plan period also and necessary provision is made. The fishery requisites other than long line gear materials will be sold at actual cost only.

Scheme No.5: Setting up of a Museum at Kavaratti

Lakshadweep marine fauna is different from that of the fauna in other parts of the country and consists of different species of tunas and a lot of different species of multi-coloured coral fishes. There are different species of beautiful corals also in these islands. The collection of these specimens has not been made so far for any academic and scientific studies. For this, setting up of a Museum in Kavaratti Island was proposed during the V Plan period and this has been sanctioned. Preliminary work on this scheme has already started and the building is also expected to be

ready during 1980-81. This scheme will continue during the VI Plan period also and is expected that by the end of the Plan a beautiful Museum will result. Necessary provision for the staff and other expenditure on specimens, preservatives, etc. are made.

Scheme No. 6: Training of Personnel

Substantial progress has been made in the development of fisheries in this Union Territory during the past years. There is great hope for further improvement. In order to efficiently handle the technical aspects in the department for its proper growth, technically trained hands are essential. With this idea, the administration has been giving training to its staff in different fisheries courses in the country, including the Central Institute of Fisheries Education, Bombay. During the VI Plan it is proposed to train two inservice candidates in the C.I.F.E. and necessary provision is made.

Scheme No. 6-A: Setting up a Fishermen Co-operative Society for fishing boat owners at Agatti.

The scheme envisaged the organisation of the fishing boat owners at Agatti under a Co-operative Society to cater to their needs of spares, fuel, fishery requisites, etc. and to undertake the marketing of fishery products. Accordingly, a provision of Rs.1 lakh has been made in the Annual Plan 1980-81. Though continuous earnest effort was made with the fishing boat owners, their response to the formation of the Society was negative. It is convinced that the scheme cannot take shape and hence is constrained to drop. As such, no allocation is proposed for the last 4 years of the VI Plan.

Scheme No. 7: Administrative set up

Remarkable improvement has been made in the field of fisheries development in Lakshadweep. Where there was practically no organised fisheries operation, there are now more than 200 mechanised fishing boats working in different fishing centres landing nearly 4,000 tonnes of fish in place of a meagre quantity of 350 tonnes, increasing the production more than 10 fold. The total income for the Union Territory out of the fishing comes to nearly Rs. 1.2 crores annually. The per capita availability of fish in Lakshadweep is above 100 kgs.,

which is the maximum for any State or Union Territory in the country. Lot of people have been attracted towards fishing from a community which was basically agriculturists and there are nearly 3,000 people now fully engaged in fishing. People have been given training in fishing. Many fishing grounds have also been located. There are two Boat Building Yards established in this Union Territory constructing the requirement of mechanised boats in this area. Besides, there are 10 workshops which attended to the maintenance and repairs of boats. The canned tuna produced from the Canning Factory, Minicoy under the Department of Fisheries is sold all over the country and also exported. The Fishermen Training Centre is imparting training to youngsters in fishing and fish technology. In the field of diversification, besides tuna, shark fishing is being established and considerable progress has been made. On the whole, the contribution of the Department of Fisheries for the improvement of the economic condition of the people has been remarkable. When compared to the resources available there is scope for much more development and the Department of Fisheries is keen to do its best in the field.

However, the administrative machinery presently available in the Fisheries Department is inadequate to manage the multifarious activities. There are no officers to assist the Director of Fisheries in the headquarter as well as in the field other than the Assistant Director of Fisheries, who is looking after the Marketing and Procurement at Cochin. To improve the situation, it is necessary that the Director of Fisheries is provided with an officer to assist him technically in the headquarters for which the post of Deputy Director of Fisheries is suggested. Minicoy is a traditional fishing centre, where tuna Canning Factory is functioning. With hard working fishermen available in the island there is much scope for future development in this island provided matters are properly managed. A post of Assistant Director of Fisheries is proposed for Minicoy in this regard. The posts of SAS Accountants and Administrative Officers which were proposed during V/Plan awaiting Five Year sanction also are included in the VI Plan.



Scheme No. 8: Procurement and Marketing Division at Cochin

Materials and equipments for running the different establishments under the Department of Fisheries are procured from different parts of the country through the Marketing Section at Cochin. Similarly, fishery products like canned tuna is marketed also through this section. Presently this establishment is under an Assistant Director of Fisheries. An outlay of Rs. 7.9 lakhs have been included for the V Plan period for meeting the salary of the staff like Accountant, Supply & Marketing Officer and Clerks and for meeting the contingent expenditure, rent, etc.

Scheme No.9: Boat Building Yard at Chetlat

There is a Boat Building Yard under the department functioning at Chetlat Island. The Yard is not yet equipped with wooden working machinery, tools, etc. Necessary staff also is not in position. Therefore, it is proposed to appoint a Supervisor in the Yard for purchase of tools and equipments. Necessary provision is accordingly made.

Scheme No. 10: Maintenance and repairs of mechanised boats

There are 10 inhabited islands in this Union Territory and fishing is conducted in all these islands with mechanised boats. As these islands are isolated from each other they have to be self-sufficient in the facilities for maintenance and repairs of boats. Therefore, workshops have been established in all the islands. However, few are yet to be equipped properly with necessary machinery and tools. So also spare parts for maintenance of the engines will have to be stocked for issue to the fishermen. It is also felt that in major workshops it is necessary to have services of Junior Engineers. Proposals in this regard have been made in the V Plan and provisions made accordingly.

Scheme No. 11: Establishment of a marine park in Suheli

The exquisitely beautiful islands of Lakshadweep are of coral formation. The vast lagoons harbouring a rich and colourful flora and fauna, is a treasure for the whole nation. The coral formation on the mainland coasts are getting depleted due to indiscriminate exploitation and also due to excessive influx of sewage and industrial waste as well as turbidity caused by dredging. Looking from this angle, it is obvious that the islands and lagoons in Lakshadweep are most ideally

suited for marine parks and reserves since chances of pollution due to sewage effluence are nil and many of the islands have so far remained unmolessted by human interference. However, recently with the advent of development programme in Lakshadweep man has been invading most of the islands with the idea of modernising, the inhabitants not knowing in the least that it is a serious threat to the marine life. Perhaps, in due course the endemic flora and fauna may change or get depleted depriving the posterity of all the knowledge and beauty of the marine life which the islands now present. Therefore, it is proposed to declare some of the uninhabited islands in Lakshadweep group as National Marine Parks and reserves. As the first step the proposal for VI Plan period is to establish a marine park in Suhelipar and its lagoon. This reef consists of two small uninhabited islands within a large lagoon.

The proposal for establishment of a marine park in Suhelipar is in line with the thinking of the Department of Science and Technology which has seriously taken up the problem of damage to coral growth and attempt to find solution to preserve it. For the execution of the scheme the administration will request the Department of Science & Technology for guidance and assistance. Necessary legislation also have to be brought in for the establishment of the marine park.

A provision of Rs. 5.3 lakhs during the VI Plan is proposed for the programme of studies and appointment of an Assistant Director of Fisheries, Warden, Field Assistant, Boat Crew and procurement of two boats.

Scheme No. 12: Civil Works

The works envisaged under the scheme are the completion of the office buildings at Chetlat, Androth and Agatti Islands. The construction of Museum building at Kavaratti also will be completed during the Plan period and also the compound wall for the Boat Building Yard, Chetlat.

Scheme No. 13: Establishment of a Fisheries Corporation for Lakshadweep

Lakshadweep waters is rich in its fishery resources and it is the richest centre of tuna in the country. It is estimated that the potential annual exploitable resources in this area is about 2 Lakh tonnes consisting 50,000 tonnes of pelagic tuna, 50,000 tonnes of sub-surface tuna and one lakh tonnes of shark. However, presently only about 4,000 tonnes of fish are

landed in Lakshadweep as the fishing operation at present is confined to close vicinity of the islands, employing small mechanised boats by the island fishermen. Tapping of the resources beyond a certain limit is impossible with these boats and exploitation of these rich resources for the development of Lakshadweep and for the benefit of the country at large is a long felt need. Tapping of these resources is possible only with the introduction of large size vessels managed by commercial organisations. Lakshadweep Fisheries Corporation is proposed in this regard. By establishing the Fisheries Corporation, the hitherto untapped fishery resources in Lakshadweep waters will be exploited and expertise will be created on tuna and other high sea fisheries. This will also improve the economic conditions of the area and provide employment to a large number of people. Tuna being an exportable item will earn considerable foreign exchange also. For the country this would be a good diversification in the field of Fisheries. The land area being limited in Lakshadweep, the development of the marine resources is the only avenue for future development of the islands.

Proposals with a project report for the establishment of a Fisheries Corporation were submitted to the Ministry of Agriculture in May, 1980 and it is hoped that it will be approved by the Ministry. The highlight of the scheme is chartering of three large size fishing vessels, including one tuna purse seiner, one pole and line vessel and one long liner with foreign expertise for operation for a limited period with provision for training the Indian crew. According to the proposal submitted, after a certain period of operation, these vessels could be purchased or the Corporation can go for new vessels. The establishments of tuna and shark processing centres and the expansion of the existing tuna canning factory in Minicoy also are included in the scheme. The operational cost of the project for one year with chartered vessels is worked out to Rs. 1,90,33,000 with an anticipated profit of Rs. 14,33,400. Since a decision is still awaited from the Ministry, we have included only token provision during 1981-82 and 1982-83,

3. Fisheries extension needs for effective implementation of the VI Plan schemes.

3.1. Realistic organisational set up for fisheries extension at different levels and coordination.

Nil

3.2. Technological needs

The establishments of a marine park and a Museum are proposed in the VI Plan. For the implementation of these schemes technical assistance from C.M.F.R.I., N.I.O. and Zoological Survey of India is necessary.

3.3. Linkages desired with various organisations

Technical and scientific improvements in pole and line tuna fishing is necessary, which the C.M.F.R.I. and C.I.F.T. may be able to provide.

3.4. Fisheries educational needs

Specialised training in different methods of tuna fishing is necessary.

3.5. Training of extension personnel & Type of training

It is desirable that few of our existing staff are trained for block level extension work.

3.6. Training of fishermen.

Not proposed.

3.7. Improvements in extension methods

We have no separate extension wing in existence to suggest any improvement in the extension methods. But we would like to implement all methods which will help extension work.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980

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STATUS OF FISHERIES EXTENSION IN ARUNACHAL PRADESH

BY A.K. DAS

Deputy Director of Fisheries,  
New Itahnagar, Arunachal Pradesh

1. Present Status of Fisheries Extension

1.1. Fisheries Extension schemes undertaken:

Fisheries programme has been initiated in Arunachal Pradesh in the year 1959 in a very modest way. The main objective of Fisheries activities is to provide Extension Service to motivate the local people to take up pisciculture in right earnest as there is no trace available of traditional fish culture. But specific programmes on Fisheries Extension activities in an organised way have been undertaken only in January 1979 with the establishment of an independent Extension Unit.

1.1.1. Title and scope of each scheme:

So far only one scheme i.e. Survey and Extension is under implementation. The scheme envisages to train as well as motivate the local farmers through various Extension media like group discussion, holding farmers training camp, conducted tour, method demonstration, result demonstration, film shows etc.

It has been observed that the scheme is very effective and the farmers responded encouragingly to modern techniques of pisciculture and, therefore, there is a great scope of further dissemination of the present programme throughout the entire Union Territory.

1.1.2. Period of implementation:

It will be continued upto the end of Vith Plan.

1.1.3. Technology - based schemes:

The scheme relates to the adoption of modern technologies of Inland Aquaculture and use of modern gears and crafts.

1.1.4. Service - based schemes: NIL

1.1.5. Fisherman welfare programmes: NIL

1.1.6. Brief description of 1.1.3, 1.1.4 & 1.1.5. Not applicable.

1.1.7. Source of technology for 1.1.3.:

Modern Technology as evolved by CIFRI.

1.1.8. Physical targets and achievements of schemes:

The scheme of Extension activities is undertaken on an experimental basis. However 15 villages have been covered under this scheme covering a population of approximately 19,000 during 1979-80.

1.1.9. Financial targets and achievements of schemes:

Rs. 0.50 lakhs in the year 1979-80.

1.1.10. Impact of schemes on development:

1.1.10.1. On production means (Craft/gear) : Per capita catch increased by 2%

1.1.10.2. On Production:

At the end of Fourth Plan the production level was 120 tonnes but due to the application of modern technology, during the end of Fifth Plan the level of production raised to 350 tonnes.

1.1.10.3. Socio-economic conditions:

No record in support of existence of fish culture in Arunachal Pradesh is available. With the initiation of Fisheries Department there are now about 2000 nos. of domestic fish ponds

and the villagers are getting good return out of it.

1.1.10.4. Services to society: NIL

1.1.10.5. Infrastructure facilities: NIL

1.1.10.6. Marketing facilities: NIL

1.1.10.7. Fishermen Welfare: NIL

1.2. Schemes for fishermen community taken up by departments other than fisheries department:

Schemes under Integrated Rural Development etc. on 50% subsidy taken up by Department of Rural Development.

1.2.1. Implementing agencies:  
Community Development Blocks.

1.2.2. Programmes:  
Construction of small sized ponds.

1.2.3. Impact:  
To improve the economic condition of the beneficiaries.

1.3. Fisheries Cooperatives: Not available.

1.4. Education & Training:

1.4.1. Education programmes & facilities (Fisheries schools etc):

NIL

1.4.2. Training programmes and facilities:

1.4.2.1. General in-service training:

In service personnel are being trained from outside Arunachal i.e. CIFE (ICAR), Barrackpore and Agra.

1.4.2.2. Extension staff training: Not available. But the staff are being trained from Fisheries Extension Training Centre, Hyderabad.

1.4.2.3. Cooperative staff training: Not available.

1.4.2.4. Fishermen training (Fishermen Training centre etc):

We have Fisheries Training Unit attached to Gram Sevak Training Centre for training local farmers (there are no local people as fisherman by caste or by profession).

1.4.2.5. Non-formal education:

The villagers are also being taught individually or in groups in regards in the methodology of pisciculture.

1.5. Information & communication services: No separate service.

1.5.1. Types of information regularly provided to fishermen:

The villagers are being informed from time to time about the advanced/improved technologies of Inland Aquaculture.

1.5.2. Modes of communication: Broadcast by local Radio Station, by Audio visual aids, personal contact etc.

1.5.3. Impact of the services on fishermen:

The impact of our extension services is worth mentioning. Day by day the demand for assistance for fisheries project by the villagers is tremendously increasing.

1.6. Linkages with other organisations on fisheries extension:

Linkages with Centre (Dept. of Agriculture, Fisheries Division, Extension Directorate of Union Ministry etc.): NIL

1.6.2: Linkages with fisheries research organisations for technology/training:

CIFRI, Barrackpore, CIFE (ICAR), Bombay.



1.6.3. Linkages with fisheries education organisations for education training: NIL

1.6.4. Linkages with fisheries training organisations : CIFE, Bombay.

1.6.5. Linkages with public financing institutions: NIL

1.6.6. Linkages with Fisheries cooperatives: NIL

1.6.7. Linkages with any other organisations relating to fisheries matters:

North Eastern Council, Shillong.

1.7. Organisational set-up for fisheries extension:

Our Extension unit is attached with our present organisational set-up of Fisheries Department. No separate organisation for Extension unit is in existence, but only one officer (Fisheries Superintendent Extension) is attached to it.

1.7.2. No. of extension personnel in each cadre : NIL

1.7.3. Location of extension centres and their jurisdiction:

Along, District West Siang, Arunachal Pradesh. At present jurisdiction of Extension Unit is East/West Siang District.

1.8. Constraints and problems in fisheries extension:

1.8.1. Technological: NIL

1.8.2. Inadequacy of personnel at different levels:

Due to lack of trained personnel in Extension methods the programme of organised extension is not satisfactory. But action is being taken to train more in-service personnel.

1.8.3. Lack of training facilities: NO

1.8.4. Technological gaps: NO

1.8.5. Financial constraints:

Due to paucity of funds allotment the existing Extension unit could not be further expanded.

1.8.6. Performance gaps: NO

1.8.7. Social: NO

1.8.8. Economic : NO

1.8.9. Policies and priorities : The local Government is yet to be convinced for the benefit of Extension services and hence not very much eager for strengthening Fisheries Extension set-up.

2. Fisheries development programmes envisaged in the VI Plan  
(Please give brief notes on all the fisheries schemes envisaged for the VI Five Year Plan):

Formulation of Sixth Five Year Plan 1980-81 TO 1984-85

During the revised Sixth Five Year Plan an outlay of Rs. 120.00 lakhs has been proposed with an additional target of production of 500 tonnes of fish against 350 tonnes at the end of 1979-80.

To meet the target, specific programmes and well defined schemes are proposed to be taken up under fish production programme and ancillary programmes like Survey, Statistics, Training and Research.. The salient features of proposed programmes are as below:

1. Direction & Administration: For proper implementation of the schemes and to achieve the accelerated production target as envisaged, strengthening of fisheries organisation is necessary.

2. Education & Training: This scheme envisages to intensify the training programme of farmers in groups by organising short term training courses on Fisheries Technology in some existing fish seed farm and in some selected places so that 'LAB TO LAND' programme could be utilised meaningfully for the interest of the farmers. This will encourage the farmers to take up self-employment as well on fisheries.

3. Intensive fish farming: It is proposed to construct more number of village domestic ponds, and Individual/Community fish farms to improve the economic status of the farmers in the rural areas. This will also raise the level of fish production and meet the demand of local markets to some extent.

4. Construction of fish seed farm & fish farm including expansion and improvement : This scheme envisages to gain self sufficiency in respect of fish seed and production of table fish to a limited extent.

4. a) Fish seed production by induced breeding and seed and fish collection from the natural sources:

i) Induced breeding programme: This envisages production of quality fish seeds which is an essential pre-requisite of fish farming. In some of our fish seed farms there are mature carp. Under the varied agro-climatic and topographical conditions experimental trial of induced breeding programme will be taken up.

ii) Fish & Fish Seed collection from natural sources: This scheme is for the collection of local economically important indigenous fish and fish seeds from accessible natural sources and culture them in impounded waters. This will be taken up on experimental trial to study the biology of local commercial species.

This programme would help to overcome transportation bottleneck of fish seeds from long distances and the demand could be met locally.

5. Paddy-cum-fish culture: For obtaining subsidiary protein crop along with paddy this scheme proposes for expansion of this activity under direct guidance and supervision of the Department which has already made a good head way in high altitude areas.

6. Reclamation of swamps, Beels, Lakes & air breathing fish farming:

(i) There are a good number of beels & lakes etc. in existence in Territory. It is proposed to reclaim and develop these water bodies for systematic fish culture.

(ii) There are also swampy and neglected water areas which are not feasible for reclamation. In these water bodies it is proposed to take up pilot project of Air-Breathing fish farming.

7. Fisheries, Survey, Statistic & Extension:

(i) Survey & Statistics: This will deal with collection, compilation and interpretation of data like statistics of resources, magnitude of potential and utilisation, the pattern of production in time and space, man power engaged, input required for fishery, cost of production, cost structure, marketing, profits, etc. This scheme envisages planning and economics and also formulation of plan and schemes.

(ii) Fisheries Extension: This unit has been set-up recently and it is proposed to increase extension facilities throughout the entire Territory.

8. Trout culture: This scheme has been successfully launched both for sports and commercial purposes. The Brown trout has been established in the natural streams and attempts for establishing Rainbow trout in the stream will be made.

9. Infrastructure programme: This scheme is envisaged for construction of functional, residential buildings and transport facility. The main bottleneck in Arunachal Pradesh is difficulty in mobility of officers & Staff for covering long distances to gear up developmental activities and carriages of inputs in time.

The Department is facing hardship for want of truck for lifting bulk fishery stores like fish seeds, fish feed, fertilisers, manure etc. Hence it is proposed the purchase at least 4 trucks for 9 districts and 4 more jeeps for timely transportation of inputs to the interior places.

10. Miscellaneous Marketing, Gears & Tackles: This includes schemes which are not mentioned above.

(i) Marketing: Our main production of fish comes from the Bheels & Lakes of Lohit District and it is proposed to take up a scheme on experimental basis for procuring fish from the landing place for public sale at the township/H.Q. of shortest distance so that fishes do not move outside the State.

(ii) Tackles & Gears: This scheme envisages supply of modern gears to the progressive fish farmers for increasing per-capita fish catch so that destructive methods of catching fish like poisoning, dynamiting etc. are avoided.

3. Fisheries Extension needs for effective implementation of the VI Plan schemes

3.1. Realistic organisational set up for fisheries extension at different levels and coordination:

It is proposed to create feeding posts of Fisheries Extension Officer for 9 districts who will be under the technical guidance of Superintendent of Fisheries (Extn) whose H.Q., is at Along in West Siang District (Fisheries Extension Unit). These Officers will be responsible for Extension work on organised pattern and they will be assisted by Fishery Demonstrators and also by the Superintendent of Fisheries of the concerned District.

3.2. Technological needs:

For this we will contact CIFE, CIFRI, CMFRI, NEC.

3.3. Linkages desired with various organisations: Directorate of Extension, Ministry of Agriculture, New Delhi, CIFRI, CMFRI, CIFE etc.

3.4. Fisheries Education needs:

It is proposed to further diversify the training courses in the existing Fisheries Training Unit attached to G.T.C., Pasighat.

3.5. Training of extension personnel & type of training:

3.5.1. State-level Officers : Not proposed.

3.5.2. District/Regional-level Officer: District level Officer will be proposed.

3.5.3. Block-level Officer: Not proposed.

3.5.4. Village-level workers: Not proposed.

3.6. Training of Fishermen:

3.6.1. Diversification course in Fishermen Training Centre: . .  
Proposed.

3.6.2. Training in additional vocations: Proposed

3.6.3. Training of fish farmers:

It has been proposed to set up an Independent Farmers Training Unit for training the farmers.

3.6.4. Training in cooperative management: NO

3.6.5. Non-formal education: YES

3.7. Improvements in extension methods:

3.7.1. Demonstrations of technologies:

It is proposed to further improve Demonstration technologies by providing more fund to the entrepreneurs for establishment of Fish Farm instead of domestic fish ponds so that their level of income is raised.

3.7.2. Fisheries Information Service:

It is proposed to broadcast monthly from local Broadcasting Radio Station the development activities of Fisheries in local language and publish in local languages package of recommended practices to improve their existing fish ponds for increasing the yield.

3.7.3. Audio-visual aids: Proposed for more Audio-visual aids for meeting the requirement of proposed organised Extension activities throughout this Union Territory.

3.7.4. Proper utilisation of Mass Media: Proposed

3.7.5. Creation of Fishermen Forum: Not applicable at present.

3.7.6. Collection, transmission and utilisation of feed-back information:

It will be done for further improvement.

3.7.7. Monitoring and evaluation: It will be done.



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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980  
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STATUS REPORT ON FISHERIES EXTENSION

OF HARYANA STATE

BY DIRECTOR OF FISHERIES HARYANA, CHANDIGARH

1. Present status of fisheries extension

1.1.1 Scheme for the Fisheries Education, Training & Extension (plan).

1.1.2 The above scheme was formulated after merging the scheme for research and extension in the year 1978-79.

1.1.3 Under the scheme for extension, education and training, the department propagates fish farming technology in village ponds, irrigation tanks constructed for flood control measures, marshy areas and cat-fish culture in water works tanks and old ponds.

1.1.4 Nil.

1.1.5 Nil

1.1.6 (a) The Schemes for Intensive Fisheries Development Programme in village ponds was launched during the year 1979-80. Under the scheme stocking rate has been increased to 10,000 per hectare besides providing financial assistance to fish farmers for renovation of ponds and on inputs.

(b) Under the scheme for development of Cat-Fish Culture in water works tanks/ponds a cat-fish seed farm has been developed and investigations are in progress for the production of cat-fish seed.

(c) There is about 250 hectares marshy area in the Haryana State. A scheme for the renovation of marshy area was launched during the year 1979-80 under which it is envisaged to construct fish production units which are to be leased out to the fish farmers on long lease.

(d) Haryana State has constructed large number of big sheets of water for flood control which are to be brought under fish culture. A fish seed farm having 4.5 hectare area has been established near Bhindawas lake having about 550 hectare water area in district Rohtak. Financial assistance to the tune of Rs. 7500/-per hectare is provided to the farmers.

1.1.7. Central Inland Fisheries Research Institute, Barrackpore and Govt. of India.

1.1.8. Physical Targets:

S.No.	Item	Unit	Target		Achievement
			1978-79 base year.	Sixth plan	1978-79
1	2	3	4	5	6
1.	Renovation of pond/large water sheets	Hectares	-	300	-
2.	Stocking of water area	"	350	1850	350
3.	Nursery area	"	11	40	11
4.	Fish Seed Production	(Million)	2.07	25.00	2.07
5.	Fish Production	(000 ton)	2.00	12.00	2.25
6.	Training to farmers	(No.)	100	800	100

	1	2	3	4	5	6
<b>1.1.9 Financial Targets: (Rs. in lakh)</b>						
1. Scheme for Education, Training & Extension	-	2.00	17.00	2.00		
2. Intensive Fisheries Development Programme	-	15.34	61.37	15.34		
3. Development of Cat-fish Culture	-	1.00	10.00	1.00		
4. Development of Fisheries in Marshy Area	-	5.00	25.00	4.94		
5. Development of Fisheries in Irrigation Tanks	-	3.00	18.00	2.95		
6. Fish Farmer's Development Agency	-	5.11	29.63	5.11		
		31.45	161.00	31.34		

**1.1.10 Impact of Scheme on Development:**

1.1.10.1 Nil.

1.1.10.2 Extension programmes launched by the department has created a class of fish farmers and fish production has increased to 2.25 thousand tonnes against a target of 2.00 thousand tonnes.

1.1.10.3 Revenue from village ponds has increased manifold. It was not more than Rs. 5.00 lakh in the year 1976-77 whereas now it is more than Rs. 16 lakh per year. About 300 farmers are earning their livelihood by doing fish farming in ponds. Keeping in view the income derived from ponds, it is quite evident that Socio-economic condition of fish farmers have undergone a change to a great extent.

1.1.10.4-

to

1.1.10.7 Nil.

1.2. There is no such Schemes operating in Haryana State.

1.3. Fisheries Cooperatives:

- 1.3.1. There is only one cooperative society functioning in the State which is a primary society.
- 1.3.2. Only one cooperative society.
- 1.3.3. As per the last audit report of the Cooperative Department the total financial outlay of the society was Rs.7350 only.
- 1.3.4. The primary society functioning in the State is mainly engaged in exploitation of fish from public waters and its marketing. Society takes part in open auction of public water and enjoys 10% preference over the other bidders.
- 1.3.5. The performance of the society is very poor and the audit report shows little dividends and reserve funds. Poor performance is mainly due to lack of interest among the members and non-adoption of modern techniques in exploitation and marketing of fish.
- 1.3.6. The management of society is entirely in the hands of managing committee of the society selected amongst the members who are only 11 in numbers. Thus the management is restricted to a few persons.
- 1.3.7. Nil.

1.4. Education and Training:

- 1.4.1. Haryana State for the first time opened a fisheries training centre at Nilokheri, district Karnal. Besides imparting regular training at this centre, the department arranges lecture, field demonstrations, exhibition at village level under the extension programme. Further, three Fish Farmers' Development Agencies operating in District Karnal, Sonapat and Rohtak also imparts short duration training to farmers selected under the scheme.

1.4.2. Training Programmes & Facilities:

- 1.4.2.1. Since there is no fisheries College and School in Haryana State, the in-service personnel are deputed every year to C.I.F.B. Bombay, Barrackpore, Agra and Hyderabad.
- 1.4.2.2. Only recently department has started deputing personnel to get training in extension methods & techniques at Central Fisheries Extension Training Centre, Hyderabad.
- 1.4.2.3. Nil
- 1.4.2.4. As in para 1.4.1. above.
- 1.4.2.5. In order to propagate and popularise modern fish farming techniques from lab-to-land, the department arranges lectures, film shows, field demonstration, exhibitions in rural area and farm visits. Department also maintains few ponds in selected blocks for giving method and result demonstration in pond culture as well as in induced breeding techniques. Extension personnel conduct induced breeding and common carp breeding experiments on pond sites to popularise the techniques. Angling competition is arranged as a regular annual feature besides broadcasting talks on fisheries in "Gramin Karaya-Karam" of AIR Delhi & Rohtak regularly.

1.5. Information and Communication Services:

- 1.5.1. Fishermen/fish farmers are kept informed with the results achieved in inland fisheries at National and State level so that they may improve their methods of fish culture practices. All types of technical assistance is provided to fish farmers leading to better fish yield.
- 1.5.2. Communication plays a vital role in dissemination of technology and it should suit both educated and uneducated masses. Department pays more attention on personal contacts by paying farm visits, distribution of printed

material in local language besides utilising mass media communication aids.

1.5.3. It is mainly due to timely information and communication services provided in the rural area that presently there are more than 300 fish farmers and a few of them are producing fish yield as high as 6500 kg. fish per ha per year whereas there was no such class prior to 1975. Now people representing different class, castes and communities are coming forward to take up fish cultural practices in leased ponds or ponds constructed in their own land. It is the impact of extension services that a private fish farm first of its kind in Haryana State has been established at Kundli village near Delhi.

1.6. Linkage with other organisation on fisheries extension

1.6.1. The State Government has a close coordination with the Department of Agriculture, Government of India for operating the three Fish Farmers' Development Agencies in the State which are primarily meant for propagation of advance technology in pond culture. However there is no linkage between the State Government and Extension Directorate of Union Ministry for Fisheries Extension. A few years back Department of Fisheries had submitted a proposal to the Central Government for sanctioning an extension scheme under the central sector but unfortunately the scheme could not be sanctioned.

1.6.2. One unit of the coordinated project on composite fish culture sponsored by the C.I.F.R.I. Barrackpore was allocated to Haryana State during the year 1971 which has been functioning at Government Fish Seed Farm, Saidpura, District Karnal since then. Recently the unit has adopted some village ponds for demonstrational purposes. There exists a regular transmission of information in between

the composite culture unit and the Fisheries Department. The department deutes in-service personnel to attend summer institute organised by the C.I.F.R.I. besides organising Lab-to-Land programme in collaboration with composite fish culture unit. There also exists flow of valuable information on Fisheries Science in between the various fisheries research organisations under the control of I.C.A.R. and the State Fisheries Department.

- 1.6.3. Fisheries Department of Haryana deutes in service personnel to the various centres of C.I.F.E. for training in fisheries administration and management besides inviting trainees from Agra Centre of C.I.F.E. to the Government, Fish Seed Farm Badkhal district Faridabad for conducting induced breeding experiments. Fisheries Department organised a seminar in coordination with the Haryana Agriculture University for the first time in Northern India to identify the problems and constraints in the field of fisheries extension and culture aspects.
- 1.6.4. As described in para 1.6.3.
- 1.6.5. Since the socio-economic status of fishermen community is poor, bank finance is arranged for the renovation of village ponds and to meet out the expenditure on inputs. Personnel from the banking institutions are invited for the district meetings for thrashing out problem of finance for fisheries projects.
- 1.6.6. Nil
- 1.6.7. Nil

1.7. Organisational set up for fisheries extension:

1.7.1. 0

1.7.2. 0

Organisational Set-up for Fisheries Extension

S.No.	Designation	Class	Area of jurisdiction	Total No.
1.	Director	Class I	State	1
2.	Deputy Director	"	"	1
3.	Project Officer	Class II	Project	1
4.	Fisheries Development Officer	"	District	11
5.	Fisheries Officer	Class III	Block	34
6.	Asstt. Fisheries Officer	"	"	8
7.	Extension Assistant	"	"	4
8.	Field Assistant	Class IV	Village level	23
9.	Fisherman	"	"	118

TRAINING WING

1.	Fisheries Research Officer	Class II	State	1
2.	Training Superintendent	Class III	"	1
3.	Extension Officer	" "	"	1
4.	Training Assistant	" "	"	2



1.7.3. The extension centres are located at block level with the jurisdiction of respective block headed by the Fisheries Officer. Other field staff working at block level are posted in rural areas depending on the availability of water resources and fish production potential.

1.8. Constraints and Problems in Fisheries Extension:

1.8.1. No doubt the science of fisheries has advanced to a great extent and significant achievements have been made in the field of inland fisheries to achieve a breakthrough in many aspects, such as hypophysation, feeds, fertilizers and manures, composite culture, air breathing fish culture and cage culture etc. However, the findings have not been disseminated to the field. Not much efforts have been made to bridge the gulf between the research centre and the farmers in the matter of introduction of improved method of aquaculture. Moreover, the technology is not self-sustained, for example, a record fish yield of as high as 10000 kg/hect./annum in composite fish culture of six species and 6 to 10 kg. per sq. meter in cage culture have been reported to be produced at various research stations but the technology has not been tried in the field conditions and no efforts have been made for making available the quality fish seed of Indian major carps and exotic carps as well as air breathing fishes in desired quantity and proportion. The fisheries research organisations have not paid much attention on the area-based needs while evolving the fisheries technology; for example, people inhabiting the Northern part of India fears to take carp fishes due to intramuscular bones in the flesh. However they relish less bony cat-fishes which are in great demand in this part of India. Unfortunately nothing

has been done on the cultural aspects of species like W. attu, Mystus singhala and Pangacius pangaso.

~~Further the technologies evolved~~ by the fisheries scientists are so cumbersome that these are out of reach of common person both financially as well as physically.

- 1.8.2. To bring a change in attitude, skill and knowledge of common man we need dedicated and expert extension workers up to grass-root level. Like that of Agriculture where different type of extension workers are available at village level, nothing of such type has been done in the fisheries sector. In most of the states only one extension officer assisted by few field workers are posted at village level irrespective of the length and breadth of the area and fisheries potential, assigning him multipurpose duties such as stocking of village ponds their renovation, collection and production of fish seed besides loading him with the clerical duties.
- 1.8.3. Presently there are few training centres in India where fisheries education and training is imparted to the fishermen and inservice fisheries personnel.
- 1.8.4. Various techniques evolved in aquaculture have not been propagated in the field and are still limited to the research laboratories and Govt. Fish Seed Farms. There is also a lack of feed-back process and area-based technology. Moreover technologies evolved under certain specific climatic conditions have not been tried in different climatic zones of India prior to their recommendation for adoption.
- 1.8.5. Financial constraints are hampering advancement of aquaculture. Banking institutions provide loans for fisheries on commercial rate of interest and repayment within a short duration. Since the fish takes more than a

year to attain marketing size, most of the banks hesitate to advance loans for fisheries. Lack of any fisheries insurance facilities also forbids banks as well as borrowers for securing finance for fish farming at heavy rate of interest.

1.8.6. Nil.

1.8.7. The socio-economic status plays an important role in

1.8.8. adoption and propagation of advance technology. The present level of education and awareness among fish farmers and fishermen is a major constraint in adoption of aquaculture technology. Our fish farmers do not have the required finance for adopting costly technology which further hampers the extension work.

1.8.9. The Government gives more stress on revenue while sanctioning a project ignoring basic principles of extension and development.

2.0. Fisheries Development Programmes of Sixth Plan  
Scheme for the Intensive Fisheries Development Programme in  
Village ponds

A record yield of 8000 kg fish per hectare per annum has been achieved as compared to an average of 600 kg fish per hectare production in the village ponds. Stocking rate shall be increased to 10,000 fish seed per hectare under intensive fish farming. The farmers shall be given 25% subsidy on inputs at 5000/- per hectare water area besides 50% matching contribution for renovation of ponds at Rs. 15,000 per hec. water areas. The Department will also help fish farmers to secure loans from financial institutions. It is planned to encourage fishermen cooperative societies. The ownership rights of ponds vest with the

Panchayats who take little interest in fish farming. Therefore, efforts shall be made to give long lease of ponds, preferably to scheduled castes, backward classes and sections of economically backward people of the same village. The lessee shall be imparted short duration training in fisheries management.

In order to bring 500 hec. pond area under intensive fish farming, the Department will require about 15 million quality fish seed. Production capacity of the existing fish seed farms shall be increased through advanced hatchery technology. Under the proposed project, it is envisaged to provide employment to about 500 villagers out of which 200 fish farmers shall be provided subsidy on inputs and matching contribution for renovation of ponds. About 2000 tonnes fish having market value of Rs. 100 lakh against a total capital cost of Rs. 22.70 lacs shall be produced by the end of 1985.

#### Scheme for the Development of Fisheries in Abandoned canals

There are about 40 canals running over about 1000 km in the State which were once constructed for irrigation purposes but have been abandoned by the Irrigation Department. In addition to abandoned canals, there are a large number of low lying depressions along the running canals or from the catchment area of the adjoining agriculture fields during the monsoon period. These canals and depressions can be developed into fish production units providing remunerative job opportunities to more than 44 families to the weaker section of the society.

It is a continuing scheme and the department has already renovated about 16 hectare area in the Karnal and Sonapat districts. The units thus established shall be leased out to fish farmers who have training in fisheries. These units shall be leased out to weaker section of the society for fish farming. It is envisaged to reclaim 25.60 hectare additional area during the 6th Plan period. With the renovation of additional area, 0.44 million fish seed shall be required for stocking these waters. Technical and financial assistance shall also be provided to the fish farmers. The main objective of the scheme is to utilise low lying unproductive areas for the production of food.

Under the proposed scheme 5.00 million fish seed and 412 ton fish worth of Rs. 2.50 lakh and Rs. 20.60 lakh respectively shall be produced during the 6th Plan period 1980-85 besides providing gainful employment to more than 44 families.

Scheme for the development of fisheries in Marshy area

There are about 300 hectare waste low lying marshy area in the districts of Rohtak, Sirsa, Karnal, Gurgaon, Faridabad and Sonapat which are lying fallow. Such marshy areas are infected with aquatic weeds and remain submerged under water throughout the year. The available marshy area can be developed into fish production units consisting of series of nurseries, rearing and marketing ponds. During the last year, the department had acquired about 18 hectare marshy area situated between Dadupur and Tajewala in Ambala distt. and a part of it had been renovated. It is envisaged to acquire about 5.00 hectares marshy area for fish seed production and fish production units during the 6th Plan period ending 1984-85. The fish production units shall be leased out to the private fish farmers preferably to members belonging to the scheduled castes. It is also envisaged to provide employment to about 33 families, besides producing about 110.8 tonnes fish having market value of about Rs. 5.54 lakhs during the plan period.

Under the proposed scheme, fish seed/fish production units in an area of about 26 hectares shall be established by the end of Plan period. Considering the average fish seed and fish production, these units will be capable of producing 7.0 million fish seed and 110.8 tonnes fish worth Rs. 3.50 lakhs and Rs. 5.54 lakhs respectively against a total capital investment of Rs. 19.98 lakhs. Under this scheme 33 families will get gainful employment during the 6th Plan period.

#### Scheme for the Development of Fisheries in Irrigation Tanks

Substantial expenditure is made by the Government every year for flood control in Haryana. Having observed heavy loss of life, property and crops every year in monsoon period, the Haryana Government have now reactivated flood control programmes. One of the most important programmes for flood control refers to the construction of large number of big size irrigation tanks serving as storage tanks to be utilised subsequent to the monsoon period for irrigation purpose. These tanks are also going to be very rich potential resources for fish production.

Works have already been started for construction of tanks around Bhindawas in Jhajjar Tehsil of Rohtak district by the Irrigation Department. Similar programme planning is being made for construction of tanks for flood control and irrigation in Nuh tehsil of Gurgaon district and certain other areas.

Close coordination of the Fisheries Department right from the beginning stage in the programme planning by the Irrigation Department is essential to have knowledge of bottom topography, pre-impoundment survey and to ensure complete uprooting of tree trunks, rock etc. for efficient netting operation. While works in big size tanks shall be taken up by the Irrigation Department, small tanks shall be deepened by providing matching contribution to the fish farmers. About 105 hectare water area shall be renovated.

In the first phase of the development programme covering only 405 hectare water area under the irrigation tanks, there is a likely production of about 1907 ton fish valued more than Rs. 95.35 lakhs for a total capital outlay of only Rs. 1.66 lakhs, providing full-time employment opportunities to more than 105 families.

#### Scheme for Education, Training and Extension

Fisheries science and technology have advanced to a great extent. The Central Inland Fisheries Research Institute has done pioneering work in the field of inland fisheries by evolving new techniques to achieve a breakthrough in many important aspects, such as induced breeding, fish hatchery systems, nursery pond management, composite fish culture, air-breathing fish culture, cage culture, sewage pond fisheries and integrated aquaculture. However, the findings have not so far been applied in the field properly. Looking at the overall situation, there is a great need to disseminate latest fisheries technologies to the fishermen, fish farmers, fisheries personnel and related industries.

It is apparent that for a judicious, logical and reasonable planning and implementation of various fisheries programmes, it is essential to have a net work of extension agencies in the State for bridging the gap between research and the fishermen, fish farmers and the industries.

Under the proposed scheme it is envisaged to create an economically sound class of fish farmers in the State who shall adopt the advanced fisheries technology in their ponds. Village Panchayat ponds shall be leased out to the private persons and they will be trained in fish culture by the training wing of the department. It is envisaged to train about 800 persons by the end of 1985. The trainees shall be provided a stipend of Rs. 5/- per day during the training period.

Scheme for the Development of cat-fish culture in tanks and ponds

There are large number of very old tanks which can be developed for cat-fish culture. Also there are number of water works constructed by the Public Health Department. It is estimated that the total water area of these tanks is about 240 hectares. The National Commission on Agriculture has recommended to utilise these tanks for fish culture. The storage tanks of the Water Works and some old Tanks are being fed with canal water which harbour some uneconomical varieties indigenous fish. The entry of weed fish in these tanks will continue with replenishment of water from the canal. Since carp varieties are more bony and are not relished by people of this part of northern India, cat-fish which are in heavy demand here shall be cultured in these tanks. Cat-fish are, carnivorous and therefore, the weed fish found in these waters shall serve as food for the former group of fish. Cage culture shall also be taken up in running and stagnant waters to popularise cat-fish culture.

Damdama fish seed farm in Gurgaon District is being developed as a cat-fish seed farm, so that the adequate quantity of quality cat-fish seed could be produced for stocking the tanks. Besides producing cat-fish seed at the proposed farm, seed will also be collected from natural breeding grounds in flood affected areas and the rivers.

Under the proposed scheme, 7.56 million fish seed valued at Rs. 3.76 lakhs and 264.5 tonnes fish worth Rs. 1.16 lakhs shall be produced by the end of 6th Plan period. The management cost under the scheme shall be about Rs. 4.29 lakhs for the Plan period. It is envisaged to lease out fish cages to the weaker sections of society benefiting 7 families during the Plan period.



Besides augmentation and conservation of the natural fish fauna in the flowing waters, fish culture in these waters shall also be practised by adopting cage culture in collaboration with the Irrigation Department. In addition to harnessing the flowing water resources, fisheries development in lakes covering 62 hectare shall also be intensified.

Keeping in view the envisaged physical and financial targets, 314 tonnes fish worth of Rs. 15.70 lakhs shall be produced during the Plan period against a management cost of about Rs. 9.00 lakhs.

Scheme for the fish Farmers' Development Agencies Karnal, Rohtak and Sonapat

On the recommendations made by the Central Board of Fisheries, Government of India approved a Central Scheme to set up Fish Farmers' Development Agencies in every State. In Haryana, a Fish Farmers Development Agency was established during the year 1976-77 as a pilot project and subsequently two more Fish Farmers Development Agencies at Rohtak and Sonapat were established during the year 1978-79. There was no fish farmer class in Haryana prior to the establishment of these Agencies. The FFDAs have created a lasting impact on rural aquaculture. It is envisaged to lease out additional water area of 750 hectares to fish farmers during the Sixth Five Year Plan period. Loan and grants shall be provided to the fish farmers through the agencies and financial institutions.

The proposed scheme is a rural employment oriented one, benefiting scheduled castes in particular, and other weaker sections of the society in general.

Under the scheme 750 hectares pond area shall be brought under fish culture producing about 5500 tonnes fish worth Rs. 275 lakhs during the 6th Plan period benefiting 750 fish farmers families. The agencies shall produce and stock 22.5 million fish seed worth

Scheme for the Development of fish farms along bundhs

There are different types of bundhs under the control of the Irrigation Department. These bundhs have been constructed for flood control and irrigation purposes. The fishery rights in these perennial bundhs including Badkhal, Dhoj and Dandama have already been transferred by the Irrigation Department to the Fisheries Department. Bundh breeding technique which is widely practised, particularly in Madhya Pradesh, shall be adopted for procurement of seed which shall be reared in nurseries for ultimately stocking in the farm ponds. Five fish seed production units measuring 6 hectares water area shall be established near the mouth of the outlet of stocking bundhs downwards, by acquiring the land. About 16.50 million seed valued at Rs. 8.25 lakhs shall be produced. The fish seed units shall consist of nursery and rearing ponds.

The scheme aims at exploitation of bundhs for production of quality fish seed for stocking in village ponds, lakes, reservoirs and other fisheries water areas and an income of Rs. 9.25 lakhs from the sale of fish seed to be produced is envisaged against a total capital cost of Rs. 5.80 lakhs.

Scheme for Development of lake and riverine fisheries

Haryana State has fairly good lake and riverine fisheries resources which have not been harnessed by scientific and advanced technology evolved by the research institutes. Natural and man-made lakes such as Ribipur, Nazafgarh, Kotal, Morni tals, etc. provides good fisheries resources. The total water area of these lakes in Haryana is estimated at 500 hectares. There are seasonal rivers like Chaggar, Markanda and Tangri besides river Jamuna which provide good resources of capture fisheries. There is also a network of irrigation canal system running over 11,000 km besides flood control drainage system running over to 2600 km. These flowing waters also have rich fisheries resources.

Rs. 11.25 lakhs. Thus, against a management cost of Rs. 59.15 lakhs, the agencies will generate a revenue resource of Rs. 286.25 lakhs during the Plan period besides providing full-time employment to more than 750 families mostly belonging to schedule castes and other economically backward classes.

### 3.0. Fisheries Extension needs for effective implementation of the Sixth Plan Scheme

3.1. It is apparent that for effective implementation of various fisheries programme, it is essential to have a full-fledged extension agency and a close linkage with the Research and Development Department on the one hand and the fish farmers and the industry on the other. Extension is a process by which new ideas and improved techniques are carried to the farmers for their motivation and adoption and their problems, in turn, are brought to the research stations. Extension is a two-way channel and an extension officer is an important link. The effectiveness of fisheries extension depends entirely on the out-look, ability and sincerity of the extension worker. At present fisheries extension services are limited to selected pockets. In order to achieve high adoption rate of new fishery technology, extension workers of lower level having training in extension methods, should be posted at village level having jurisdiction of 5 km and a middle order extension worker should be posted in the area having 10 to 20 hectare water area and the Block-level post should be handled by a Science graduate trained as extension officer. Since the fisheries rights of village ponds and property rights of large sheets of water vest with the Gram Panchayats and other local bodies, there should be a State-level coordination committee headed by the Secretary of Fisheries Department.

3.2. The research institutions should work out different sets of recommendations pertaining to aquaculture, keeping in view the different climatic conditions, ecological factors, educational standards, awareness, skill and socio-economic status in different zones and sub-zones of India. The operational methods should be simplified with reference to the facilities and infrastructure available with fish farmers and the fishermen community as a whole. Applied research should be conducted keeping in view the needs of farmers ensuring high returns and streamlining the marketing process. Since the people of this region like cat-fishes, a research and extension centre should be established for the development of cat-fish culture in Haryana, Punjab and other Northern States of Indian Union.

3.3. At present there is no separate extension agency in fisheries sector at National level. There is a great need to have such an agency which can coordinate with various research organisations, educational organisations and public financial institutions for regular exchange of information on fisheries science besides bringing out extension materials and aids for the use of extension workers. This agency can play an important role as feed-back and can evaluate the extension process at various levels.

3.4. Presently the various fisheries educational organisations and training centres conduct long-term training programmes and that too in limited numbers. These organisations should also conduct short-term vocational, professional and refresher courses for the inservice personnel and general public. To fill up the gap of fisheries education, Agricultural Universities can play an important role by including fisheries training programmes in their activities.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980  
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IMPACT OF EXTENSION SERVICE IN THE DEVELOPMENT OF FISHERIES IN PUNJAB

BY A.K. KAWATRA

Director & Warden of Fisheries, Punjab, Chandigarh

In the implementation of any development programme concerning Fisheries or any other allied subject, monitoring and dissemination of its know-how, methodology, planning concepts etc. should be made known both to the field functionaries and recipients. The greatest pitfall in the proper implementation of any programme is that after the programme has gone from the drawing Board to the implementation stage, due to unforeseen practical problems, very little results are achieved and its schedule is also shaken and not adhered to for the obvious reason that the agency which has to play a vital role in the implementation itself lacks the preliminary know-how of the technology. This gap looks to be a very minor matter to most of us but, in fact, this is a very vital joint between the planning and implementation stages. Most of the programmes launched with the best planning die out half way through/want of adequate /for knowledge by the recipients, who are the sole agency to adopt it in the field. There is paramount necessity to bridge this gap for the successful implementation of any programme in any field of Science. In the absence of this connecting link all efforts made will be fruitless and all the amount spent will be waste of national funds.

In all well developed countries this aspect is taken care of at the planning itself by making adequate provision for extension service. This Extension Service is considered as the most vital organ of the programme, as heart in the human body. <sup>The Extension</sup> Service in the implementation of any programme can in no way be ignored or left out, if the programmes are genuinely meant to be successfully implemented in the national interest.

Punjab being an inland State, for development of fisheries only the inland resources have to be tapped, keeping in view the three major essentialities, firstly the poor socio-economic conditions of our fisher folk, secondly the propagation of advances of fisheries knowledge which has not been communicated to the required sectors, and thirdly the Finance for investment.

In the implementation of Development Programmes of the Fisheries Department dissemination of fisheries knowledge concerning renovation and improvement of ponds, eradication of predatory fishes, dewatering of unwanted aquatic vegetations, manuring and fertilisation etc. to the interested fish farmers and Panchayats, who own most of the ponds in Punjab which can be brought under fish culture, through the media of modern publicity is very essential.

To manage and improve the lot of fishermen and fish farmers, the State Fisheries Department introduced Extension service in the year 1976-77, with the sole aim of imparting the technical know-how to the fish farmers. This scheme was established as transgression agency in collaboration with other production oriented schemes. Through this media the people of the State have to be made conversant about the assistance and cooperation required from them for conservation measures to be adopted to save natural fisheries resources and to avoid depletion of stock of particular species of fish in the natural waters in order to maintain population equilibrium.

This Extension Division is also undertaking publicity work for organising Fishermen Cooperatives and also to propagate scientific and hygienic techniques essentially needed for improvement of fish trade in the State.

It is a well known fact that, in the modern times, to implement any development programme publicity of that programme through press, leaflets, pamphlets, posters, charts and audio-visual means is of great importance to apprise the people about the basic fish culture practices to be adopted according to the environmental conditions prevalent from place to place in the State. For instance the interested fish farmers must know the methods to identify the fish which he should select for stocking the ponds, and the source from which the fish seed can be procured. They should also know about the predators and weeds, manuring and fertilisation, harvesting of fish crop and arranging for the market etc. In addition to this they are required to be apprised about the day-to-day improvements in these techniques. The detailed programmes of different Fisheries Schemes launched by the Department are also being made known to the masses through wide publicity and by showing fisheries films on different subjects of pond culture, riverine and reservoir fisheries in order to create incentive to utilise every inch of suitable water area of the State for fish culture.

Thus the creation of Fisheries Information and Extension Division in the Fisheries Department both from the development point of view as well as for the enforcement of conservation measure, was of paramount importance. It is also worthwhile to state here that adequate publicity and propaganda through the means already indicated above are proving helpful for the enforcement of conservation measures in the notified and other waters of the State and will go a long way both for increasing the population of important species of food fishes in our waters as well as bringing additional

State revenue from these sources. Propagating the necessity of conservation and righteous use of fish ladders at the regulators and Barages will surely protect the brood fish, resulting in increasing its progeny, which will eventually result in the increase of fish production from these natural sources. This will also result in the availability of highly nutritious food for human consumption.

Fish is a high quality food and contains as much as 60 percent protein on dry matter basis. It is rich in vitamins and also contains variable quantities of fat, calcium, phosphorus and other minerals important to human health and growth. Inclusion of fish in the diet of nursing, expectant mothers and school going children is all the more essential for making up deficiencies.

In Japan when whale steak was introduced it was served free of cost to every school going child at the time of mid-day meals, in order to provide proper balanced diet. The other idea of serving whale steak to the school going children was to establish their taste to this item of food. Publicity and propaganda to build taste for fish in the younger generation is very essential in the State and this can only be done by arranging film shows, showing the advantage and necessity of adding fish in the diet of expecting mothers and school going children and by distributing hand bills indicating the nutritional value of fish meat. It is a hard fact that Punjabis are the poorest fish-eaters and their percentage is 0.96. Roughly, over 75 per cent fish catches from our State every year are exported to Delhi and Calcutta. This is because no publicity and propaganda work has been taken up on the modern lines for building and developing taste for fish amongst the young generation and womenfolk of this State. Through adequate publicity in this direction this State may also figure at a reasonable level in the per capita consumption of fish.



For successful implementation of Fisheries Extension Service in the State, uptill now, eight Fisheries Officers were trained at the Central Fisheries Extension Training Centre, Hyderabad. For this very purpose aid for the establishment of Extension Units was sought from Government of India during the years 1976-77 and 1977-78 and one Extension Unit has been established at the Headquarters. With this one Unit staff, efforts have been made to cover the gap in the transmission of technical know-how from laboratory to land, and the result is self evident from the response of persons for subsidy and demand of fish seed.

Regular feature of short-films on technical aspects were screened in the villages and a total number of 500 film shows were given, besides organising exhibition at State level and District level to effect a change in prevalent practices and guide them to adopt fish farming.

It is through this very persuasive mode that the Department had been able to impart training in fish farming to 1514 persons including 250 members of the four Fish Farmers Development Agencies in the State. The scheme of Mobile Fisheries Field Laboratory under the lab-to-land programme is also getting impetus, whereby fish farmers come to know about their soil components, feeds required and other hydrobiological factors with regard to intensive fish culture on extensive scale.

The introduction of the Scheme of Financial Assistance from 1977-78 onwards for private individuals gave a boost and many farmers are availing the subsidy. The total number of progressive fish farmers has gone up to 230, besides 236 fish farmers of Fish Farmers Development Agencies. Under Extension Service Programme, 7 folders, 5 hand bills, 7 pamphlets and 12 bulletins have been printed and distributed at various exhibitions and fairs.

It is a matter of pride for the Department that amongst the State level exhibitions, the Fisheries Department was adjudged at 2nd position among the Development Departments and got a prize from the Governor of Punjab in 1978. In order to pass on the technical know-how of fish farming to the people, Radio Bulletins too have started to propagate fish farming as a part of mass media campaign.

Thus Fisheries Extension Service has its own important role to play in the propagation of fish culture practices to be adopted by farmers and to build up a taste for fish consumption amongst the people, especially in the under-developed inland States.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980  
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STATUS REPORT ON FISHERIES EXTENSION IN SIKKIM

BY FISHERIES DEVELOPMENT OFFICER

Fish & Wildlife Department, Gangtok, Sikkim

1. Present status of Fisheries Extension:

So far there is no true organisational set up for extension programmes. In order to create interest towards fish farming in villages, a loan extension scheme has been started with subsidy. Creation of Posts to cover extension and research wings has been proposed during the Sixth Five Year Plan.

1.1.1. Fisheries loan extension

1.1.2. 2½ years 96 individuals covered with total loan of  
Rs. 2.90 lakhs

1.1.3. Nil

1.1.4. Nil

1.1.5. Nil

1.1.6. It has not yet been identified properly the number of  
"Whole time fishermen family"

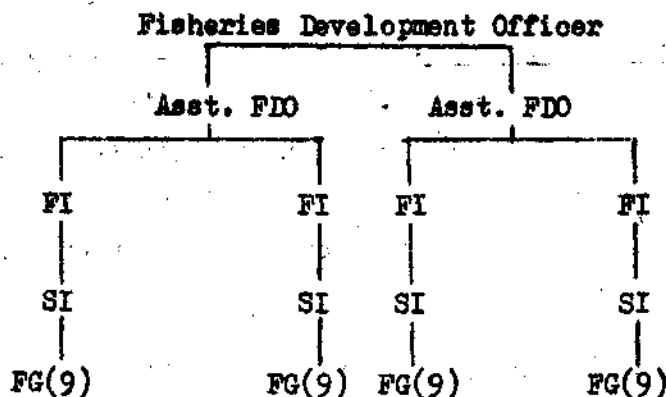
A rough survey indicated 250 fishermen families who are engaged  
in part time fishing activities when they are free from  
agricultural works.

1.1.7. Nil

1.1.8. 1.94 hac ova covered  
0.5 M.ton Fish produced

1.1.9. Rs. 2.50 lakhs was given as loan

- 1.1.10. ----
- 1.2. Nil
- 1.3 Nil
- 1.4
- 1.4.1. Nil
- 1.4.2.1 Departmental training for Fisheries guards
- 1.4.2.2. Nil
- 1.4.2.3 Nil
- 1.4.2.4. Nil
- 1.4.2.5 Nil
- 1.5
- 1.5.1 Cultural aspects
- 1.5.2 Demonstration in Government farms
- 1.5.3 Effective
- 1.6
- 1.6.1 C.I.F.E. Bombay
- 1.6.2 Nil
- 1.6.3 C.I.F.R.I. Barrackpore
- 1.6.4 Nil
- 1.6.5 Nil
- 1.6.6 Nil
- 1.6.7 Nil
- 1.7
- 1.7.1



Asst. FDO - Assistant Fisheries Development Officer

FI - Fisheries Inspector

SI - Sub-Inspector

FG - Fishery Guard

(N.B : Chart represents organisational set up for whole development project in addition to extension work)

1.8 1.8.2 Yes.

2. Brief notes of Fisheries Development programme envisaged in the VI Plan. According to the available resources, the programme of development of fisheries in the State has been phased as follows:
  - 1) Trout Fishery Development: Three hatcheries have been proposed to establish trout fishery for sport in the State. Proposals are put forward for commercialisation of trout fish.
  - 2) Carp and catfish : Three demonstration cum fish seed production Farms have been proposed in three districts respectively to meet the seed requirements and to demonstrate the technique of fish culture to the villagers.
  - 3) Conservation of Riverine Fisheries: Number of guards quarters along the river system has been proposed for conservation of riverine fishes.
  - 4) Propagation of Mahseer: Looking at the possibility of extinction of this great game fish by human intervention, a separate scheme of Mahseer propagation besides conservation has been kept.

5) Extension and Training:- A target for establishing 300 village ponds each of average size 0.02 hectares with an expenditure involvement of Rs. 9 lakhs has been kept, in the VI Five Year Plan. Similar number of villagers will be trained departmentally at respective fish seed production cum demonstration farm in four districts.

6) Research and survey:- A detailed survey of resources, especially lakes, is essential, Survey on possibility of stocking three lakes and stream has to be carried out. Hence purchase of all lab equipment has been prepared.

3. 3.1 Yes

3.2

- 3.3
- 1) Research organisation
  - 2) Public financing institution
  - 3) Fisheries Cooperatives.

3.4

3.5

3.5.1 Yes

3.6.1.

3.6.3 Yes

3.7.1 Yes

3.7.3 Yes

3.7.7 Yes

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December, 1980

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FISHERIES EXTENSION AND RELATED ACTIVITIES IN THE  
UNIVERSITY OF AGRICULTURAL SCIENCES, KARNATAKA

BY COLLEGE OF FISHERIES, MANGALORE

It is by now well known that extension is the weakest link in Indian fisheries, while it is fairly well established in the field of agriculture. This has, therefore, resulted in numerous valuable research results pertaining to fishery science remaining on the shelves of research laboratories, on account of the lack of a suitable machinery for the transfer of technology to the primary producers. Since about the dawn of Independence, several fisheries research institutes have been established by the Government of India, and some research work is also being carried out by some of the State Governments. Agricultural Universities are a recent feature in this country and still more recent is the fisheries work of these Universities. At the moment, three of the Agricultural Universities in the country are having full-fledged fisheries faculties imparting professional education in Fishery Science, in addition to carrying out active research and limited extension. A separate fisheries faculty or department has also been established by a few other Agricultural Universities, even though their activities are, at present, confined only to research. Since the Agricultural Universities are entrusted with the job of teaching, research and extension education, they have a very important role to play in organising and implementing fisheries extension in the country. The extension activities of these universities will have to be coordinated with those of the concerned State Governments, Central Government and the Central Research Institutes.

The University of Agricultural Sciences of Karnataka was the first to establish a full-fledged College of Fisheries in the country in 1969 for imparting professional fisheries education at undergraduate and post-graduate levels. The second and third fisheries colleges of the country were established in Tamilnadu and Kerala during 1977 and 1979 respectively. In addition to the College of Fisheries at Mangalore, the University of Agricultural Sciences has a Fisheries Research Station at Hesaraghatta near Bangalore and has research establishments at Bangalore, Mandya, Dharwad and Raichur. A detailed plan for extension education has been drawn up by the University and it is proposed to implement the same shortly on a State-wide scale. Before dealing with the extension activities of the University in the field of fisheries, it will be helpful to have an idea of the general fisheries set up in the University in regard to academic programmes, research activities, training programmes, etc.

#### ACADEMIC PROGRAMMES

The academic programmes of the University of Agricultural Sciences are conducted at its College of Fisheries, Mangalore and consist of the following degree programmes.

##### B.F.Sc. (Bachelor of Fishery Science)

This undergraduate programme is of 4 years' duration, after the 2-year Pre-University Course or its equivalent examination. Detailed theoretical instruction and intensive practical training are imparted in this course in respect of all major facets of Fishery Science. Since at the time this course was started the College at Mangalore was the only one of its kind in the country, 33 1/3 per cent of the seats were kept reserved for candidates from other States of the country and from the neighbouring African and Asian countries. This facility is still being continued.



M.F.Sc. (Master of Fishery Science)

This programme is of two years' duration, after B.F.Sc. and is offered in two broad streams, viz. Fish Production and Management and Industrial Fishery Technology. In addition to undergoing course work, each student has to work on a research problem in the area of his specialization and submit a thesis thereon. Admission to this course is open to candidates from all States of India and the neighbouring countries, the only condition being the possession of B.F.Sc. degree or its equivalent.

Ph.D.

The Ph.D. programme is of three years' duration after M.F.Sc. This is being offered at present in fishery biology, aquaculture, fishery hydrography and fish processing technology. This programme also consists of both course work and research.

In addition to the above mentioned regular degree programmes, there are two approved post-graduate diploma programmes.

D.F.P.T. (Diploma in Fish Processing Technology)

This is a practical oriented one-year diploma course in fish processing technology, open to holders of B.Sc. degree in Science. This programme was started by the erstwhile Marine Products Processing Training Centre in 1963 and was continued till 1973 under the aegis of the University of Agricultural Sciences, with which the Centre merged in 1969. This course was suspended after 1973, with a view to provide better employment opportunities to B.F.Sc. graduates, who also receive adequate training in fish processing technology. The D.F.P.T. programme may be revived later on, once the employment opportunities for B.F.Sc. graduates in different fisheries sectors become crystallised and certain.

D.F.C.T. (Diploma in Fish Culture and Technology)

This is a one-year course of purely vocational nature open only to B.F.Sc. graduates. This course consists of intensive vocational training in fish culture, fishing technology and fish processing technology. The main idea behind this course is to make the candidates acquire sufficient professional skill and confidence for self-employment. This course would be conducted during any year when there would be a minimum of 10 applicants.

RESEARCH PROGRAMMES

Active research is being carried out on all the essential aspects of fishery science both by the staff and post-graduate students. Most of the research projects are financed by the University itself, while a few others are funded by the I.C.A.R. Several significant results of great applied value have been achieved in the short span of about 11 years. The more important of the research findings, which can be utilised for extension purpose are listed below.

1. By the technique developed in the College, it is now possible to freely breed all the freshwater Indian major carps and the exotic Chinese carps using pituitary glands taken from the marine catfishes, Tachysurus spp. This method has already been adopted by all the fish seed farms of the Government of Karnataka. The marine catfish pituitary extract has been successfully ampouled.

2. Several types of pelleted feed have been formulated and prepared using different combinations of ingredients, like rice bran, groundnut oil cake, tapioca flour, poultry droppings, duck weeds, cabbage leaves, fish meal, silk worm pupae, Colocasia leaf powder, fish ensilage, etc. Most of these formulated pelleted feeds have proved to be more effective and economical than the conventional feed of rice bran and oil cake.

3. Feeding experiments carried out on the Chinese grass carp have indicated that the fish grows better when fed with a number of terrestrial grasses and leguminous plants (hybrid napier, paragrass, kndzu, etc.) than with aquatic plants (Hydrilla and Ceratophyllum). This is of particular importance in areas where the aquatic plants, which are the normal food of the grass carp, are scarce.
4. Detailed investigations on pond fertilization have shown that poultry manure is the best among the commonly available organic manures, such as cattle dung, poultry manure, sheep manure and sewage sludge cake. The effectiveness of poultry manure could further be increased by using it in combination with NPK.
5. Of the 6 inter-generic carp hybrids produced in the College, the hybrid between male catla and female rohu and that between male catla and female mrigal have been found to be promising. These hybrids could be advantageously used in composite fish culture in place of rohu and mrigal respectively.
6. The freshwater catfish, Clarias batrachus, was found to be a compatible species for culture along with the Indian and exotic major carps and it helped in increasing the total fish production by 6 to 9 per cent. The best yield obtained in these composite fish culture experiments was around 10 tonnes/ha/year.
7. Acceptance of fresh poultry droppings as feed by carp fingerlings has been established by the poultry-cum-fish rearing studies carried out in this University.
9. Paddy-cum-fish culture studies so far carried out have indicated that the paddy fields could be successfully utilised as nursery and rearing areas for the seed of freshwater fishes. This is of particular significance in the context of an acute paucity of nursery and rearing areas in Karnataka, as in the rest of the country.

Fish rearing in paddy fields has also resulted in increased yield of paddy by as much as 6-9 per cent.

9. The work so far carried out on the culture possibility of the edible oyster Crassostrea madrasensis has shown that it could be grown to marketable size in the estuary within a period of 7 to 8 months. Techniques for successful collection of spat from their natural habitat have also been evolved. Lime coated tiles, automobile tyres and asbestos sheets have been found to be the most suitable spat collectors.

10. Analyses of trawl catches have revealed that trawling grounds off Mangalore form the nursery grounds of some commercially important fishes and that stomatopods form a substantial portion of trawl catches, especially during February and March.

11. Spawning could be successfully induced in four bivalves, viz. Saccostrea cucullata, S. commercialis, Perna viridis and P.indica, by osmotic and biological stimulation. It is possible to bring about gamete maturation to the pre-spawning condition by rapid salinity changes in the medium, while gamete release is stimulated by conspecific gametes in the medium.

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

13. The biology of fouling communities in the Mangalore area and the extent of fouling on plates of different materials, such as wood, fibre glass, glass, asbestos, etc. have been studied. The use of certain anti-fouling paints has given encouraging results.

14. Pollution monitoring work in respect of discharge of effluents by M/s. Mangalore Chemicals & Fertilizers Ltd. into the Arabian Sea is being successfully carried out since the last few years.

15. Bioassay studies carried out have indicated the tolerance limits of fish and fish food organisms to various toxic substances which are likely to be present in industrial effluents.
16. An adapter for seaming quarter dingley cans has been successfully developed for use in the imported oval can seamer. This has enabled the use of the same seaming machine for seaming both the oval cans and quarter dingley cans.
17. Of considerable significance is the development of a drum type meat picking machine, which has come in as a handy 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/-. Imported machines of similar capacity would cost well over a lakh of rupees.
18. 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.
19. A net hauler has been developed for hauling gill nets on board the fishing vessel.
20. 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 fish hold of the carrier boat.
21. A hand operated stuffer has been developed. It can be used in the preparation of several fish products, such as fish sausage, fish spiral, fish sevru, etc. on a cottage industry basis.

22. A number of new canned products have been developed in the College and most of these are quite promising and can be profitably taken up by the industry for commercial production. Among these may be mentioned mackerel-in-curry, sardine-in-curry, mackerel fillets in oil, canned clams and mussels in brine, oil and masala and canned fish sausage. Techniques have also been standardised for canning such prime table fishes as seer, tuna, etc. A suitable method has been evolved for controlling the "pack weight" to achieve better economy and avoidance of losses in the canning of prawns.

23. 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, the College of Fisheries developed another type of fish sausage in natural casing, identical to the meat sausage. Such sausages could be kept for about a week at +2°C and for about a month under frozen storage at -20°C. As a further development of this work, canned sausage was developed, thereby increasing the shelf-life of sausage to over a year.

24. 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 stored at -20°C.

25. Partially hydrolysed and deodorised fish meat (PHD meat) has been developed through a simple technique using mild acid or enzymes. The meat so obtained can be easily incorporated into any of the common Indian snacks. A large number of fish products have been successfully prepared out of PHD meat, viz. 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.

26. Fish protein concentrate or partially hydrolysed and deodorised fish flour has been developed by a simple new method without involving the usual solvent extraction method. 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.

27. 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 the Indian mackerel upto 12 months and that of the oil sardine upto 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 upto 10 months by treating the fillets with a mixture of sodium chloride, ascorbic acid, monosodium glutamate and sodium tripolyphosphate.

Investigations have also indicated that freshwater fish could easily be preserved in frozen condition over 6 to 12 months without any considerable quality change.

28. Suitable measures have been evolved to prevent "melanosis" in frozen prawns.

29. As a result of experiments carried out in collaboration with FAO experts during 1979, chilled sea water preservation of small pelagic fishes, like sardines and mackerels, immediately after they were caught, was found to retain the fish in much better condition than when they were preserved only in ice or left as such on the deck of the boat, as is being commonly done by the purse seiners in this region. Marketing trials carried out with the chilled sea water preserved fish at Crawford Market in Bombay fetched decidedly a higher price than the ice preserved fish.

30. A new method has been developed for smoke curing of oil sardine, which yields a product of good colour, flavour and taste with a shelf life of 8 weeks at room temperature.
31. A method has also been developed and standardised for preparing fish pickle from lean varieties of fish, such as the pink perch. The product has no fishy odour and has a shelf life of more than 6 months at room temperature.
32. Of considerable interest is the development, for the first time in the country, of "fish shavings" from trash fish, after salting and hot smoking. The product has a protein content of 50 to 60 per cent and keeps well for more than 6 months at ambient temperature.
33. 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 feed for common carp and pigs.
34. An investigation into the incidence of Salmonella contamination of shrimps in Mangalore area revealed that the shrimps were getting contaminated from the skin and gut of frogs processed in the same factory.
35. A few Kanagawa positive strains of Vibrio parahaemolyticus, a food poisoning organism with a very high potential of human virulence, have been isolated from various sources around Mangalore.
36. The nature of raw material was found to influence the jelly strength of fish sausage prepared from it. Proline and Alanine were found to be very effective in controlling the denaturation of frozen meat of croaker and pink perch, particularly when the meat was preserved in minced form.



37. A study carried out on the economics of mechanised and non-mechanised fishing boats has revealed that mechanised boats are definitely more profitable if operated properly.

38. Studies on price spread have indicated that the costs of transportation and ice form the major components of price structure of fish. These studies have also indicated that the selling price of fish could be brought down by eliminating some of the intermediate links.

#### TRAINING PROGRAMMES

##### 1. Fish Processing Technician's Course

Since 1975, the College has been conducting a 3-month Fish Processing Technicians' course for the benefit of in-service personnel. This is a stipendiary scheme, financed fully by the Marine Products Export Development Authority, Ministry of Commerce, Government of India, with a view to impart training in the modern methods of fish processing to the technically untrained personnel employed in governmental and private fish processing industries.

##### 2. Refresher courses for technical staff of State Government

Periodic refresher courses on various aspects of fisheries are being conducted every year for the benefit of technical personnel of the Department of Fisheries, Government of Karnataka. The officers receiving the training range from Inspectors to Senior Assistant Directors.

##### 3. Training in Co-operative Management

A training in Cooperative Management for the benefit of fisheries executives from all over the country was conducted during July-August, 1976, in collaboration with Vaikunth Mehta National Institute of Cooperative Management, Poona.

4. A management course was organised from 15th April to 11th June, 1977 on various aspects of fishery cooperatives for the benefit of secretaries and other office bearers of fishery cooperatives, in collaboration with the Karnataka State Cooperative Union Limited.
5. Brief training programmes lasting over a couple of days are being periodically conducted for the benefit of officers of commercial banks.

#### FISHERIES EXTENSION PROGRAMMES

There was no programmed fisheries extension work in this University in the initial stages. However, later on active extension work was taken up both by the staff and students of the College under several programmes like agricultural production programme, lab-to-land programme, etc. In addition to transferring established techniques to the field, the staff also prepare extension pamphlets and deliver extension lectures and radio talks.

##### Agricultural Production Programme

Under this programme, students of final year B.F.So. are engaged in field demonstration of techniques in the field of fish culture, fish handling from the fishing ground onwards and fish processing. The work relating to fish culture consists of actual demonstration of preparation of pond, its stocking and management in farmers' ponds. In the field of fish processing, correct handling and processing techniques are demonstrated by the students in governmental and private fish processing establishments. The handling of fish from the fishing ground onwards is demonstrated by taking the persons concerned to the fishing ground and teaching them the methods of correct handling upto the time they are taken up for final processing in processing factories.

##### General extension activities of the faculty

The staff of the Department of Aquaculture have been

demonstrating pond culture techniques in farmers' ponds in different regions in and around Mangalore.

The Fishery Microbiology Department of the College has been now and then collecting samples of water used in processing in fish processing establishments in and around Mangalore, analysing the same regarding their potability and intimating the results to the firms. Similarly, bacteriological analysis of the water is also done by this Department, whenever such samples are brought by the processors.

Chemical analysis of water samples received from fish processing factories is done by the Fishery Biochemistry Unit, while analysis of fish products received from various parts of Karnataka and other States is carried out by the Department of Fish Processing Technology. Some of the fish products developed from cheap varieties of fishes are being distributed now and then to the nutritionally weaker section of the society through the Department of Social Welfare, Government of Karnataka. The method of manufacturing such products has also been taught to a number of trainees from different states and it is now being extended to rural folk under the lab-to-land programme.

Periodic visits are made to several fish farms of the State Government in Karnataka and necessary curative measures are suggested to the concerned for dealing with fishes afflicted with different types of diseases.

Technical guidance was given by the Department of Fishery Engineering to a private boat builder for the construction of a 25' long ferro-cement boat.

#### Lab-to-land programme

Under the lab-to-land programme, active extension work is being carried out in fish culture and fish processing technology. In regard to fish culture, ponds belonging to small farmers in two villages near

Mangalore have been chosen and are being used for demonstrating the technique of composite fish culture to the pond owners. In the field of fish processing technology, a few families in a nearby village have been selected and the programme of extension is being chalked out. It is proposed to teach the technique of preparing low cost nutritious fish product to the rural population in the selected village.

#### Establishment of Extension Education Units

The University has recently taken a decision to strengthen the existing Extension Education Units in different parts of Karnataka and to open two more centres at Mangalore and Mudigere. It is proposed to have qualified specialist staff in all the disciplines of Agricultural Sciences, including fisheries, in all these centres. The extension staff at the Mangalore Centre would have specialists both for fish culture and fish processing technology, while in other centres the fisheries extension personnel would be mainly aquaculture specialists. This is expected to come into operation in the near future.

#### TRYSEM

##### programme

Under the TRYSEM programme, it is proposed to conduct 2-4 week long training programmes for rural youth in fish culture and fish products technology.

#### Radio talks, specialist lectures and extension publications

Radio talks are being regularly broadcast by the faculty members over All India Radio, Mangalore on different aspects of fishery science for the benefit of fish farmers, fishermen and fish processors. A number of extension articles and pamphlets have also been issued in English and Kannada. Further, the concerned staff members have been delivering specialist lectures to gatherings of farmers, fish processing workers, fishermen, etc. organised by several agencies like commercial banks, Marine Products Export Development Authority, educational institutions, etc.

DEVELOPMENT OF A SYSTEM OF TRAINING OF SUBJECT  
MATTER SPECIALISTS IN FISHERIES EXTENSION

At present there is no instructional programme for training in fisheries extension either at undergraduate or post-graduate levels. Fisheries extension work in Karnataka is presently carried out by personnel who have no qualifications in extension. Now that fisheries extension work is being taken up on a fairly big scale by the University of Agricultural Sciences, it is proposed to take action to arrange for suitable training of fisheries graduates in extension methods. In the first stage it is proposed to allow some fisheries graduates to go through the post-graduate degree programme in agricultural extension. At a subsequent stage it is proposed to organise a separate Department of Fisheries Extension in the College of Fisheries for offering post-graduate degree programme in fisheries extension, with facilities for specialisation in aquaculture, fish processing technology, control of fish diseases, fishing technology and fish handling. The infrastructure facilities for such an instructional programme are already available to some extent and they could be easily built up to the required level. The only additional requirement would be the appointment of some extension specialists.

LINKAGES AND CO-ORDINATION WITH THE STATE FISHERIES DEPARTMENT  
WITH SPECIAL REFERENCE TO FISHERIES EXTENSION

The main linkage with the State Fisheries Department is in respect of periodic refresher training programmes organised for the benefit of various levels of State Department's technical personnel, including fisheries extension officers. Necessary facilities required for giving field training to the students of the Fisheries College are provided by the State Department of Fisheries in their fish seed farms. Since the number of fisheries extension guides to be appointed by this University in different parts of Karnataka will be limited, it is proposed to co-ordinate our activities with the extension staff

of the State Department for effective implementation of extension programmes.

#### LINKAGE WITH OTHER ORGANISATIONS

In Manjanady village, the Department of Aquaculture is having linkage with the 'Farm Clinic' organised in that village by the Syndicate Bank, which has adopted that village for overall development.

It is hoped that once the proposed extension education units in various parts of the State are established, it would be possible to effectively transfer the available useful technology to the primary producers and the industry.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980  
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FISHERIES EXTENSION ACTIVITIES AT THE  
FISHERIES COLLEGE, TUTICORIN

K.C. JOSEPH

Fisheries College, Tamil Nadu  
Agricultural University, Tuticorin - 628 003

The structure of an Agricultural University is such that it is best equipped through its extension education programmes to benefit farmers, agricultural labourers and artisans. So, apart from teaching and research, extension programmes play an important and vital role at the Fisheries College.

Fisheries extension workers are the main link between government and the fishing industry. A well trained staff of properly equipped extension workers is the base on which every fisheries department stands (Cole and Hall, 1973).

The principal task of the extension service is to provide fishermen and personnel in the primary and secondary sectors with information and advice. One essential feature of such services is that the advice is taken to those who need it. The most important consideration is that the extension workers must be more able than those they set out to advise. If extension workers are to demonstrate fishing techniques, they must be able to out-fish the local fishermen; if they are to demonstrate processing techniques they must be able to show that the products they make will keep better than the traditional ones or fetch better prices or both.

Extension workers must thus be well educated in the first place so that they can be abreast of modern developments and well trained in the second place, and training must include practical instruction and practice. So in order to impart the techniques of extension a teaching programme entitled "Fisheries Extension" is offered at the Undergraduate level, at Fisheries College, Tuticorin.

There is a Directorate of Extension Education, to link all the research workers of the Tamil Nadu Agricultural University and departments of the State and farmers and fishery workers. The Communication Centre, in close cooperation of the Fisheries College, processes the research findings of the College and disseminate them to fish farmers, fishermen and the fishing industry through mass media like All India Radio, Television, Newspapers, Journals, film shows and the extension workers with increased efficiency. The Communication Centre also helps in free exchange of ideas between research workers and field workers and bring field problems to the research laboratory.

The Communication Centre with its fully furnished Radio Recording Room is extending effective information support to AIR. A Correspondence course programme entitled "Fresh water fish culture" was conducted and 40 farmers were selected from different parts of Tamil Nadu. They took active participation and a Certificate of proficiency was given.

The Farmers Training Centre at Coimbatore and Madurai imparts training to farmers interested in freshwater fish culture with the assistance of the Fisheries College technical staff. The Krishi Vigyan Kendra at Pondicherry is actively involved in Extension education activities for rural uplift. An Assistant Professor is posted there to look after fishery extension activities.



Seminar: A two day, All India seminar on Development of Coastal and Inland Fish Culture of Tamil Nadu was conducted. This was attended by participants from West Bengal, Kerala and Tamil Nadu besides the staff of the Fisheries College.

Farmers Training Centre: The Farmers Training Centre (State, Agri. Department) conducts a meeting every month at each Block to enlighten villagers on the modern methods of agriculture. The Staff of the Fisheries College assist them by giving lectures and by supplying technical pamphlets on fish culture integrated with agriculture.

Farmers' Day: Every year Farmers' Day is celebrated during January in Coimbatore, Madurai and Pondicherry campuses. More than 5000 farmers from various districts visit the farm exhibition and participate in the discussions. These occasions are utilised by the Fisheries Faculty to disseminate the information on all aspects of fisheries development.

Seed Sales Depot: Seed Sales Depots located in different centres of the University distribute fish seeds for aquarists.

Enquiries answered: Questions and enquiries received from farmers and fishermen from various parts of Tamil Nadu relating to fisheries are being answered promptly. Some are answered directly and some through the All India Radio.

Release of information to Press: The results of research are processed in the form of popular articles both in English and Tamil and sent to the Extension workers of State Fisheries departments and to the farmers through the Mass Media.

Information support to All India Radio: Research findings are processed and regularly sent to the five All India Radio Stations in Tamil Nadu and Pondicherry for dissemination. Besides, the specialists from the College deliver talks on innovations and take

part in interviews, group discussions etc. Information on package of practices to be adopted by farmers in Composite and Brackishwater fish culture is sent to All India Radio which are broadcast to benefit the farmers.

Answers for questions received by All India Radio from listeners are provided for timely broadcast.

Farm Information News Broadcasting: Findings of the College are recorded and sent to the All India Radio, Coimbatore for broadcast in a special programme called "Vivasaya Seithi Malar". This facilitates quicker and timely transfer of technology to the fishermen and fish culturists.

University Newsletter: The Tamil Nadu Agricultural University brings out a Monthly "TNAU Newsletter" wherein the research highlights of the College are published. Copies of these are mailed to the district level officers of the State Departments and all Agricultural Universities in India.

Publication of Tamil Journals: The monthly journals "Valarum Velanmai" from Coimbatore and "Ulavar Thunaivan" from Madurai campus contain regular fisheries articles and facilitate speedy dissemination of findings.

Central Exhibition: More than 20,000 farmers and other general public including VIP's visit the Central exhibition located at Coimbatore campus where all the latest technology and findings of Fisheries College are displayed.

Lab to Land Programme: The National Organising Committee for the Golden Jubilee of the ICAR decided that the most important activity during the Golden Jubilee year (1979-80) will be a massive effort for transfer of technology from the Laboratory to the farmers'

fields designated as Lab to Land Programme. The programme aims at an intensive treatment and individual attention to the neglected sector of the rural community. Under this programme a nearby village, Perianayagipuram was selected and a bench mark survey was conducted. Twenty fish farm families were supplied with fish seed and feed and this programme is still in progress. They are given technical guidance by the College staff.

Demonstration of Sewage-Fed Fish Culture: Urbanization and industrialization of the country lead to the generation of large volume of waste water from domestic, commercial, industrial and other public uses. In Tamil Nadu, daily 23.4 crores litres of waste water is obtained from the 26 sewage disposal systems. Hence, if sewage water from thickly populated areas is collected and processed, the huge amount of sewage resources can be utilized usefully. So in order to demonstrate the sewage-fed fish culture technique, the sewage farms located at the Madurai Municipal Corporation was selected and all the technical help was rendered to them and a fish production of 9000 kg/ha/year was achieved realising a sum of Rs. 45,000/ha/year. This is more than 10 fold of the income obtained in these farms through raising grass. Model plans for utilizing sewage effluents for different population units were prepared and sent to civic bodies and educational institutions for adopting this technique.

Objection to consuming sewage grown fish on aesthetic grounds is prevalent among certain sections of the population. This could be overcome by transferring the fishes to fresh water prior to consumption as proved by our investigations and extension work.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980

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FISHERIES EXTENSION PROGRAMMES OF THE FACULTY OF FISHERIES IN  
KERALA AGRICULTURAL UNIVERSITY

BY COLLEGE OF FISHERIES, MANNUTHY 680651

Introduction

The Faculty of Fisheries under the Kerala Agricultural University has three major roles to play and they are carrying out Research, Education and Extension Education in Fisheries in the State. Fisheries research involves new ideas and development of new techniques; education provides trained personnel for fisheries developmental work including research and extension; and extension education is concerned with the transfer of the newly developed technology. Fisheries extension in its broadest sense refers to the introduction of new and improved technology to the fishermen, the fish farmers and those in the fish processing and export industry. The Fisheries Faculty of this University is concerned with those extension functions which are primarily educational and which are related to what is referred to as 'the knowledge input'. Specifically, these activities involve communication of research findings through various media, training of field workers and other functionaries, and advisory and consultative services to provide technical support to departments and agencies engaged in development activities.

1.1. The academic programme:

The academic programme of the faculty consists, at the present, of offering the Degree of Bachelor of Fishery Science (B.F.Sc.). The course is of 4 years' duration (12 trimesters) and the minimum qualification required for admission is a pass in the Pre-degree Examination with Physics, Chemistry and Biology as optional subjects. The annual intake of students at the present is only 30, of which 9 seats are reserved for fishermen students, 10 seats are filled up on merit basis and the remaining 11 seats are allotted on the basis of communal reservation. The trimester system of education is followed. The course curriculum includes theory and practical classes on all the subjects connected with fisheries in which at least some knowledge is required for a successful professional career in fisheries. The last trimester of the course is set apart exclusively for apprentice training in various Fishing Companies, Fish Processing Plants, Fish Farms, Development Departments and Research Institutions.

Post-graduate degree courses in fisheries (M.F.Sc.) will be started during 1983-84 when the first batch of B.F.Sc. students will pass out from the College and Ph.D. degree programme in the year 1985-86 when M.F.Sc. degree holders will be available for admission.

1.2. The Faculty and College of Fisheries:

The Faculty of Fisheries consists of 7 departments with a Professor or Associate Professor in charge of each department. The existing departments are:

1. Department of Aquaculture
2. Department of Fishery Biology
3. Department of Fishery Hydrography
4. Department of Fish Processing Technology

5. Department of Fishing Technology
6. Department of Fishery Engineering
7. Department of Management Studies.

Even though the College of Fisheries is functioning at Mannuthy at present, it will be shifted permanently to Panangad in Cochin by early 1981. In Panangad about 30 hectares of land with water frontage is being acquired and all infrastructural facilities are being provided. The College will have its own ice plant, cold storages, freezing and canning plants, fishing boats, fisheries museum, library, aquaria, fish hatchery etc. in addition to student amenities like play grounds, gymnasium, indoor stadium, swimming pool, auditorium, hostels etc. The College has started developing an area of 100 hectares in Puduveypu, Cochin into a Research-cum-Instructional Fish Farm for providing practical training to the students in aquaculture.

#### 2.1. Research Programmes:

The following research programmes are undertaken by the Faculty at the places noted below.

- i) Survey of seed resources of cultivable species of prawns and fishes in Cochin backwaters (Vyttilla).
- ii) Nursery rearing of brackishwater fishes and prawns (Vyttilla).
- iii) Studies on mono and polyculture of finfish and shell-fish, with and without artificial feed (Vyttilla).
- iv) Studies on the ecology of brackishwater ponds in relation to productivity (Vyttilla).
- v) Studies on the identification of suitable species of fishes which can be cultured alongwith rice in the Pokkali fields (Vyttilla).

- vi) Adaptive trials for introducing fish culture in Pokkali fields (Vyttilla).
- vii) Prawn culture in Pokkali rice fields after the harvest of paddy (Vyttilla).
- viii) Farming of fish as a follow up crop in paddy fields of the Kuttanad and Kole lands (Ramankari, Rullazhi, Karanchira).
- ix) Adaptive trials for simultaneous farming of fishes and prawns alongwith paddy (Ramankari, Karanchira).
- x) Intensive farming of Macrobrachium rosenbergii in paddy fields (Ramankari).
- xi) Hatchery production of seed of M. rosenbergii (Vyttilla).
- xii) Pig-cum-fish culture (Kumarakom).
- xiii) Composite culture of Indian major carps and exotic carps along with local species (Kumarakom).
- xiv) Adaptive trials on fish culture in household ponds along the sandy coastal belt of Kerala (Shertala).
- xv) Induced breeding of the grey mullets (Vyttilla).
- xvi) Propagation and farming of frogs (Kumarakom).

## 2.2. Research results:

The seed resources survey conducted in Cochin backwaters showed that Tiger prawn seed could be collected, upto 1200 post-larvae per net per tide, when the Midnapore nets were used during the high tide during April to May.

Mixed culture of Penaeus indicus, Metapenaeus monoceros and M. dobsoni showed that the rate of growth of the latter two species was less than 2 g per month, whereas it was 4.71 g for P.indicus. Penaeus monodon in monoculture registered a rate of growth of 8.98 g per month during 130 days of culture from the postlarval

stage; they were found to die when salinity drops suddenly to 0.42‰.

The pH of pond water in Vyttila was found to drop suddenly with the onset of the first heavy monsoon rains. The indications are that the leaching of salts from the pond bunds contribute to the lowering of pH of the pond water. Liming was found helpful in correcting the pH of the water.

In mixed culture of Etroplus with Chanos and Mugil cephalus, a production of 1353 kg/ha could be obtained in 7½ months. The production of fish from brackishwater ponds could be raised to 2165 kg/ha/year resorting to manuring of the pond alone, and to 2264 kg/ha/year resorting to manuring and supplementary feeding.

Experiments conducted in the Kuttanad and the Kole lands showed that the Indian major carps, Catla, Rohu and Mrigal, the Common carp and Etroplus grew well and matured under paddy field conditions. When cultured as a follow up crop after the harvest of paddy the yield of fish obtained was 208 kg/ha. In the experiments on simultaneous farming a production of 219.6 kg/ha could be obtained in 230 days.

The pig-cum-fish culture experiments showed that Etroplus suratensis, Cirrhinus mrigala and Cyprinus carpio registered better rate of growth in a pond which received pig dung at 5 kg/day as compared to the fishes stocked in a similar pond where they were fed coconut oil cake and rice bran at 1:1 ratio and at a dose of 2% of body weight.

In the case of induced breeding of grey mullets it was found desirable to have the breeders lightly sedated. Considering the quickness of the action of the anaesthetic, the brief recovery period and the overall healthy condition of the



fish after recovery, it was found that Tertiary Butyl alcohol was better when compared to Quinaldine, Sodium Barbitol and Pentobarbital Sodium.

### 2.3. Extension of results:

More adaptive trials in extensive areas of farmers' fields are being undertaken so that the fish farmers in and around the localities are also benefitted. Programmes of training the farmers in scientific methods of fish farming will be undertaken as soon as farm facilities are commissioned.

### 3.1. Training programmes:

One of the extension education functions of the Faculty is the formulation and implementation of training and instructional programme for extension personnel, fish farmers, fishermen and other groups serving fisheries. Training programmes adapted to the specific needs of the different categories of clientele are being developed. During 1979-80 the following training programmes were undertaken:

i) 2+0 credit course on Pisciculture was offered to the Officer Trainees from the State Animal Husbandry Department as part of their post-graduate diploma course in Veterinary and Animal Sciences. The objective was to enable these officers to understand the potential for aquaculture development and to encourage starting aquaculture as a complementary activity to livestock raising in the rural areas.

ii) Classes on Economics of Aquaculture and Economics of Mechanised Fishing were offered to the Rural Development Officers of the State Bank of India, as more and more financial support from banks is required for further development in these fields.

iii) Classes were offered on Fresh Water Aquaculture to the Village Development Officers of the KESS Centre, Ollur, in order to see that

aquaculture is integrated with agriculture and livestock raising in the rural development programmes.

4.1. Other Extension Programmes:

In addition to the training programmes listed above, technical advice and guidance were given to the fish farmers in the Kuttanad, the Kole lands and Cochin on the scientific methods of farming of fishes and prawns. Several adaptive trials on fish and prawn farming were conducted in farmers' fields with a view to demonstrate the feasibility of paddy-cum-fish and prawn culture. Twenty farmers were given technical advice and inputs for aquaculture and overall farm improvement under the lab-to-land programme of the ICAR. The staff addressed the farmers in farmers' seminars organised by the Directorate of Extension Education and gave radio talks on the scientific methods of aquaculture. Extension pamphlets on Fresh Water aquaculture and Brackishwater aquaculture were prepared and published through the Directorate of Extension Education of the University.

5.1. Development of a system for training of Subject Matter Specialists - areas of specialisation available - facilities

The Faculty gives high priority to the development of aquaculture in the State. With this in view sufficient fish farm facilities are being commissioned. There are 2.8 hectares of fish ponds in Vyttila. 100 hectares in Puduveypu are being converted into a fish farm with ponds suitable for conducting statistically designed experiments. A hatchery for brackishwater fishes and prawns is being planned and the laboratory building work is nearing completion at Puduveypu. A hatchery will be commissioned at Panangad by middle of 1981 mainly to produce seed of major carps and Macrobrachium rosenbergii. Once the hatchery and farm facilities are commissioned it will be possible for imparting training on various aspects of fresh and brackishwater aquaculture to the fisheries

development officers of the Department and other agencies. This is expected to be possible by the end of 1981.

6.1. Linkage and Co-ordination with State Fisheries Department

The Director of Fisheries of the State is a member of the top policy-making bodies like the General Council and the Academic Council of the Kerala Agricultural University. Fisheries research function has been recently transferred from the State Fisheries Department to the Agricultural University and financial support is being given by the Government to the University for undertaking research in aquaculture. The University is to transfer the new technologies developed through the State Department extension personnel to the actual fish farmers.

7.1. Linkages with other organisations:

The Indian Council of Agricultural Research periodically sends visiting teams of experts to assess the progress of work under the University. The Director, CMFRI is a member of the governing bodies of the University. The Dean, Faculty of Fisheries is a member of the Advisory Committee of the Centre for Advance Studies in Mariculture run by the CMFRI. He is also a member of the Academic Council and the Senate of the Cochin University which offers M.Sc. (Industrial Fisheries) course. Thus, there are ample opportunities for interaction between these institutes.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980

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FISHERIES RESEARCH AND EXTENSION  
PROGRAMMES OF THE FACULTY OF FISHERIES  
OF KONKAN KRISHI VIDYAPEETH

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The Taraporevala Marine Biological Research Station, Bombay, alongwith the Library and the Marine Biological Research Station, Ratnagiri, constituted the Research Wing of the Department of Fisheries Maharashtra State, Bombay. At both the centres research on various aspects of Inland and Marine Fisheries comprising different projects, was being carried out by the research staff and the students. Facilities existed at both the research stations for research supervision leading to M.Sc. (Research) and Ph.D. degrees for the students. The Senior Scientific Officer at Bombay was the chief co-ordinator for research and extension programme at both the research centres.

From the Department of Fisheries, the Research Wing comprising both the stations as above, was transferred to Mahatma Phule Krishi Vidyapeeth, Rahuri, w.e.f. August, 1971. Subsequently the research wing along with the assets and the liabilities was ceded to the Konkan Agricultural University, Dapoli, w.e.f. May, 1972. The headquarters of the research wing was then shifted from Bombay Station to Ratnagiri Research Station. Under the University set up, the Senior Scientific

Officer was redesignated as the Associate Dean (Fisheries). Further details of the constitution of the Faculty are being finalised. Under the Faculty, the State Government has sanctioned establishment of Fisheries College for B.Sc.(Fisheries) degree course at Ratnagiri and the first batch of the students would be admitted from 1981 academic year. Details of the Faculty are given in the separate foregoing section.

On assessment of fisheries extension work by the research wing of the fisheries department, evolved subsequently as the faculty of fisheries, it can be gathered that considerable progress has been made in both inland and marine fisheries. In case of the latter field, as a result of extension work mainly by the staff of the department of fisheries, considerable advancement has been made as regards mechanisation of vessels, organisation of fishermen cooperatives and imparting education to fisherman youths by conducting 6-monthly courses under fisheries training centres at different places in the State. Some information on these activities is published. However detailed work is yet to be done with cooperation of the department of fisheries. In regard to dissemination of preliminary knowledge on important marine as well as freshwater fauna of fisheries significance, the role of Taraporevala Aquarium under the Fisheries Department, Bombay, is noteworthy. The public from all walks of life and all parts of the country have a good facility to get acquainted with variety of aquatic fishery fauna under simulated natural conditions. In this connection there is a good scope for presenting further details which need to be highlighted in separate publications. The Department of Fisheries has the privilege of undertaking a rare extensional activity dealing with culinary aspect of sea food popularisation. In order to demonstrate and project the importance of proteinaceous diet out of sea food, a special

fish and chips stall has been working in the premises of the Taraporevala Aquarium, Bombay since long with very good patronage and response from the public.

In this communication, before covering salient features pertaining to faculty of fisheries under the University, progress made in the field of fish nursery management practices as regards research and extension activities is highlighted.

#### RESEARCH IN THE FIELD OF FISH NURSERY MANAGEMENT PRACTICES

Consequent to development of induced breeding techniques, the necessity of presenting suitable methods for successful hatching of fish eggs and rearing the spawn into fry under fish seed production programme at all the farm undertakings became the foremost objective. Prior to the facility of induced breeding, the early fry and fry of major carps were being imported from West Bengal with riverine collection, unlike in Maharashtra where induced breeding, wet and dry bund techniques, had to be relied upon. Under the growing awareness of freshwater fish culture in the ponds, demand for fish seed for private fish farmers increased progressively. This State being deficit in fish seed production, needed intensive fish seed production programme. However the technology of fish seed production was very primitive. As such research work on development of improved methods in fish nursery management practices gained first priority in the early sixties.

During the span of one decade, three important problems, viz., control of predatory aquatic insects in fish nurseries, rapid production of zooplankton in fish nurseries and production of safe herbal fish poisons for clearing unwanted fish fingerlings prior to rearing were tackled successfully.

In regard to control of predatory aquatic insects, as against the old and deleterious method of vegetable oil and cheap soap emulsion, water-in-oil type of emulsion from petroleum oils and synthetic surfactant, Hyoxid 1011, was developed giving the least expensive and the most efficient method to control the freshwater insects. In the event of infestation with dragon fly naiads, Chlorine method has been advocated. Other specific methods were also developed and the data published.

For rearing of spawn of major carps there was no dependable method of production of suitable zooplankters in fish nurseries. The technique of phased manuring developed in 1969 and extensively tried at Aarey Fish Seed Farm, Goregaon, Bombay, gave the needed method of rapid production of zooplanketers in fish nurseries linked up to the schedule of breeding, hatching of fish eggs and spawn formation in a well coordinated manner.

In the two research works an account of trial of powders from parts of 5 species of indigenous plants has been detailed giving the information for clearing unwanted fishes from the nursery ponds. It was found that for LD 100 values for 6 hour mortality limit have been appropriately adopted. The powders of Balanites roots, Randia seeds and D. elliptica twigs as well as roots, and Albizia bark would be suitable substitutes for imported Derris powder.

Further work of application of sophisticated techniques of phased manuring in respect of brackish water cladocerans, copepods and the other filter feeding zooplankters is in progress. This should be very useful for nursery management of brackish water and marine fish farms which are rapidly coming up in coastal States.

During 1974-1978, extensive work was undertaken for development of fish egg hatcheries. This project was initiated by trial of portable glass jar hatcheries. On the basis of the experimental results with reference to these models and subsequent models, improvement in hatchery designs proceeded side by side. This project culminated in development of commercially feasible single and 3 unit (also 6 unit models in case of exceptionally large scale utility) aluminium hatchery cum spawnery with common egg vessel for both major carps and Cyprinus. Running water system has been proposed for all the levels of fish farm activities from breeding to spawn formation before being introduced in fish nurseries for rearing upto fry stages.

#### EXTENSION WORK BASED ON RESEARCH IN FISH NURSERY MANAGEMENT

1. On control of predatory aquatic insects in fish nurseries, a field note was prepared on the basis of extensive trials at the Aarey fish seed farm, Bombay. This field note published from the Department of Fisheries, Bombay, was circulated to all the State Fisheries Directorate. The method was demonstrated to the staff of the Central Institute of Fisheries Education, Bombay initially. Subsequently several demonstrations were given, besides lectures on the subject, to the technical staff of the Fisheries Department and officer trainees. On account of this extension work the method of surface oil film using light speed diesel oil. Hyoxid 1011 has gained rapid acceptance all over the country. Recently a revised note was also circulated to all the fishery workers citing alternative methods of control of the insects.
2. As in case of the above project, field note on rapid production of zooplankton in fish nurseries was prepared and circulated to all the fishery workers. Role of inland fisheries subject staff of the Central Institute of Fisheries Education, Bombay in trial and assessment of this method is very noteworthy.



The phased maturing technique operates very well in the nursery ponds which then becomes ready for stocking of spawn for rearing into fry. Percentage of fry from spawn stage rose to nearly 80% as compared to 20% by the previous cow dung method.

3. In regard to technique of application of safe poisons from indigenous plants species, a field reference note has been published for necessary information to the fishery workers.

4. After two initial publications, development of commercial fish egg hatcheries proceeded on the basis of field trials at Aarey fish seed farm, Bombay. Further data has been now published.

Prior to this, in order to acquaint the fishery workers, a series of field notes were prepared and circulated. As a result of this publicity, there was a considerable response from all over India. The commercial models are now being put to trial at the fish farms of Central Institute of Fisheries Education at Balabhadrapuram, and Barrackpore, Gujarat, Karnataka, Haryana, Tripura and other regions. In Maharashtra, single unit aluminium hatchery models have been supplied to all the fish seed production units for regular use. At the present juncture, only single and 3 unit models with improved designs have been prescribed. The patents for the hatchery models have been obtained and advertised.

Under the prospects of dissemination of above knowledge to private fish farmers, the fish seed production programme would be highly boosted.

#### FISHERIES FACULTY UNDER THE AGRICULTURAL UNIVERSITY

The Following are the salient features:

1) The Fisheries Faculty which comprised only the two research stations is now being expanded. The post graduate facility is already existing for M.Sc. and Ph.D. degree courses entirely by research. The College of Fisheries for imparting education

at bachelor level in fisheries is being started w.e.f. the academic year 1981, at Ratnagiri. Preparation for development of campus is going on. All the details regarding finalisation of syllabus and the courses and credits for 3-year degree course after XIIth standard are being worked out. In the third year and second semester a separate course entitled 'Fundamentals of fishery extension education' has been incorporated.

ii) At present 23 research projects as given in the Fisheries Sub-committee, 'Agricultural Council (Agresco)' annual report of the year 1980, are in progress at Ratnagiri and Bombay Research Centres (Annexure-I). During the current few months 3 projects are under completion. Project No. 14 deals with paddy cum-fish culture under Lab-to-Land programme of Indian Council of Agricultural Research. On the basis of the results prior to the Lab-to-Land programme and currently gathered (3 years), it was found that Cyprinus fingerlings in Rabi paddy plots with assured irrigation facilities are the most suitable varieties yielding additional income to the farmers. The details are being worked out. As against the rabi system of paddy-cum-fish culture, the kharif trials gave uncertain results due to vagary of monsoon and bund breeches and consequent loss of the fish. In all 21 farmers' families from Karjat area (Maharashtra) are adopted for grass-root level transfer of technology.

Project No. 20 deals with mass scale production of post larvae of Macrobrachium rosenbergii. Extension work on the basis of technology developed is yet to be carried out. The post larvae produced under nursery conditions of the Laboratory are being tried for further growth in fish nurseries, where there exists a facility to produce dense zooplankton by phased manuring technique discussed above.

Besides the information contained in the Agresco reports, the Fisheries Faculty has started a half yearly research periodical, 'Bulletin of Fisheries Faculty'.

iii) Fisheries extension under the faculty as evaluated above is elaborated.

iv) Development of a system for training of subject matter specialists (SMS) in fisheries for extension work in the State is the concern of the Department of Fisheries. With the development of the College of Fisheries, such facilities would be provided.

v) There is very good co-ordination and linkage with the State Fisheries Department with special reference to fisheries extension work as detailed above in the field of fish nursery management practices and other matters. The research station at Bombay is situated in the premises of the State headquarters of the Department of Fisheries (Maharashtra State) Taraporewala Aquarium, Bombay. This centre of the Fisheries Faculty serves very well for necessary liaison work with the faculty headquarters at Ratnagiri.

vi) As has been discussed in the text, linkages with other organisations exist. Association with Central Institute of Fisheries Education, Bombay has been there since long in several matters of co-operation.

Under the circumstances only a brief account of research and extension work in the field of fish nursery management practices is given. In the other areas as pointed out in the text, there is a good scope for elaboration which work is being expedited.

ACKNOWLEDGEMENT

The author is grateful to Dr. P.V. Salvi, the Hon. Vice Chancellor of Konkan Agricultural University, Dapoli, District Ratnagiri, Maharashtra, for his keen interest in the subject and encouragement to participate in the Seminar on Fisheries Extension.

ANNEXURE - I

AGRESKO PROJECTS

Part-I (A):

Decisions and Recommendations of Agresko-1979.

Part-I (B):

1. Conservation of marine resources
2. Culture of food organisms
3. Experimental studies on nutrition, growth and endocrine glands of the Indian major carps.
4. Studies on the taxonomy, life history, ecology and distribution of polychaetous annelids of Maharashtra.
5. Use of herbal poisons as effective pesticides in piscicultural practices.
6. Laboratory culture of Decapod Larvae
7. Production of monosex in the fish Tilapia
8. Culture biology of estuarine clams
9. Investigations on biometrical relationship of penaeid shrimps of commercial importance.

Ph.D. Research Programme

10. Taxonomy, biology and culture of a new species of cladoceran Alona taraporewalae
11. Studies on freshwater prawns
12. Studies on environmental influence on enzyme system of the Banana shrimp Penaeus merguensis
13. Taxonomy, life history and behaviour studies in relation to artificial culture of three species of euryhaline copepods

Part-II (A):

Programme of work during 1980-81

Part-II (B):

New Projects

14. Paddy-cum-fish culture
15. Studies on Rock oyster Saccostrea cucullata
16. Studies on mass culture of a euryhaline Rhabdocoelid Turbellarian

Part-III

I.C.A.R. Projects

- (A) I.C.A.R. Co-ordinated projects

Nil

- (B) I.C.A.R. Ad-hoc Projects

17. Cultivation of marine shrimp Penaeus merguensis

18. Raft culture of the green mussel Mytilus viridis
19. Production of common carp Cyprinus in recirculating water system
20. Mass-scale production of post larvae of Asiatic giant freshwater prawn Macrobrachium rosenbergii
21. Mass-rearing culturing methods and biology of prawn Macrobrachium malcolmsonii

Part-IV

State Government schemes

22. Prawn culture scheme
23. Oyster culture project.

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SEMINAR ON FISHERIES EXTENSION

COCHIN, 8-10 DECEMBER 1980

AGRICULTURAL UNIVERSITIES -

AN AID TO FISHERIES EXTENSION

BY SHRI L.M. JOSHI

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The primary function of extension is education. Education defined in any form simply means "Production of changes in human behaviour". Thus extension is an educational process by which scientific and technical knowledge is carried to and learnt by farmers and is included in their practices. It is also sometimes referred to as 'Out-of-School education' in which people learn by doing.

All the processes of extension education are ultimately aimed at increasing the production from the available resources, may it be Agricultural, Livestock, Fisheries or any other production. Agriculture has a very well-organised net work of extension education, which has helped to a very great extent in taking the modern technologies right up to the doors of the rural masses. However, in the field of Fisheries, the picture is unsatisfactory. It would not be an exaggeration to state that Fisheries has the weakest link of extension education, which has hampered transfer or dissemination of technological advancements to the fishermen and fish farmers.

There are various agencies which are directly involved for the development of Agriculture viz, State Departments, Zilla Parishads, Corporations and Agricultural Universities. Because of

the increased number of agencies involved for the same cause, i.e. development of Agriculture, the number of personnel is also equally large, resulting in sizeable extension work. But the picture of Fisheries is quite different. Due to the lack of adequate number of technical persons in the State Departments the Extension Education aspect has been almost left uncared for.

However, the opening of Fisheries Faculty or Department in most of the Agricultural Universities is bound to change this unsatisfactory state of affairs and we can look forward to a better outcome in the days to come. Although Fisheries Faculty of the Department in the Agricultural Universities will be comparatively small, yet it can have better contacts with the Extension Directorate, Soil Sciences Department and Veterinary Faculty of the University and try to derive results and transfer the appropriate technology in the field.

The jurisdiction of Punjabrao Agricultural University extends over eight districts of Vidarbha Region of the State of Maharashtra. The two districts in the Region viz. Bhandara and Chandrapur have immense potentiality for the development of fresh water fisheries, since they are endowed with a large number of tanks. The other districts are also enriching every year with regard to fishery potentials, since new irrigation tanks and reservoirs are coming up.

With a view to undertake applied research in the various fields of Inland Fisheries, a Department of Aquaculture has recently been established in the Agricultural University at Akola since 1978-79. During the short span of just two years, the Department could not make much headway, except starting of construction work of a fish seed farm, procurement of laboratory equipments and other essential equipment needed for the scheme.



### Academic Programme

Fisheries is one of the core courses offered for the Veterinary students leading to B.V.Sc. & A.H. degree. The duration of the course is six months. The students are not awarded any degree/or diploma in fisheries subject but this subject forms a part of curriculum. The main aim for introducing this subject for Veterinary Graduates is to impart some basic knowledge of the subject and the technical know-how. These Veterinary Graduates who come out in a sizeable number in the State go to the rural areas and they can be of some use to pass on the knowledge to the fishermen or fish farmers whom a fishery officer cannot contact due to the shortage of technical personnel in the fisheries department of the State. It is a fact that this Veterinary Graduate will not be able to get a very deep knowledge of the subject within a short period of six months, but he will at least be able to distinguish "What is good and what is bad". This is one of the extension services that an Agricultural University is doing. The curriculum of the course contains general introduction of the subject with more stress on Inland Fisheries. A brief knowledge of fish preservation, craft and gear, important schemes implemented by the State Department will be of use to the Veterinary Officers to render assistance to the fish farmers in the rural areas.

### Research Programme

As already indicated above, the working of the department has not commenced in full swing. Construction of a fish seed farm initially in an area of about 4 hectares is in progress. The plan of research projects which are to be taken up at the farm has been worked out after giving careful consideration to the needs of the fish-culture practices commonly adopted by the fishermen and the fish farmers of this region. The important topics of research proposed are:-

- 1) Nutritional studies to ascertain the optimum nutrition required for faster growth.

- ii) Studies to identify causes of mortality from the stage of spawn to fry and to evolve solutions for their control and prevention.
- iii) Limnological studies of the existing water sheets.
- iv) Artificial breeding to evolve a breed with ability to achieve rapid weight gains.
- v) Search for cheap nutrients to improve the nutritional status of the existing water spreads with a view to increasing the fish production in unit space and time.
- vi) The fresh water giant prawn (Macrobrachium malcomsonii) is a native of Wainganga, Godavari and Pranhita rivers of this region. Prawn catches are generally seen in a sizeable quantity during the summer months. It is, therefore, proposed by the Department to undertake studies on culture of this species in captivity, with an intention to get maximum production in unit time and space.

The research findings obtained will be disseminated to the fish farmers through the Extension Education Department of the University by organizing fishermen rallies, by taking part in the agricultural exhibitions, through bulletins and other extension methods. Since the Extension Education Wing of any Agricultural University is bound to be well organised and equipped with various efficient mechanisms of Extension Education, the Agricultural Universities shall also be a boon for the Fisheries Extension to transfer the laboratory technology to the field.

#### Training Programme

After starting the functioning of the farm, field training to fishermen and other landless agriculturists can also be organised which shall be of much use to them in carrying out fish cultural practices in a scientific way.

Linkages and Co-ordination with State Fisheries Department  
with special reference to fisheries extension

The University keeps strong co-ordination with the State Fisheries Department at all levels. At University level, there is a "Statutory Committee of Aquaculture Department" and the top senior officers of the Department at State and Regional levels, have been nominated as members of this committee. Besides this, the department also participates in the discussions in the "Joint-Agresco" meetings which are held every year. This helps in bringing about a close liaison with the State Fisheries Department which is the chief agency for promotion of fisheries in the State.

Since the Department has been only recently established in the University, it can not put forth any specific findings of its own, but has sufficient plans to implement in the field of Fisheries and further extend them to fish farmers for the cause of rapid fisheries development.

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SEMINAR ON FISHERIES EXTENSION

8-10 DECEMBER 1980 COCHIN  
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APPROACH TO FISHERIES EXTENSION IN INDIA

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ABSTRACT

'Extension' has already been identified as the weakest link in fisheries development. There is considerable scope for extension work in aspects of aquaculture, fishery information and forecasting, conservation, fish handling and processing, fishing craft and gear. This requires dedicated workers, with technical knowledge, zeal and ability to put across ideas in an effective and convincing manner among people having set ideas and a great deal of empirical knowledge. If extension has not succeeded, it could be a case of half baked technology, absence of package approach, lack of economic benefits etc. In such cases the approach should be to correct these deficiencies. On the question as to who

should be entrusted with the task of extension, it is suggested that it should be separately designated and specially trained extension workers, proficient in the art of extension and trained in the subject matter of extension with good rapport with research and development.

#### INTRODUCTION

1. Fishery, like many other biological sciences, is a multi-disciplinary science based on a number of basic and applied disciplines. Hence, the exactness associated with physical sciences is often difficult to be established in the case of fishery science. Nevertheless, scientists are endeavouring to give certain degree of exactness by identifying the cause and effect in isolation as well as in unison to give a fair degree of reliability. No doubt numerous factors are involved and building of a precise mathematical model taking into account all these factors is well nigh impossible. Another relevant factor is the existence of empirical knowledge, mostly with those engaged in the actual operational part. In a good many cases a careful synthesis of observed data, anticipated response based on mathematical models, conditioned by empirical knowledge hold the key to many problems connected with fisheries. It is in this context that the average fishery operative looks up for guidance and here comes the role of extension and consultancy service in fishery.

Extension service is free and is designed to bring about changes in the attitude and working of persons technologically not well-equipped but often having empirical knowledge and practical experience in the trade. On the

other hand, the consultant is a specialist, and often deals with educated people, but not having trade experience. The consultant charges for his consultancy. The services are also custom-oriented and specific to his requirements.

#### EXTENSION SERVICE IN INDIA

2. India is considered to be one country that has made significant advances in its extension service, particularly in the field of agriculture and dairy. The 'green revolution' and the 'white revolution' are living examples of the efficacy of extension service in India. Unfortunately, we do not have an impressive record of extension service in Fisheries in India or elsewhere to claim a 'blue revolution'.

#### FISHERIES EXTENSION UNITS

3. Immediately after Independence, Community Development Projects and National Extension Services were started. But unfortunately, there was no Extension Officer for Fisheries and very often the Extension Officer for Agriculture or Animal Husbandry was considered to be responsible for giving extension advice to fishermen and farmers. It was the Balwant Rai Mehta Commission, 1957, that focussed attention on the need for separate Extension Officers in Fisheries and training the village level workers in fisheries also.

The Working Group on Fifth Plan on Research, Training and Extension focussed attention of the Government to the fact that extension is the weakest link in the

development of fisheries. The Group recommended:

- i) The establishment of extension training centres for inland fisheries and another for marine fisheries.
- ii) Provision of equipment and extension literature support to the State level extension units.
- iii) Starting of Fish Farmers Development Agencies.
- iv) Starting a fishery data and information service and starting a Fishery Information and Forecasting Bureau for marine fisheries.

#### EXTENSION UNITS FOR FISH CULTURE

4. The first organised extension service in Fisheries was started in the early 50s at the Central Inland Fisheries Research Institute, in the context of organising a fish fry trade. The success of the Extension Unit at Calcutta led to the creation of nine more Extension Units on a regional basis during the Second Five Year Plan. These Units undertook work like survey of cultivable water areas, correction and improvement of ponds, prospecting fish seed from riverine sources, demonstrating induced breeding, nursery practices, weed control etc. The extension Unit at Mandapam, finding the scope for fish farming was limited in that area, took up marine extension work covering improved methods of fish handling and fish curing, use of sea weeds etc. It also took up the question of brackish water culture using mullets, chanos, pearl spot, Tilapia; live fish

transport etc. These Extension Units functioned for about 10 years before Government took a decision to close them down as the States considered it to be their rightful domain. As a result, the extension units at Gauhati (Assam), Mandapam (Tamil Nadu) and Bangalore (Karnataka) were transferred to States while the remaining were regrouped into 2 Regional Training Centres for inland fishery operatives, recognising training as the most important function of extension. There had been further changes in policies and Government later decided to convert one of the Regional Training Centres into Extension Training Centre for fish culture so as to train extension workers. The Extension Training Centre at Hyderabad and the Regional Training Centre at Agra are now being continued even though their administrative control is transferred to the ICAR in 1979. While an Extension Training Centre for Inland Fish Culture was started in Hyderabad, the proposal for a similar Extension Training Centre for marine fisheries ran into some difficulty. Various organisations consulted in this matter gave divergent views and almost all of them pleaded that their organisation/State was the best suited for the establishment of such a Centre. Hence this proposal did not go through. A fresh attempt was made by the Marine Products Export Development Authority to convert an organisation created for inplant inspection into an extension service. Here again there had not been much progress. Recently a proposal has been made by the Central Institute of Fisheries Education to start marine fisheries extension service.



5. An evaluation of the extension services in the country revealed that the Extension Units were handicapped for want of adequate training of personnel and equipment including transport, extension material, field kits, publicity pamphlets, slides, films and regular news bulletins to post the extension workers informed of developments on the research and development side. While some beginning was made in the preparation of equipment, kits like fish farm kits, induced breeding kit, water and soil analysis kit, splashless tank for the fish transport etc., later, it was decided that these may be left to the States and only cash assistance need be given.

#### EXTENSION WORK IN FRESH WATER FISHERIES

##### Fish Farmers Development Agencies

6. The working of Fisheries Extension Units also brought to light that extension work, delinked with administrative support, tie up with finance etc. may not succeed beyond a point. The Fish Farmers Development Agencies (FFDAs) drawn up on the lines of Small Farmers Development Agencies (SFDA) seek to provide a package assistance under the direct control of District Collector, tying up long lease of water areas, training, extension services credit and incentives by way of subsidy. FFDAs have made significant progress in some areas, while its impact had not been that good in some other areas. However, this FFDA approach has been recognised as appropriate in an Inland Fisheries Project, being implemented in 5 States with World Bank assistance. This Inland Fisheries Project stipulates one Extension Worker for every 100 hectares of water area and one Extension Officer for every 10 Extension Workers.

EXTENSION WORK IN BRACKISH WATER FISHERIES

7. Brackish water fishery is similar to inland fisheries. Already shrimp culture is being practised in many maritime States, taking advantage of readily available water areas like paddy fields, bheels, etc., subject to saline inundation. However, there are very few brackish water fish farms as such. Under a Central Sector Scheme pilot brackish water fish farms are under construction in all maritime States. All these States have run into serious difficulties in the construction of brackish water farms. Government is, therefore, proposing to expand role of the present project for Pre-Investment Survey of Fishing Harbours into a Coastal Engineering Project, so as to survey, design and prepare project reports for large Brackish Water fish farms adopting an area development approach, keeping in view the possibility of resettling marginal fish farmers and landless fishermen on such large farms. Such large farms will work as "collective farms", and will lean heavily on extension support in the matter of fry collection, rearing, harvesting etc. Already the Central Marine Fisheries Research Institute, Central Inland Fisheries Research Institute, Central Institute of Fisheries Education, Marine Products Export Development Authority and State Governments are providing extension support to interested parties.

EXTENSION WORK IN MARINE FISHERIES

1) Mariculture

8. The basic research work in respect of culture of mussels, oysters, pearl oysters, sea weeds etc. is being undertaken. India is, I think, unfavourably

located in the matter of mariculture, as we do not have extensive protected bays. Most of our coast is surf-beaten and subject to heavy littoral drift and occasional cyclones. Nevertheless, the lagoons of coral islands, the Gulf of Manaar, Palk bay, Gulf of Cambay, Gulf of Kutch, certain areas in the Andaman and Nicobar Islands etc. offer good scope for mariculture.

ii) Extension Work in Fishery Information & Forecasting

9. The money and effort put in in studying ocean, fish life, fish behaviour, fish abundance etc. would make no sense unless the information so collected is extended in a form and manner helpful to the fishing industry. In this field what is required is not a narration of what has happened, but what is happening and what is likely to happen. What is happening is fishery information and what is likely to happen is fishery forecasting. The fishery information to be useful should be passed on before the pattern changes. For instance if an agency can state that shoaling of small pelagic fishes has started at a particular area, the purse-seiners can go there to catch the shoals. Similarly a prediction of the extent of fishery, occurrence of mud bank, etc. would be welcomed by the industry. It is, therefore, necessary that the entire marine fisheries research and exploratory surveys are tailored to run a fishery information and forecasting service. At one time, it was proposed that Pelagic Fisheries Project be revamped into a Fishery Information and Forecasting Bureau. By a system of collection and

collation of information from exploratory fishing vessels, supplemented by data from commercial fishing vessels, it would be possible to indicate to the industry the areas of abundance of fish on a day to day basis. The likely trend of movement can also be indicated based on past experience, oceanographic data etc. However, a mathematical model for this purpose has to be evolved.

iii) Conservation

10. Regarding conservation, while the research scientists feel that a stage has come for enforcing the conservation particularly in respect of shrimp resources and protecting juveniles in the back waters, the fishing community has not accepted this view as it would affect the livelihood of those who are engaged in fishing on juveniles. This is an area which requires immediate extension work.

EXTENSION WORK ON FISH HANDLING & PROCESSING

11. There has been serious criticism in the export markets about the quality of our marine products. While some of the complaints are exaggerated, the fact remains that a good deal of improvement is required in the matter of handling and processing of fish. This is another area quite amenable to extension work. It is very often the lack of appreciation on the correct procedures that is responsible for the deficiencies in fish handling. Since fish handling is mostly done by illiterate fishermen, it makes it all the more necessary that suitable extension techniques are evolved to carry the message. This is by way of maintaining the boats in

a clean condition, icing of fish, use of proper quantity of ice as well as ice prepared from potable water, washing of fish in clean sea water, avoiding bruises etc. The shed used for cutting, sorting and washing of fish, quality of water, the personal hygiene, the use of proper equipment, maintenance of prescribed low temperature etc. are very important. On these, guidelines and codes of practices have already been drawn up. The Export Inspection Agency, MPEDA etc. are the enforcing agencies. While inplant inspection, pre-shipment inspection etc. are regulatory measures, what is more effective is the educational approach through the medium of extension. On fish handling and processing our past efforts have been largely directed towards the export marketing; very little has been done to improve the standards for fish handling and processing for the domestic market. The technique of making urea-free shark flesh, preparation of superior grade cured fish, minced meat and its derivatives, various ready-to-serve items, etc. have ready applicability. However, much of technology has not been transferred and the average consumer is unaware of the scope and variety of marine foods. The processing industry has completely neglected the domestic market, which is even a more important market than the export market. What is perhaps needed is a pilot project intended for processing and test marketing of new and diversified products.

#### EXTENSION WORK ON FISHING CRAFT AND GEAR

12. The main thrust during the last 5 Plans had been the introduction of mechanised boats capable of

trawling and gill netting. A few mechanised boats capable of purse-seining, pole and line fishing, long lining have also been introduced and today 15,500 mechanised boats are in operation. However, very little research or extension could be done to improve the traditional catamaran, canoe and plank-built boats. Our neighbouring countries have introduced fibre-glass boats and out-board engines to modernise the traditional sector.

13. On fishing gear, the shift from vegetable yarn to synthetic yarn has been fast, particularly in marine fishing. However, on gear design, the impact had been slow and is clearly an area requiring a good deal of extension work.

#### EFFECTIVENESS OF EXTENSION WORK

14. Extension work is similar to missionary work, calling for sustained, dedicated work. It requires technical knowledge, zeal and an ability to put across ideas in an effective and convincing manner among people having set ideas and a great deal of empirical knowledge. In a few cases, extension work has not succeeded, because technology is only half-baked. In some cases technology by itself is not sufficient and a package programme is necessary. In still other cases, the economic benefits were not tangible. However, wherever extension advice could be directly related to increased economic benefits, the effect was substantial.

APPROACH TO FISHERIES EXTENSION IN INDIA

15. As already indicated extension continues to be a weak link in our programme for development of fisheries. Evolving and perfecting suitable techniques fit for extension work, is the responsibility of both research and extension personnel. For transfer of technology, carefully planned demonstrations are required. These may be both result and method demonstrations. While method demonstrations are more effective, the coverage is necessarily limited. The need for adequate preparation and meticulous planning of demonstrations cannot be over-emphasised, as a poor demonstration does more harm than good. The information given should be timely, accurate and adaptive. The effect of extension work is pronounced when linked with economic benefits. Where the benefits are marginal, or where it is not realisable to the individual or where it involves a long gestation period, other monetary inducements like subsidy, loan etc. could be considered. In some other cases, it may be the ego of the person that is to be pampered. The institution of awards, certificate of merit etc. are of this category.

EXTENSION PERSONNEL

16. The question as to who should be entrusted with the task of extension is a debatable one. On one hand it is argued that extension should be the direct responsibility of research personnel, the development personnel feel that extension is only part of their activity. Yet another school feels it is the function of an agency separate from research and development

(administration). While research personnel is best equipped to demonstrate a technique till it gains acceptability, it would be a waste of research capacity, if the energy that should otherwise be deployed for creative research is channelised to a routine extension work. Besides extension itself is a highly evolved subject and requires a specialist in extension to effectively handle extension work. Similarly development officers are usually enforcement officers and to the public they are symbols of administrative authority. Such persons would not be effective as extension workers, where only a persuasive approach is needed. There is also a feeling that extension is too important to be tagged on either to research or development to be effective. It would appear that separately designated and specially trained extension workers, proficient in art of extension and trained in the subject matter of extension with good rapport with research and development, with undiluted responsibility on extension would be the best solution, although variations and adjustments are always possible.

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SEMINAR ON FISHERIES EXTENSION

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INTRODUCTION OF FISHERIES EXTENSION SERVICE FOR DEVELOPMENT  
OF INLAND FISH FARMING IN INDIA

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ABSTRACT

A well organised Extension System in the field of Agriculture has given encouraging results in increasing the agricultural produce during the last two decades. But in the field of Fisheries in general, and Inland Fisheries in particular, the modern fish farming technology developed in India and elsewhere could not be propagated to the remote rural areas for want of a broad net work of Extension Service.

In the present paper, the pattern of extension service proposed under the World Bank assisted Inland Fisheries Project in the States of West Bengal, Bihar, Orissa, Madhya Pradesh and Uttar Pradesh, the anticipated benefits of this programme in the implementation of this project, the prospects of extending this programme to other areas of the country and the likely impact of this programme on the improvement of the rural areas etc., are presented and discussed.

## 1. Introduction

1.1: The Training and Visit System (T.V. System) of Extension developed by Daniel Benor has been introduced in many countries in the Agriculture Development Projects taken up with the financial assistance of the World Bank, yielding very good results (Benn and Harrison, 1977). In India the T.V. System of extension was first introduced and experimented in Chambal area of Madya Pradesh and Rajasthan Canal area during 1974. Now this system is in operation under the World Bank assisted Agriculture Projects in the States of Madhya Pradesh, Assam, Orissa, Andhra Pradesh, Bihar, Haryana, Karnataka and Gujarat, with a view to enhancing the agricultural produce.

1.2: The experience so far indicates that the results of the T.V. System have been dramatic in the field of agriculture and that the system is equally suited for livestock and fish farming as well.

## 2. Need for Extension Service in Fish Farming

2.1: It is estimated that about 1.5 million ha. of culturable water area are available in the country for development of inland fish farming. Fish farming in tanks and ponds as time old practice developed by the farmers in our country was mainly confined to the North Eastern States such as West Bengal, Bihar, Orissa and Assam.

### 2.1.1: Traditional Fish Farming Methods

The traditional methods of fish farming developed were to make large scale collection of spawn from rivers and canals in the North Eastern States during the monsoon months and to rear the spawn to fry stage in traditionally prepared nurseries. The sale of spawn and fry has developed as an **organised** industry

in West Bengal with the main trading market at Calcutta. The fish farmers purchased either spawn or fry and stocked them in their tanks and ponds. This traditional fish farming practice had several drawbacks resulting in high rate of mortality of spawn or fry stocked, leading to very low fish production.

2.1.2: Recent advancement in inland fish farming technology

During the last 30 years, several advances in inland fish farming have been made, particularly as a result of researches conducted by the Central Inland Fisheries Research Institute. Some of the notable contributions of the CMFRI are, the development of

- i) a method for transport of spawn, fry and fingerlings in polythene bags containing water with required oxygen, with a view to reduce mortality during transport,
- ii) nursery management techniques to reduce considerably the mortality in the initial stages of rearing from spawn to fry stage,
- iii) rearing-pond management techniques to reduce mortality in rearing of fry to fingerling stage,
- iv) technique of induced breeding (Hypophysation) of Gangetic and exotic carps in tanks, ponds and 'bundhs' to produce pure fish seed for fish farming,
- v) techniques for augmentation of the resources of fish food organisms in the pond by fertilisation using organic manures and inorganic fertilisers,
- vi) techniques for fuller utilisation of the available fish food organisms in the pond by introduction of fast growing and compatible species of Gangetic carps and exotic carps in suitable combination with a view to enhance fish production from an unit area, and
- vii) feeding the fish stock by supplementary artificial feed compounded from the by-products of agriculture.

2.1.3: These recent developments in the field of fish seed production have assured enough supply of pure and quality fish seed to the farmers and high rate of return from fish farming. The basic inputs for fish farming viz., fish seed, manures, fertilisers, artificial feed etc., are now supplied to a farmer with a package technical know-how for modern fish farming with very high rate of economic return. Even then, fish farming has not picked up as anticipated and most of our tanks and ponds having high potential for creation of rural employment and provision of additional nutritive food to overcome malnutrition, are still remaining unutilised. This was mainly due to the resistance on the part of the fishermen in accepting the extension service offered by the Fisheries Departments, lack of proper transport facilities and proper monitoring agencies.

## 2.2: Extension Service Programme in Inland Fisheries Development

2.2.1: Need for having a well organised fish farming extension service in the field of Inland Fisheries was recognised right from the beginning of the First Five Year Plan. The fisheries extension units were established by the Government of India during 2nd Five Year Plan period at Calcutta, Gauhati, Patna, Allahabad, Bhopal, Hyderabad, Bangalore, Raipur, Karnal and Mandapam. These units were set up to take up extension work, collection and transportation of fish seed, fish seed production, preparation of fish ponds, and eradication of weeds and predatory fishes from tanks and ponds for fish farming. It was envisaged that additional units would be established during the Second Plan period onwards to cover the other States also. However, further progress under this scheme could not make a headway as the field of Inland Fisheries was vested with the State Governments. Moreover these units worked without any coordination between each other and without having a wider area of field of operation and coverage. Due to these reasons, the extension programme started during the

Second Plan period could not make any impact on propagating Inland Fish Farming technology and so finally these Extension Service units were wound up in 1967 and converted into field operation training centres. No attempt was made to evaluate the working and achievements of these units.

2.2.2: During the Fifth Five Year Plan, the Extension Service Programme was again revived in the field of Fisheries. The State Governments were encouraged to set up fisheries extension units to undertake training of officers in the extension methodology and operation with assistance from the Central Government. Under the scheme, extension service kits, audiovisual equipments etc., were provided by the Government of India as a support to the State Governments for taking up extension work.

2.2.3: During Fifth Plan a new scheme of Fish Farmer's Development Agencies (FFDA) was started to offer financial and technical support to the rural population, to develop inland tanks and ponds for intensive fish farming. In addition to these, the extension officers of these FFDA's were also to provide extension service to the fish farmers, with a view to spread the technology of inland fish farming to the remote corners of the rural areas. By the end of the Fifth Plan period, 50 such agencies have started functioning and the programme has really created an awareness among the rural population on the benefits of intensive fish farming in small tanks and ponds. The full benefits of the extension service offered by the FFDA's would be reaped only during the Sixth Plan period when all the fifth FFDA's would become fully operative.

### 3. Fisheries Extension Service Programme for the Sixth Five Year Plan

3.1: Keeping in view the long felt need for a well organised extension service system in the field of fisheries, emphasis has been given for this programme on a large scale in the recently

taken up Inland Fisheries Project with World Bank assistance in the States of West Bengal, Bihar, Orissa, Madhya Pradesh and Uttar Pradesh. The main objective of the proposed extension service under this project would include promotion of intensive fish farming in tanks and ponds, increasing the inland fish production from these water resources and improving the socio-economic conditions of inland fishermen community.

3.2: The Inland Fisheries Project with World Bank assistance envisages development of 117000 ha. area of village tanks and ponds spread over 58 districts of the above mentioned five project States during the period of five years from 1980-81 to 1984-85. Out of a total provision of Rs.3790.4 lakhs Rs.263 lakhs would be spent on the fisheries extension service, under this project.

### 3.3: Pattern of Extension support and service proposed

3.3.1: The basic organisation for the establishment of a well based Extension system in the project is setting up of 58 Fish Farmer's Development Agencies in 58 districts. These Fish Farmer's Development Agencies besides offering necessary financial assistance for fish farm improvement and first year inputs such as manure, fertilisers, fish seed and feed, would also provide the essential technical expertise for taking up intensive fish farming in 117,000 ha. water area.

3.3.2: To take up fish farming in the project area under this project, there will be one Extension Worker for every 100 ha. water area to be developed and one Extension Officer for every 10 Extension Workers. Based on this norm, to cover the entire project area, 1170 Extension Workers and 117 Extension Officers would be required over the Five Year Project implementation period. So, in total, by the end of the project i.e. by April 1985, there will be 1287 extension staff in these five project States to continuously

monitor the intensive fish farming in 117,000 ha. pond area. These extension staff in the form of incremental staff of the 58 Fish Farmer's Development Agencies, would take up the task of providing a well-knit extension service to all the fish farmers in the five project States mentioned earlier. The date on the break up of the water area to be covered by each State and the number of extension staff in position, is furnished in Table 1. All the 58 FFDA's would also be provided with one audio-visual equipment and other requisites for taking up extension service. These FFDA's would organise regular exhibitions and film shows in all the remote rural areas to propagate among the rural population the techniques of intensive fish farming and the benefits thereof. These FFDA's would also organise mobile training programmes to give practical training to the fishermen and fish farmers on the improved fish culture techniques.

3.3.3: The extension workers would be provided with motor-bikes. This will help them in reaching the individual fish farmers and also in identifying the problems faced by the farmers in fish farming and to suggest ways and means for proper utilisation of the water resources available, so as to enhance inland fish production.

#### 3.4: Establishment of Extension Training Centres

3.4.1: One of the pre-requisites for a well organised extension system is the availability of well trained personnel to take up the work. With this view in mind, in the Inland Fisheries Project with World Bank assistance, it has been envisaged that before the extension staff are put into the extension service, they are properly trained in the field of fisheries extension and the recent advances in fish farming technology developed in various countries. New Fisheries Extension Training Centres would be established in the States of West Bengal, Bihar and Uttar Pradesh at a cost of Rs.37.3 lakhs each. In Madhya Pradesh, the existing

training centre at Raipur would be suitably strengthened at the cost of Rs.17.9 lakhs to take up this task. In Orissa, the ICAR Composite Fish Culture Training Unit at Dhauli and the State Training Centre at Kosala Ganga would be utilised for this purpose.

3.4.2: These training centres would impart training to the Extension Workers primarily in intensive fish farming in tanks and ponds besides providing the basic refresher course and practical training on fish culture and principles of Fisheries Extension Service. Each training centre would have audio-visual equipments and extension kits for this purpose. These extension training centres would also undertake training of fish farmers besides training the extension staff. In total 1287 fisheries extension staff would be trained by these centres by the end of the project period and would be put into service.

#### 4. Likely impact of the proposed extension service programme in fish farming

4.1: On successful implementation of the Inland Fisheries Project, it is expected that the present level of fish production could be increased to about 2 lakh tonnes per annum on full development, from the five project States mentioned elsewhere. Every fisherman expects higher fish yield and better cash return from either capture or culture fisheries. So, this project would have a great impact not only on the fishermen but also on the other people who are interested in intensive inland fish farming in the country. The successful operation of the project and the better yields could very well be propagated by the well knit organisation of extension service under this project. The large number of extension staff and the facilities provided to them would improve the quality of extension service offered, as they would be in a position to meet the individual farmers and public and explain the benefits accrued by taking up intensive fish farming. This would also result in more water areas to be brought



under fish farming, indirectly helping to enhance the fish production from these resources. The exhibitions organised by local bodies and other agencies would be properly utilised by these extension staff to broadcast the achievements of the project and the benefits of taking up intensive composite fish culture in village tanks and ponds. This would have a greater impact on the rural population, inducing them to take up intensive fish farming in the remaining water resources also. If the workability of the scheme is properly demonstrated to the fishermen, they would readily accept the new ideas. Since the extension service offered in these five States would be location oriented and would be implemented by well trained extension staff, it is expected that the basic problems of the fishermen and the conditions of the fishermen of that area could be better identified and redressed. This would create a sense of awareness among the fishermen on the added advantages of fish farming technology and generate interest in them to take up large scale fish farming in these areas, consequently enhancing inland fish production as well as the spread of modern fish farming technology among the people.

4.2: Besides this, the proposed extension service organisation would provide employment opportunities to about 1287 graduates and post-graduates, who would be employed as extension staff in 58 Fish Farmer's Development agencies in these five States. In addition to this, about fifty thousand fish farmers would be imparted, training on the latest fish farming technology and settled with 117,000 ha. water area in the rural areas for taking up composite fish culture. The short-term training provided to them and the extension service offered by the extension staff of the FFDAs, besides the supply of necessary inputs and financial assistance for fish farm improvement, would give a confidence among the people to take up fish farming in larger areas. The benefits reaped by the farmers would not only go to them but also help to improve the rural economy and eradication of malnutrition among them by increased production of protein food, as well as the spread of the technology among the rural population.

5. Prospects of extending the proposed Extension Service System to other parts of the country

5.1: Hitherto, the extension support given under the programme of Fish Farmer's Development Agencies in the country has been too inadequate to drive home the advantages of intensive fish farming in tanks and ponds, which is considered to be more beneficial than crop husbandry. The present pattern of staffing in the FFDA's is one Chief Executive Officer, two Extension Officers, one Farm Superintendent and other technical and administrative staff. Out of these staff, only the C.E.O. and the E.O. are directly involved in offering any extension support required by the farmers, irrespective of the water area taken up for fish farming. This has resulted in poor coordination between the Extension Officers and the fish farmers, for want of enough facilities to reach the individual farmers and also because of large area under operation. The water area settled for fish farming in the previous years go without proper extension support and supply of necessary inputs, because of the fact that they should concentrate on taking up additional water areas for fish farming in the subsequent years. Consequently, there has been a lull of activity in taking up additional areas for fish farming. To overcome this shortfall in achievement of targets for bringing more water areas under intensive fish farming, introduction of the proposed extension service system under the World Bank project into the ongoing FFDA programme may be a welcome change.

5.2: Since the revised pattern of extension service system proposed under the World Bank Project is on the same model of T.V. System of Extension now in practice in some Agricultural Development Projects, it is expected that the introduction of this system in the inland fish farming will have a greater impact on improving the fish production in general and rural economy in particular. In view of this, the system would be tried under the ongoing FFDA programme also, which is operating in 15 States (excluding West Bengal and Madhya Pradesh where all the FFDA's fall

under the World Bank Project). Here also the same pattern of provision of one Extension Worker for every 100 ha. or 50 ha. water area covered and one Extension Officer for every 10 Extension Workers could be followed, for better coordination between the farmer and the FFDA staff and also to properly propagate the composite fish culture technology throughout the country. This would also considerably reduce the burden on the existing extension staff and also help in providing well organised extension service to the farmers.

## 5. Summary

5.1: To sum up, it could be said that the proposed extension service organisation under the World Bank assisted Inland Fisheries Project, in the pattern of the T.V. System in Agriculture, would be in a position to effectively communicate to the rural population the advantages of intensive fish farming in the country helping in enhancing the inland fish production and rural economy. This would also help in bringing in more water areas under fish farming, making us self-sufficient in fish production over the next one or two decades.

## Reference

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**TABLE.1. Inland Fisheries Project with World Bank Assistance - Requirement of Extension Staff for the Extension Service Organisation.**

Sl. No. State	1981-82			1982-83			1983-84			1984-85			Total		
	Water area ('000 ha)	E.W.	E.O.	Water area ('000 ha)	E.W.	E.O.	Water area ('000 ha)	E.W.	E.O.	Water area ('000 ha)	E.W.	E.O.	Water area ('000 ha)	E.W.	E.O.
1. West Bengal	3.4	34	3	6.8	68	7	10.2	102	10	13.6	136	14	34.00	340	34
2. Bihar	2.6	26	3	5.2	52	5	7.8	78	8	10.4	104	10	26.00	260	26
3. Orissa	1.6	16	2	3.2	32	3	4.8	48	5	6.4	64	6	16.00	160	16
4. Madhya Pradesh	2.5	25	2	5.0	50	5	7.5	75	8	10.0	100	10	25.00	250	25
5. Uttar Pradesh	1.6	16	2	3.2	32	3	4.8	48	5	6.4	64	6	16.00	160	16
<b>TOTAL</b>	<b>11.7</b>	<b>117</b>	<b>12</b>	<b>23.4</b>	<b>234</b>	<b>23</b>	<b>35.1</b>	<b>351</b>	<b>36</b>	<b>46.8</b>	<b>468</b>	<b>46</b>	<b>117.00</b>	<b>1170</b>	<b>117</b>

E.W. = Extension Worker;

E.O. = Extension Officer.

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FISHERY EXTENSION IN PRODUCTION FOR EXPORT

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Introduction

Systematic and rational exploitation of natural resources of fishery wealth from the sea or inland waters requires a well-planned system of extension both at the national and state levels.

The fishery is a self renewable natural resource providing cheap protein food for the masses. It is highly essential to preserve them for a continuous harvest by keeping exploitation at an optimum level through proper conservation. In India there are about one million fishermen engaged mainly in fishing. They are educationally and socio-economically backward in the society and therefore it requires careful planning to introduce any modern technology more effectively. The nature of extension work to disseminate the latest technology to them should be planned in an impressive manner with audio-visual education, practical demonstrations and incentives to adopt the technology.

The objectives of fishery extension programme with a pattern for organisational set up at National and State levels is discussed in this communication. The areas where special attention, with respect to marine products export, required are identified.

### Objectives of Extension

1. To increase the production of fish in capture and culture fisheries by applying the latest technology, for domestic consumption and export.
2. To regulate fishing for optimum exploitation and conservation of fishery resources.
3. To develop hygienic handling and processing of fish and fishery products from the time of catch till marketing.
4. To arrest the exploitation of fishermen by middlemen especially in marketing.
5. To improve the living standard of fishermen who are engaged in fishing and aquaculture.

### Present status

The Central and State Fisheries Departments are propagating the technology in fishing and fish culture. A few states in India have really shown progress in fresh water fish culture and in fishing by active extension service. The fishery extension machinery built up so far in India is far inadequate and incomplete to disseminate the latest technology developed in other parts of the world. Let us examine what are the pre-requisites for fishery extension and what type of extension machinery we require in India to disseminate the technology to common man.

### Pre-requisites for fishery extension

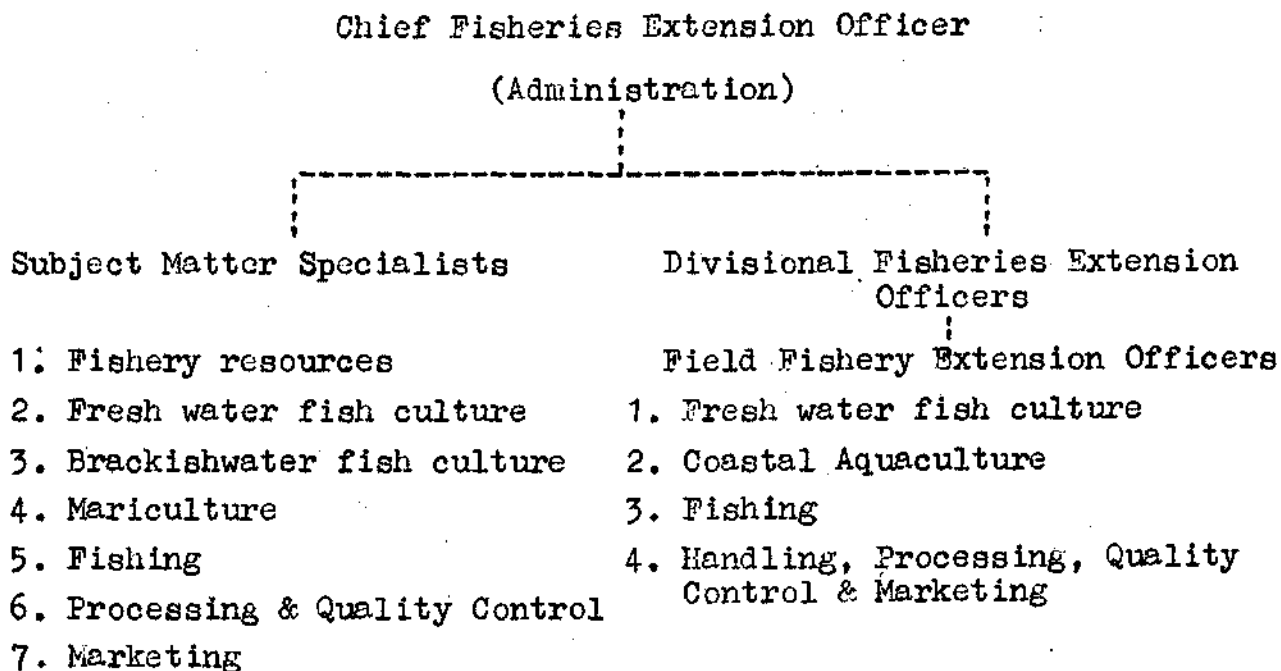
1. Commercial production of any nature is linked with economics and marketing. Therefore, before the technology is taught to a lay-man it has to undergo a test in economics of production and scope for marketing. Only products which come out successfully in the above test should be taken up

for production and extension work and until such time it should remain as experimental project with the concerned fisheries department of the centre/state.

2. The common man, to start his own production, needs resources, technology, area for fishing or fish culture, finance, management and marketing channels. The extension worker has to be trained not only in the fishery technology but also in management practices and marketing.
3. The latest technology in fishing/fish culture should be either developed in India by the Fisheries Institutes or should be borrowed from the developed countries through joint ventures.
4. A central team of experts in different disciplines of fisheries have to form a special cell to build a reference section for the current development in commercial fishery and pass on that information to all the extension divisions of the State Fisheries.
5. Each State Fisheries should set up a special cell for extension with a Chief Extension Officer. According to the extent of water area available for fish culture/fishing the State may be divided into as many divisions as possible and the number of extension workers are appointed in each division for specialised lines such as fresh water fish culture, brackish water fish culture, Mariculture, fishing, handling, transportation, marketing etc.
6. The Central team should conduct refresher courses every year for all the extension workers of the State Fisheries.
7. To get qualified staff for extension work in each state the university should start fisheries as one of the major subjects at B.Sc. level.

Organisational set up

Organisational Pattern for Fishery Extension



Functions of Extension Officers

Field Fishery Extension Officers: Field Fishery Extension Officers should be selected subjectwise to carry out extension in specialised line of work. According to the nature of work involved in a particular division either for fishing or aquaculture the extension officer with proper knowledge and training in the concerned subject should be posted. The number of officers required may be decided according to the population of fishermen and the extent of area to be covered in each division. For example if a division includes areas for fishing and coastal aquaculture it is necessary to post atleast two officers, one for each field. The officer who is specialised in fishing should not be transferred to aquaculture or vice versa. The Field officer should keep in close contact with fishermen



and study their requirements to adopt the latest technology to increase the production. They should conduct necessary audio-visual publicity, training and demonstrations on the latest technology. Periodical visits to the field should be made by the officer to follow the current development and offer necessary advice to tackle any problem. He should keep a drag record of all the fishermen families in his jurisdiction and follow their progress. Instead of working like an officer sitting in the office he should become part and parcel of the fishermen community. He should create goodwill and respect towards him by his talented dedicated service. A diary should be maintained by him for his day to day work.

Divisional Fishery Extension Officer:- The Divisional Officers will be in charge of a division which may contain several field extension officers. He should supervise the work of the field officer by periodical visits. He should prepare periodical questionnaires to the fishermen and get reply from them directly. It will help him to assess the type of assistance they are getting from the field officer. The diary maintained by field officers should also be checked by the Divisional Officer. The Divisional Officer should collect all the information in the technology from the Chief Extension Officer and pass on to the field fishery extension officer.

Subject Matter Specialists:- It is highly necessary to set up a team of specialists with reference cell to collect the information on day to day development in fisheries from all over the world by contacts, visits and through publications. As Fishery Science has become multi-disciplinary it is essential to create subject matter specialists in each line of commercial fisheries and build up a reference section under him. For the current development in fisheries the following subject matter

specialists should form a team under the Chief Fisheries Extension Officer in the Headquarters.

1. Fishery resources
2. Fishing technology
3. Coastal Aquaculture
4. Freshwater fish culture
5. Fish processing
6. Quality control
7. Marketing

The Subject Matter Specialists should also prepare extension manual in the local languages and distribute them to the field officers. They should also run a journal to pass on the day to day development in fisheries to the public. They should conduct refresher courses once in a year to the field officers.

Chief Fisheries Extension Officer: The Chief Fisheries Extension Officer will be over all incharge of the extension programme of the State. He should identify new areas for extension as per the day to day development in fisheries. He must be able to assess the technological development in a new line of fisheries for commercial exploitation. For example, the technology for seaweed culture has been developed in India as a new line for commercial exploitation. The Chief Fisheries Extension Officer should plan a programme for extension on seaweed culture in those areas where large scale culture is feasible. He should arrange the experts in India or from foreign country to teach the technology to the field officers on commercial exploitation. He should conduct periodical meeting of the Divisional Fisheries Extension Officers to check the progress of extension work in disseminating the technology.

#### National Level Fisheries Extension

As India is a big country with 6100 km long coast line for fishing, 1.7 million hectares of brackishwater area and 1.6 million

hectares of freshwater areas for aquaculture, it requires multi-lateral effort to achieve practical results in production. As the development of fisheries is mainly vested with the states with different cultural and educational backgrounds it requires a strong central team to coordinate the various agencies. At present we have a Fisheries Extension Training Centre at Hyderabad with limited staff and functions. The Central Marine Fisheries Research Institute, Central Inland Fisheries Research Institute, Central Institute of Fisheries Education, Central Institute of Fisheries Technology, Central Institute of Fisheries Nautical and Engineering Training, Integrated Fisheries Project and Fisheries faculties of Agricultural and other Universities at Mangalore, Tuticorin, Cochin etc. are imparting training and education in fisheries. Unfortunately there is no central agency to-day in India to put up demonstration in commercial fisheries for providing the economics of production. We have to build up a reference cell for all commercial fisheries of India and keep on up-dating it with the day to day development in national and international research results.

As Madamba (1979) stated, the path of technology from its generation to its application moves along a continuous line wherein it undergoes various stages of refinements. The technology is generated at one end, disseminated and utilised at the other end. This is a continuous process and the extension teams have to keep themselves upto date in the day to day development. The technology developed in other countries sometimes may not be applicable to our local conditions. It needs a field test for its viability and adaptability before it is really disseminated to the farmers. This system is well established in the Philippines. The final result of the Research and Development system is fed to the extension by a team of subject matter specialists. Even such results and recommendations have provision for periodic updating.

The team of experts should not only collect the information in their relevant field but also make field visits to study the lacuna and assess the appropriate technology required for development. They should also prepare extension manuals in different languages and run a "Fisheries Bulletin" for fishermen/fish farmers in different languages. As the Marine Products Export Development Authority is very much interested to develop commercial fisheries for export it can act as a nucleus of coordination for all fisheries extension in India. The function of the Marine Products Export Development Authority can be modified in such a manner to take up internal marketing also so that comprehensive programme can be worked out to develop all commercial fisheries in India. The items of current export from the existing fisheries in India is given in the Table-I. A joint plan of action is required to take up new lines for production and also strengthen the existing production by applying advanced technology.

#### Diversified fishing

Purse seining: In India trawling and gill netting are well developed in many states and purse-seining only in Karnataka. The purse seining is found to be very successful for tapping shoaling fishes like mackerel, sardines and anchovies but unfortunately this fishing is still not developed in other states. Therefore wherever pelagic shoal fishes are available it is necessary to introduce purse-seining by active extension work. The fishermen should be convinced by practical demonstrations.

Squid fishing: Similarly squid fishing is a new method of fishing which is yet to be introduced in India. As the squids are having good market in Japan and West Europe it is worth developing this fishing. As the technology is not yet developed in India we have to borrow this technology from countries like Japan/Korea. A series of training and demonstration should be conducted to train

our extension workers and fishermen. Wherever squid resources are bright we should try to build a strong extension team for teaching the technology to fishermen.

Deep-sea fishing: Deep sea fishing for lobsters and prawns is another line that awaits development. The fishing ground for lobsters and prawns have been known for the past several years, but the resources are exploited only by a few vessels once in a way. Due to lack of extension work many entrepreneurs are yet to take up this fishing in large commercial scale. As the deep sea fishing has become very expensive many entrepreneurs hesitate to take up this venture. Therefore, it is necessary to prove the economics of fishing by conducting a few demonstrations. As there is persistent demand for lobsters and prawns the economics of deep sea fishing for such items will prove to be successful.

Tuna fishing: Long lining and purse seining for tuna are other important methods of fishing that need further development. Many foreign vessels are coming and fishing for tuna in Indian waters. Due to recent hike in fuel price such resources can be exploited only by our own fishing fleet. As we have not developed this fishing in India, we may have to borrow the technology from countries like Japan, Korea, USA. A special team of extension workers should be trained to develop this fishing around Islands like Laccadives and Andamans.

There is great scope for items like deep-sea lobsters, prawns, squids and tuna in the international market and their production should be strengthened by developing necessary diversified fishing. It will in one way solve the problem of over fishing for prawns in the inshore waters.

Aquaculture: In the aquaculture field we have developed carp culture in many states in India but we have not made break-through in the commercial culture of fin fishes of the brackish and marine

habitat. The Central Marine Fisheries Research Institute has developed the technology for mussel and sea weed culture. The demand for mussel is very much limited in the international market since it is produced in large quantity by many other countries. There is scope for sea weed culture due to demand in the internal and export market. Therefore we have to build up a strong extension team to produce sea weed through culture in suitable areas of our coast.

Japan was importing eel in 1978-79 due to low production, but now the demand has fallen down due to surplus domestic production. However, when there is scarcity we can explore the export opportunities once again.

Live items such as prawns, lobsters, scallops, mussels, oysters etc. have good market in Japan fetching very high price, but the size of the market is very small and the demand is met by neighbouring countries. Therefore there is very little scope for countries like India to export live items in large scale.

#### The M.P.E.D.A. Programme

As Madamba (1979) puts it in a nutshell the aquaculture industry has three elements such as support (Fry resources, credit, infrastructure, technology, other production inputs), production units and marketing (marketing, processing, storage, post harvest, handling etc). The Marine Products Export Development Authority is taking steps to implement commercial shrimp farming in India by following the above principles. The tasks involved in implementing the programme are described below.

For promoting commercial shrimp farming in India the Marine Products Export Development Authority is trying to build up a floating core staff on coastal aquaculture engineering, hatchery technology, farm management, feed technology and disease problems by pooling experts in India and abroad. This staff will be

mainly responsible for imparting necessary training to the staff of the states. Each maritime state shall build up a core staff in the similar line to tackle the problems in shrimp farming. This team will conduct systematic survey to identify suitable sites for prawn farming, impart training to extension workers of their state and set up model farm and hatchery.

The Marine Products Export Development Authority is also trying to put up demonstration in farmers' ponds to prove the economics of shrimp farming and educate the farmers on scientific technology. This is done at present in Kerala, Karnataka and Orissa and will be extended to other states. This programme will be continued till the states are equipped to take up such work. This demonstration pond is also used as a training ground to impart training to the farmers in that region.

#### Conclusion

For doing effective extension work it is essential to build a strong core staff by a central organisation like the Marine Products Export Development Authority which has direct interest in commercial production. A regular practical training should be conducted to give training to maximum number of people in the essential and potential lines that awaits development. The economics of production in fishing and aquaculture should be proved by practical demonstrations in the field.

#### Acknowledgement

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**SEMINAR ON FISHERIES EXTENSION**

**Cochin, 8-10 December 1980**  
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**IMPROVED TECHNIQUES ON FISHERIES PRODUCTION AND PROCESSING**

**COME TO LIFE THROUGH SUPER 8 mm MOVIES**

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Film is a medium through which human mind can effectively be motivated and moulded for the betterment of their living especially with the millions of illiterate farmers for imparting knowledge about the improved farm techniques.

Basically the film medium is considered not only as a source of entertainment but also as instructional and educative and can effectively be utilised as a window to observe the new areas of learning and situations which are beyond their comprehension. To assimilate, absorb and consequently help in the evaluatory process of human progress, the image, more particularly the moving images, have played a very important role everywhere. Sound movies with their life like-high fidelity, full-colour images and sound put at our disposal an effective power to motivate people towards better understanding and maximum use of their abilities. Since the concept of this film medium is based on the theory of entertaining the common man, for all the educational and Fisheries Extension programmes, the element of entertainment may have to be kept in view either by screening a short entertainment or relief films or by imbuing this element within the instructional film itself.



There have been movie films of one kind or another for a long time. Fishermen and farmers have accepted them like many other materialistic products of our gadget minded civilization. Many agricultural extension specialists were using movie films to augment their lectures and demonstrations. It has been observed that the use of sound movie films by the agricultural extension personnel not only has increased the attendance at rural meetings but also motivated by arousing the emotions and ultimately lead the trend towards the changes in their attitudes. Knowledge acquired through movie films is perhaps remembered longer with better clarity.

There are at present four sizes of movie films: either in colour or in black and white and they are in 75 mm, 35 mm, 16 mm and super 8 mm sizes. The 75 mm and 35 mm are highly sophisticated with bulky and static projection equipment fitted in luxurious and sumptuous theatres for screening the feature film in the cities, towns, suburbs, etc., for entertainment purposes. The 16 mm movie films are being highly extensively used in most of the educational institutions, campaigns, sales representatives, etc. A few old teachers and very few extension officers had chances of using movie films before world war I - employing expensive, bulky and complicated 35 mm movie projectors. In the 1920s a sub-standard gauge 16 mm great resistance by the advocates of 35 mm movie. It is the 16 mm movie projectors which have dominated the entire educational and extension fields from the mid 1930's until now. While the 16 mm technology which has dominated the educational, publicity, propaganda and extension fields, with lighter, more easily movable projectors and films has been instrumental in stimulating the moving images, it is still accurate to say that movie films are not yet widely used in the country for instructional and educational purposes due to many obvious reasons.

While film has found a central role in our culture at large, its role in education and extension is marginal at best. Undoubtedly one reason for our gloominess in capitalising on the educational potential of the moving image in extension is our reluctance to depart from the ways of our ancestors. But it is probable that a more important reason is that the right film simply has not been easily accessible for use. Within recent years a new movie film tool has appeared which places an unique device in the hands of any one who has a need to communicate visually. This is the result of a coordinated audio-visual system with built in screen designed and developed with a film format called super 8 mm screening system. This is a major break through not only in film size but also in the film handling system in Camera and in projector design inviting maximum film utilisation. Super 8 mm film production and screening equipment are compact, inexpensive and mostly with automatic controls and devices. Another important feature of Super 8 mm. is that of price consideration - the film is more economical for production as well as for duplication and for the price of one 16 mm sound movie projector at least two magnetic sound super 8 mm. projectors can easily be obtained.

The general impression is that 16 mm film prints are precious, so they are stored in the central film libraries, which are brought out or loaned out occasionally when a venturesome teacher or extension officer troubles to order them, and then they are returned to be inspected, cleaned and rewound. This is true only to a small extent with the super 8 mm because of their cheapness, the versatility and the possibility of decentralising the film libraries, perhaps placing frequently used films in cartridges on permanent deposit with the District and Sub-Divisional/Block authorities.

If cost of film prints has kept movie films out of the class room or of an Fisheries extension agency, a factor of equal or perhaps greater importance is the complexity of the projection equipment, procedures, projectionist, transportation and other complicated arrangements for screening the films in dark. These combined with the other obstacles are vanishing now with the advent of relatively inexpensive and most versatile super 8 mm cartridge - loading projectors with built in screen which can be located permanently at the Sub-division/Block and District level in all the States and which can easily be - operated by inexperienced extension workers or officers. Because the cartridge - loading projectors which are now readily available today in India can be used by any officer or Fisheries extension worker with a brief training in handling for about an hour or two, the Departments of Fisheries, Agriculture, Animal Husbandry and the Fisheries Institutes, Colleges and Agricultural Universities can now think of going in for these versatile super 8 mm film shows on a large scale.

An example of the simplicity and convenience of using these projectors is that "A farmer in Raipur in Madhya Pradesh was astonished to see a group of villagers underneath a tree during bright day light watching a gadget with built in screen on which a moving image of an agricultural implement in operation in a field with audible commentary. As he proceeded near and near, he could see sound movie on agricultural implements for better crop management and an Extension Worker seated by the side of the screen of a Super 8 mm projector now and then explaining the salient features as supplement to the film commentary". The important feature of this Super 8 mm projector is that the cartridge - loading feature is economically possible, for a variety of technical reasons, only with the Super 8 mm films.

Several attempts have been made to make cartridge loading for 16 mm film, but found so complicated that each empty cartridge costs more than the film and weighs as much as that of a small projector.

Super 8 mm and 16 mm film screenings - Comparative merits and demerits:-

	Super 8 mm	16 mm
1. Equipment.	Light and easy to carry.	Heavy and needs people to carry.
2. Film.	Non-breakable, polyester base - permanent colour retention.	Breakable celluloid base colours are likely to fade.
3. Longevity of film.	Withstands for more than 1500 screenings.	Cannot withstand for more than 400 screenings.
4. Operator.	Any Extension Officer can handle. No need of Projector Operator.	Projector Operator with an attendant are essential in addition to the Extension Officer.
5. Day time screening.	With builtin screen the films can be screened in open.	Not possible unless darkening facilities are available.
6. Transportation.	Replaces information Van as the Projector and films can be carried by cycle, bus etc.,	Needs transport and darkening facilities
7. Quality	Average.	Very good.
8. Frequency of Screening.	Most frequent.	Less frequent or nil.
9. Storage of films.	Occupies less space - does not need air conditioning.	Needs more space and requires air conditioning.

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|---------------------------------------|---|---|
| 10. Film prints.                      | Comes in cartridges with end to end film loop - Re-recording or dubbing in local language is possible.          | Comes in spools loaded in cans-Re-recording or dubbing is not possible. |
| 11. Rewinding.                        | Not necessary. Best suited for displays for continuous showing.   | Not suitable for continuous showing in displays.                        |
| 12. Threading the films               | Takes few seconds to fix the cartridge.   | Few minutes for threading and wrong threading damages the film.         |
| 13. Maintenance.                      | As they are dust proof, does not require much maintenance except the cartridges which are delicate in handling. | Film is open and subject to dust and finger prints.                     |
| 14. Cost benefit ratio per screening. | Maximum benefit.  | Very low benefit.   |

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Keeping the foregoing features in view, most of the countries in the world are making a head way in maximising the utility of Super 8 mm film screening systems. An example of such usage can be observed from a press release in Times of India on 7-1-1979 which has reported as follows:-

China produces 15 to 20 movie films every year. In spite of such a low production it is interesting to know how successful the Chinese are in showing these limited films to a vast audience. To know how the Chinese have been able to meet their demand for films is useful to Countries like India which produces an astounding number of films but suffer from a lack of exposure. The normal practice in China is to make a minimum

of 350 copies in 35 mm, ONE thousand copies in 16 mm and TEN thousand copies in Super 8 mm film sizes. For the time being the Super 8 mm size might look odd but the Chinese have evolved a very convenient gauge by just quartering the conventional 35 mm celluloid film".

In India the 16 mm. film is sliced into two halves for getting the Super 8 mm and thus the film raw material is being economically utilised which has an added advantage of best utilisation of the available film raw material during these days of film raw stock shortages.

The Super 8 mm films are to be duplicated and supplied in large number through out the country. So far, the Directorate of Extension of the Ministry of Agriculture and Irrigation has supplied copies of the films in Super 8 mm size cartridges on about 40 titles covering the topics of Agriculture, Fisheries, Animal Husbandry, Forestry etc. in English, Hindi and major Regional languages, to all the State Department of Agriculture, Extension Education Institutes etc. As such the films are readily available for the use with these projectors anywhere in the country. Thus the Super 8 mm films can be borrowed either from the Directorate of Extension or from the State Department of Agriculture.

The Super 8 mm movie films in various region/<sup>al</sup>languages are also available from the Directorate of Extension, Ministry of Agriculture & Irrigation, New Delhi and from the respective Directorate of Agriculture of the States concerned for borrowing.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980

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TECHNOLOGY GENERATION AND TRANSFER FOR  
MARINE FISHERIES DEVELOPMENT

By Central Marine Fisheries Research Institute, Cochin-682018

The importance of technology transfer through education, training and extension programmes in the marine fisheries sector has been stressed from time to time in the successive Five-Year Plan proposals, in the reports of Parliamentary Committees and other reviewing committees; and more recently by the National Commission on Agriculture.

The Central Marine Fisheries Research Institute has always attached considerable importance to extension activities and in recent years they have formed an integral part of its research and development programmes. Transfer of technology through training, demonstration and extension programmes are given high priority in the current programmes of the Institute.

The Institute was started at a time when the country was facing acute shortage of proteinous food and a strong research base was very much wanting to lend adequate scientific support for various development plans to augment marine fish production. Over the past 33 years the Institute has steadily grown from strength to strength and it has now become a premier national facility for marine fisheries research and development. The research programmes undertaken by the Institute are inter-disciplinary and are intended to provide technologies and data base to various departments/organisations of the Centre, maritime States, the industry,

Agricultural and other Universities and the individual fisherman and fish farmer for the ultimate objective of fisheries development.

Notable impact on capture fisheries

As a result of the efforts of the Institute drawing attention to the extent of the exploited resources, new and additional untapped resources and the scope for increasing production by extending the area of fishing operations to non-traditional grounds, notable impact has been made on the overall development in capture fisheries in the recent years. The State Governments and the industry have progressively increased the mechanised fishing operations in the northwestern region, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh and Union Territories. Substantial increase in the catches of tunas, catfishes, perches, pomfrets and elasmobranchs has been witnessed after introduction of nylon gill net fishing for these species. Penaeid prawn catches in Kerala and non-penaeid prawns in Maharashtra have steadily increased during the 1970s and along the east coast both these groups have registered sharp increase in recent years. The recent introduction of purse-seines in Karnataka based on research information on pelagic resources made available by the Institute enabled the State to double its catches of mackerel and oil sardine. Purse-seines are already in operation in Kerala. Other maritime States are contemplating introduction of purse-seines for increasing the production from capture fisheries.

The Institute's estimate of potential resources in the seas around India and its findings on the pelagic, oceanic, deep-water and demersal resources (both conventional and non-conventional) assumes added significance in the context of exploration and utilization of the Exclusive Economic Zone.

Breakthroughs in coastal aquaculture

Aware of the importance of coastal aquaculture for augmenting fish production and for improving the rural economy,



the CMFRI launched research programmes in the early seventies to develop appropriate low-cost technologies for the culture of marine organisms. Within a short time major breakthroughs were achieved in several fields. For the first time, an indigenous technology for pearl culture was developed in 1973. Open sea mussel culture showing its great potential for increasing production followed this. Techniques for breeding and culture of almost all commercially important penaeid prawns were developed during 1974-77. Valuable results have been obtained in the culture of lobsters and crabs. Intensive surveys have been undertaken since 1975 to evaluate the availability of seed and potential seed grounds along the coasts for culture. Culture of fin fish initiated in the 'fifties has been considerably strengthened and extended to farming studies on mullets, pearlspot, sand-whiting and eel. Simple techniques for seaweed culture have been developed for commercial-scale propagation. The Institute has also taken up integrated programme in crop-livestock-fish farming.

#### 1. Fin fish culture

Many species of fishes such as milkfish, mullets and perches are suitable for culturing in the low-lying areas and impounded brackish water. The work carried out by CMFRI at Mandapam and Tuticorin has shown that with proper management procedures production of milkfish in saline lagoon and ponds could be substantially increased.

The Institute has developed methods of culturing the eel, Anguilla bicolor in running fresh water. This species is abundant along the east coast and they breed in the open sea. The elvers ascend the rivers during the rainy season. Elvers are collected and reared in experimental culture tanks at Mandapam Camp. This species has given a production rate of 38 t/ha at the end of a period of 2 years.

Another species of fish, Sillago sihama is being successfully cultured at Mangalore. The species grows to about 200 mm in 7 months.

At Narakkal farm, polyculture of mullets, pearl spot and prawns has given good production rates. Similarly fish and prawns are cultured in salt pans at Tuticorin. At Mandapam techniques for culturing mullets, milkfish and perches in pens have been developed. At Vizhinjam experiments are in progress for culturing tuna bait fishes such as anchovies in enclosed wells.

The Institute has developed methods for induced breeding of mullets using pituitary extracts and hormones and similar experimental work on milkfish is in progress.

## 2. Marine Prawn culture

The recent technologies developed in marine prawn culture were the fruits of sustained and intensive researches carried out in the field laboratories of CMFRI particularly at Narakkal, and at Tuticorin, Mandapam Camp, Kovalam and Kakinada.

At Narakkal, breakthroughs were achieved in the spawning and rearing of larvae upto stocking size under controlled conditions, of almost all commercially important prawns such as Penaeus indicus, P. monodon, Metapenaeus monoceros, M. dobsoni, M. affinis and Parapenaeopsis stylifera. One of these species, M. dobsoni, has been successfully "domesticated" and viable eggs liberated by the cultured prawn have further been reared to stocking size.

Recently, the laboratory has evolved the technique of 'unilateral eyestalk ablation' for enabling prawns to mature consecutively. For mass production of prawn seeds hatchery techniques are being developed here.

The techniques of mass culture of several species of diatom, the brine shrimp Artemia salina and zooplankters which form the food of larvae and juveniles of prawns have also been developed.

At Mandapam and Tuticorin methods of culturing prawns and fishes together have been studied to get optimum stocking rates and for obtaining better yield. At Kovalam, success has been achieved in the breeding and rearing of P.semisulcatus. At Kakinada, the feasibility of culture of P.monodon in salt pan reservoirs has been worked out.

The Institute has evolved proper techniques for improvement in traditional prawn culture, selection of farm site, construction of farms, preparation of field for stocking, and scientific prawn farming.

As a result of these technologies, it has been shown that improved methods of culturing selected species of prawns with proper management would result in production rates of 1000-1500 kg/ha/annum.

### 3. Pearl culture

The technology for production of cultured pearls and farming of pearl oysters were developed indigenously for the first time in India by CMFRI at Tuticorin in 1973. ~~The raft culture method was introduced to rear pearl oyster.~~ The important species cultured is Pinctada fucata. The surgery is performed in the shore laboratory and the operation consists of grafting a piece of mantle in the gonad or hepatopancreas region of the oyster, followed by the implantation of a spherical shell-bead nucleus.

Although cent per cent success has been achieved in certain batches, the average production is about 60-70%. Multiple production of pearls in individual oysters has been achieved. The size of nucleus employed ranges from 2mm to 7 mm diameter depending on the size of the oyster and the choice of single or multiple implantation. The rate of deposition of nacre is high in the tropical seas and hence the duration of post-operative culture is considerably reduced, requiring only 3 months to 18 months for the range of 3 mm to 8 mm pearls for maturity. The shell beads required have been produced from the conch-shell wastes. The surgical tools have been fabricated indigenously.

#### 4. Culture of edible oysters

Intensive work on the culture of edible oyster, Crassostrea madrasensis is being carried out at Tuticorin Research Centre. The techniques of oyster farming consist of collection of spat by using different spat collectors and growing them to adult stage by methods such as rack culture, long-line culture and tray culture. For collecting the spat, materials such as lime-coated tiles, oyster shells strung on galvanised wire, empty coconut shells and rubberised coir mats are being tried. It has been demonstrated that the farm oysters have better growth rate and healthy condition, and give higher yield when compared to those growing in the wild.

#### 5. Mussel culture

The techniques for mussel culture were developed at CMFRI Research Centres at Calicut, Vizhinjam and Madras. Two species namely Perna indica (Brown mussel) and Perna viridis (Green mussel) occur in the country. The experiments conducted at Vizhinjam on the culture of brown mussel follow the suspended or raft culture method using ropes. The seeds of mussel are collected from the natural beds and transplanted to these ropes.

The annual production rate was estimated as 150 tonnes/ha as compared to natural production of 4 tonnes/ha.

At Calicut, the technique of culturing green mussels in the open sea has been developed successfully. The average production per rope of 7 metres length is about 80 kg of mussels and it has been estimated that the yield/ha for a period of 5 months is about 235 tonnes. A system of mussel culture using submerged rafts suitable for rough sea conditions is under development at Madras.

#### 6. Seaweed culture

The culture experiments on seaweeds are carried out from the Regional Centre at Mandapam Camp. The cultivable seaweeds are agar-yielding plants like Gracilaria and Gelidiella species and algin-yielding plants such as species of Sargassum and Turbinaria.

The method of cultivation of Gracilaria edulis, the fast growing species with minimum of seed material has been standardised. Culture experiments have been done by introducing fragments of seed material in the twists of coir ropes which are fabricated in the form of 5 x 2 metre size nets. These nets are then tied to wooden poles fixed in the coastal waters. The plants reach harvestable size after 80 days of growth.

Experiments have shown that other species of seaweeds such as Sargassum could also be cultured economically. There is increasing demand for seaweeds for the manufacture of agar-agar and algin which used to be imported previously.

### 7. Culture of other organisms

Apart from the technologies developed in the above mentioned major areas of mariculture, the Institute has also developed techniques for the culture of spiny lobsters and crabs. Experiments on the culture of clams and cockles are also in progress. The possibilities of culturing sponges, holothurians and marine turtles have also been explored.

#### Impact of these technologies for rural development

These recent technologies have had the desired impact on the maritime State Governments/coastal rural population. /and Pearl culture technology and seaweed culture are industry oriented. A pilot project on pearl culture has been started by the Kerala Government.

As a result of technologies developed in prawn culture there is an intense awareness among coastal rural population to take up scientific prawn farming. The coastal rural people are taking up mussel culture to increase their income and the industry is also evincing keen interest for processing mussel meat for export.

In general, many of the maritime States are now coming forward to develop coastal aquaculture and integrated farming for augmenting fish production in their state.

#### Future thrust in mariculture research

Future programmes of the Institute in mariculture will have major thrust on the following aspects:

1. Efficient methods of seed collection, conditioning and transport to ensure supply of seed of desired species during different seasons.

2. Development of hatcheries for large scale production of seeds of fishes, prawns, mussels, edible oyster and pearl oyster and developing a low cost technology for such hatchery production.
3. Development of designs for construction of farms and low-cost farm implements.
4. Genetic upgrading of cultivable organisms.
5. Physiology, nutrition and fish pathology and disease control of cultivated organisms.
6. Monitoring pollution and physiological stress; pollution control in areas where culture operations are undertaken.
7. Technology for efficient methods of harvesting; post-harvest technology for quality control, product development and utilisation.
8. Developing integrated system for crop-fish-livestock farming to ensure maximum possible utilisation of land and water areas during all seasons towards raising the living standards of coastal rural community.

Strong information base

As one of its major objectives, the Institute collects, compiles and disseminates all-India marine fish production data based on an internationally accepted sampling system; the major traditional marine fisheries have been studied intensively; new fishing grounds and resources have been explored and charted; and stress has been given to oceanographic investigations for obtaining synoptic pictures of environmental parameters that influence distribution and seasonal abundance of various fisheries.

In recent years, several breakthroughs have been achieved in the culture of finfishes, prawns, oysters, pearl oyster, mussels and seaweeds. The Institute has developed economically viable technologies for mariculture which are easy for adoption by fishermen, small farmers and coastal rural population.

The sustained research development activities of the Institute over the past three decades have resulted in building up a strong information base and this is contained in the numerous publications of the Institute, which may be listed as follows (Total Numbers/Volumes issued so far are indicated in paranthesis):

1. Indian Journal of Fisheries - Official Journal of the Institute of fishes (24)
2. CMFRI Bulletin - On Major groups/such as oil-sardine, mackerel, prawns, Bombay-duck and on exploratory fishing, primary productivity, exploited fishery resources, mussel farming, etc. (29)
3. Special publication-on selected topics of interests (6)
4. Marine Fisheries Information Service - Technical and Extension series (22)
5. CMFRI News letter (10)
6. Extension pamphlets - on various technologies (24)
7. Annual Reports and other special scientific reports on sponsored projects (15)
8. Proceedings on Symposia and Seminars
9. Monthly exploited fishery data provided to all State governments and Industry.
10. Scientific and technical papers in Journals published in India and abroad (1600)
11. Proceedings of Summer Institute, Workshops, Training Programmes etc.



12. Krishi Vigyan Patrika - Mariculture series (English & Malayalam) (6)

Transfer of technology

In order to demonstrate the techno-economic feasibility of coastal aquaculture/seafarming and on aspects of small scale capture fisheries, the CMFRI has taken up a number of projects on technology transfer. These programmes are profitably utilised by maritime States, Universities, development agencies, the industry and individual fish farmers. These may be briefly mentioned as follows:

Operational Research Project

The Institute has taken up an Operational Research Project on 'Blending sea farming with traditional capture fisheries' at Kovalam, a fishing village near Madras. This village has 175 families comprising 975 fishermen. The objectives of the project are to train the fishermen in the methods of mariculture of fishes, prawns, and molluscs so that these could be undertaken along with traditional capture fisheries. This has created among the fishermen of the village, a sense of involvement and participation in the sea farming techniques evolved by the CMFRI and has demonstrated the scope for overall improvement of socio-economic conditions of the area. The Integrated approach to blend culture fisheries with capture fisheries for rural development is a new concept in marine fisheries sector in the country.

Demonstration projects

After having developed appropriate technologies in the culture of various species, the techno-economic viability of intensive culture is demonstrated to interested fish farmers and entrepreneurs through the following demonstration projects:

1. Demonstration Project on pearl culture at Tuticorin.
2. Demonstration Project on edible oyster culture at Tuticorin.
3. Demonstration Project on mussel culture at Calicut.
4. Demonstration Project on seaweed culture at Mandapam.
5. Demonstration Project on intensive prawn culture at Cochin.

#### Pilot Projects

The Institute has rendered technical assistance to the Government of Kerala in organising and implementing a pilot project on pearl culture.

#### Sponsored Projects

CMFRI undertakes sponsored projects funded by private and public sector agencies. A Sponsored Project on "Elver resources survey and eel culture" and another on "Assessment of fry resource of cultivable penaeid prawns at selected centres in Kerala and Karnataka", both financed by the Marine Products Export Development Authority have been implemented. During 1978-79 the Institute was participating in the Co-operative Intensive Prawn Farming project jointly undertaken by Kerala Government, MPEDA and CMFRI. This project was intended to demonstrate the economic viability of intensive prawn culture to the industry and fish farmers in the Ernakulam District.

#### Inter-Institutional Projects

The Institute maintains close liaison, co-ordination and co-operation with other institutes in the ICAR, Government of India and other organisations in implementing its research programmes

as well as extension programmes. The following are the inter-institutional projects undertaken:

1. Fish and prawn feed development for intensive culture - This is being implemented at Cochin (with CIET).
2. Product development and quality control of molluscan product at Cochin and other centres (with CIET).
3. Operation of conventional and experimental Dol nets being implemented at Bombay and Veraval ( with CIET).
4. Improvements in gear and methods of lobster fishing being implemented at Cochin, Mutton and Tikoli (with CIET).
5. Economics of marine fisheries in the Calicut area (with IASRI) has been undertaken. This project will suggest ways and means to improve the socio-economic condition of coastal fishermen and rural community and also study the impact of changing fishing pattern in the area.

#### Lab-to-Land Programme

The Lab-to-Land programme organised by the ICAR during the Golden Jubilee Year was implemented at the Institute's level from the beginning of 1979. The appropriate technologies developed by the Institute on various aspects of coastal aquaculture were considered ideal for transfer to the fishermen and farmers in the coastal sector. During 1979, 302 families were involved under this programme as follows:

- 122 families of the Harijan Society at Valappu, Ernakulam District for intensive prawn culture.
- 15 families of marginal farmers in Quilon District for prawn and fish culture.

30 fishermen families selected at Elathur for mussel farming.  
15 fishermen families for oyster culture at Tuticorin.  
20 fishermen families at Mandapam for seaweed culture.  
50 Harijan families at Muttukkad for prawn culture.  
50 fishermen families for mussel culture at Karikkattukuppam.

All the farmers were trained in scientific farming methods and respective technologies in a phased manner. Critical inputs are provided by the ICAR and the scientists of the Institute are providing technical assistance.

As a mid-term appraisal a workshop was organised in July 1979 and the farmers provided much needed feed-back information, discussed the constraints and problems and future course of action.

#### Training programmes

One of the objectives of the Institute is to effect transfer of technology through various training programmes organised at different levels. Training is imparted in the undermentioned areas of specialisation to candidates sponsored by maritime State Fisheries Departments, Agricultural Universities, developmental agencies such as the MPEDA and those from abroad sponsored through Government of India.

##### 1. Training in marine prawn culture

This programme is usually conducted at Cochin and training is given on various aspects of prawn culture such as identification of larvae, post-larvae and juveniles of commercially important prawns, collection of spawners, breeding, rearing, stocking methods, scientific methods of prawn culture, etc. The course includes group discussion, field and practical

work besides lectures and demonstrations. Besides this, ad hoc training in prawn culture is given to students, in-service personnel, and staff of other organisations who require such training. During 1978 and 1979 about 50 officers have been trained which included two from abroad.

## 2. Training in pearl culture

A long-term trainer's training course of six months duration intended for officers from maritime State Fisheries Departments and a short-term course of 6 weeks duration in specific field of pearl culture intended for operative personnel are conducted at Tuticorin. About 10 candidates are trained in each batch. The officers trained in these courses are now working in pearl culture projects in Kerala, Tamil Nadu and Gujarat.

## 3. Training in edible oyster culture

The main thrust of this training programme is to transfer the technology of edible oyster culture to small scale and marginal farmers so as to propagate this field among them. Adhoc training course in edible oyster culture is also given to batches of students from Universities and Agricultural universities.

## 4. Training in under-water diving by SCUBA

Under-water investigation through diving with SCUBA received considerable importance as a result of the pioneering work done by the scientists of CMFRI during the survey of pearl oyster and chank resources off Tuticorin. Under this training programme scientists are educated on the principles and methodology of SCUBA diving and on methods of underwater survey of resources. Practical training is given on swimming, snorkeling and use of self-contained underwater breathing apparatus.

5. Training in fishery resource assessment and population dynamics

This is an important training programme in capture fisheries and the course of 6 weeks duration involves lectures and practical training on sampling techniques, statistical methods involved in processing and analysis of data and population dynamics for the assessment of fish stocks. The course is conducted at Cochin and usually about 12 candidates drawn from maritime States and Agricultural universities are trained each year.

Krishi Vigyan Kendra

The Krishi Vigyan Kendra for mariculture was established in 1976 at Narakkal and it is designed and devoted to impart need-based and skill oriented vocational training to fish farmers who intend to go for self employment. The KVK disseminates technical knowhow developed at the CMFRI on the culture of marine prawns, fishes and molluscs, ensuring a ready and regular flow of scientific and technical information from the laboratory to farmers. The duration of training to each batch ranges from 5 days to one month. So far 914 persons have been trained, which include 262 farm women and 303 members belonging to the Scheduled caste. Some of the trainees have taken up prawn culture in their own fields or derelict waters. The farm women who have been trained are now engaged in collecting prawn seed from the wild, thus utilising their spare time profitably. The KVK also organises mobile training programmes at other centres depending on the demands and needs of the fish farmers.

Centre of Advanced Studies in Mariculture

The Centre of Advanced Studies in Mariculture was

instituted at the CMFRI, sponsored by ICAR/FAO/UNDP. The main objective of the Centre is to catalyse research and education in mariculture for augmenting the fish production of the country. The objective would be accomplished by providing adequate facilities to carry out research of excellence in mariculture, improving quality of post-graduate education, enhancing competence of professional staff, developing linkages and collaboration with other institutions in the country and organising seminars and workshops.

The first batch of 10 M.Sc. students and 4 Ph.D. scholars are attending the regular courses from the middle of 1980.

#### Consultancy service

The Institute is regularly approached by small farmers, fish culturists, industry, development agencies and Government departments for consultancy on various aspects of capture fisheries, culture fisheries and environmental problems. In capture fisheries, it is usually on matters relating to introduction of large mechanised vessels, location of fishing ground, production and seasonal species composition, new resources that could be profitably exploited, economics of fisheries operation etc. On culture fisheries consultancy is rendered on suitability of areas or selection of sites for farming, farm lay-out and construction, farming methods and the economic viability of such operations. The industries which pose environmental problems consult the Institute for pollution monitoring and pollution control measures.

#### Education

Although research programmes of the Institute are mostly of an applied nature, basic research on complementary aspects of

capture and culture fisheries are also carried out mainly through research scholars and fellows who do post-graduate work. The Institute has been recognised by many universities as a centre of post-graduate research leading to M.Sc. and Ph.D. Degrees. Many of the scientists hold Ph.D. Degree and have been recognised as guides or supervisors of students carrying out research for Ph.D. degree.

The scientists also serve as members of advisory committee, panels, board of studies etc. of many universities and also take classes for M.Sc. and Ph.D. students in respective departments of the universities.

Towards transfer of technology at higher levels the institute conducts periodically Summer Institutes on important subject areas such as Coastal Aquaculture, Breeding and rearing of marine prawns, and culture of edible molluscs. The teaching staff in Universities and colleges are much benefited by this level of training to update and improve their knowledge.

#### Publicity

In order to publicise and project the technologies developed by the Institute and also its activities, various publicity media are utilised.

Popular articles on farm oriented research highlights are regularly written in different languages in leading newspapers and magazines in the country. The scientists of the Institute are invited by the different stations of All India Radio to give talks on recent technologies developed by the Institute and which are of immediate benefit to the farmers or fishermen.



The scientists participate in programmes such as rural science gathering organised by All India Radio. The Institute's activities are also projected in the T.V. programmes.

The Film Division, Government of India has taken a number of documentary and feature films on the technologies developed by the Institute. These are being exhibited throughout the country.

The Institute has regularly participated in Exhibitions, "Open House", and Fairs organised at All-India, State and Municipal levels or by individual Institutions. The Institute also organises Farmers' Day and Kisan Melas for the benefit of the farming community.

#### Facilities for training of Extension personnel

The Institute has well developed laboratory facilities at its headquarters in Cochin and in the various Research Centres. Field laboratories and farms have been developed at Cochin, Mandapam, Calicut, Tuticorin and Madras and similar facilities are being developed at other centres as well. The Institute has an excellent library with a present holding of over 50,000 volumes and periodicals. Part of the main library is housed at Mandapam Camp where the main Museum and marine aquarium are also located.

The Institute has acquired a sophisticated 107' Research Vessel for carrying out all types of fishery investigations in the seas around India. Other physical facilities such as smaller vessels, conveyance, and audiovisual equipments have been adequately developed.

The Institute has also proposed a Trainers Training Centre (TTC) in the Sixth Plan and will be an organised facility for training the trainers and extension personnel.

For a massive transfer of technology to artisanal and farming community in a proper manner the Institute has proposed a full fledged Extension and Fishery Economics Division during the Sixth Plan period. The proposed Division will have adequate scientific and technical staff and will be provided with all physical and equipment facilities for carrying out extension work.

Low-cost technologies for the small fisherman

The various technologies developed by the Institute have been outlined in the earlier paragraphs. Conscious of the fact that most of the fishermen and small farmers live below the poverty line in spite of various development plans in the marine fisheries sector and also bearing in mind the inherent conflicts between the fishermen in the artisanal Sector and those of the mechanised fishing sector, the Institute has strived to develop appropriate low-cost technologies for coastal aquaculture. These could be profitably undertaken by the fishermen along with the traditional capture fishery as evidenced in the progress of the Operational Research Project being implemented at Madras. This helps them to utilise the spare time and augment their income for improving their economic status.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980  
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TECHNOLOGY GENERATION AND TRANSFER FOR FISHERIES  
DEVELOPMENT

By Central Institute of Fisheries Technology, Cochin 682009

The Central Institute of Fisheries Technology, with its Headquarters at Cochin and 6 Research Centres, i.e., at Veraval, Kakinada, Burla, Calicut, Goa and Bombay was established in 1957 with the aim of developing suitable techniques and equipment for the exploitation of the rich fishing grounds of our country and to undertake research for the proper utilisation and processing of the catch. It was also entrusted with the responsibility of extension work when the Extension, Information and Statistics Division was organised in 1961.

Technologies/Information base developed so far  
at this Institute - utilisation - evaluation  
of their impact on development

The Institute has prepared 12 standard designs of mechanised fishing boats in the size range of 7.67 metres to 15.24 metres. In addition to this, several designs were prepared against specific requests from the State Governments. As a result of the designs recommended, it was possible to construct many fishing crafts out of the timbers locally available. Most of the mechanised boats in operation along our coastline may be traced to have been built as per CIFT designs.

A number of methods for the proper preservation of fishing crafts have been developed at this Institute after extensive trials. Of particular mention in this respect is

an anti-fouling paint developed for fishing boats to prevent fouling organisms from causing damage to the hulls. This process is now being patented. Dammer battu, a resin which was being imported for protective application on wooden boats, was recommended to be replaced by five different varieties of various indigenous resins.

In an attempt to bring down the cost of construction of wooden fishing boats, the researches carried out at this Institute have resulted in recommending Venteak as a suitable boat building timber in place of the more expensive timbers like Teak, Aini etc. Copper sheathing, which is very costly, has been recommended to be replaced by aluminium alloy sheathing. Another substitute recommended is Fibreglass reinforced plastic which has also been very suitable for the internal lining of fish holds.

As a result of these technological developments, the cost of construction and maintenance of fishing boats is receding gradually. The substitutional sheathing with aluminium-alloy and fibreglass reinforced plastic is being imported. Some of the technology relating to the maintenance practices is also being applied more widely to country crafts.

Studies on corrosion and other deleterious effects of the oceanic environment have resulted in the development of various techniques for increasing corrosion resistance. Of special mention here is the development of zinc blocks and ternary aluminium alloy anodes to be applied on hulls as anodes. These blocks sacrifice themselves in electro-chemical reaction for the protection of important metallic parts of the boat especially the propeller etc. A self-sacrificial paint primer has also been developed as an anode for the protection of hulls.

/\*taken up increasingly to replace copper, most of which was

This primer has been developed from the Cashew nut shell liquid resin. A super tropical antifouling paint with indigenous raw materials developed in this Institute is now extensively used on departmental vessels.

Side by side with the development of improved crafts, this Institute also undertook studies of various indigenous fishing gears with a view to study their characteristics. From these studies an overall mapping of the gear utilisation in our coastal areas and inland waters was obtained.

As is well-known, the main basis of India's seafood exports so far has been shrimps. More than 30 designs of different trawl nets have been prepared by the Institute for operation from different sizes of boats in different parts of the country. Many of these designs continue to be used for fabrication of trawl nets for use by fishermen. Investigations at this Institute have also helped to finalise the design details of a horizontal curved type of otter boards to be coupled with various types of trawl nets. As a result of these developments trawling has now become a very popular fishing method and is contributing substantially to the seafood export industry.

Many designs have been developed for gill nets for seer, pomfret, lobster etc. These designs have now become available for commercial exploitation. This Institute has also introduced trolling -- a new technique of fishing for seer, barracuda, etc. especially from small mechanised boats. This technique relies on the use of artificial baits and trolling lines. Besides being independent gears, these fishing techniques can also be utilised for diversified fishing so as to prevent a slump in the industry should a failure occur in prawn fishing.

The fishermen of Gujarat region were using improper mesh and twine sizes for gill nets. As a result of studies carried out at this Institute the sizes were rationalised and standard nets have been developed for hilsa and pomfrets.

A number of country crafts are operating along the coast and their overall contribution to the fishery industry is substantial. Most of these are using indigenous gears. To help them improve their catch, design of a purse seine has been developed for operation from these country crafts and is being put on field trials. This type of net is very much suited to catch the pelagic fishes like sardines and mackerel.

After testing many different kinds of gear materials such as cotton, hemp, sisal, manila, coir, etc., suitable standards have been evolved and specifications laid down for the various types of fishing gear. Standards have been laid down for synthetic and cotton twines. Many of these standards are being regularly used by the net making industries. Import substitution was possible when this Institute recommended a Karwar variety of hemp called "green shorts" as a substitute for imported Italian hemp which was used for the fabrication of gill nets for daga in Gujarat and Maharashtra coasts. Many methods have been devised for the preservative treatment of vegetable fibre twines used in fishing gear. Specifications have also been laid down for suitable floats for different fishing gear.

Several studies undertaken in the inland waters of the country have resulted in the development of efficient gears for exploiting the resources of our inland waters. It has been shown that in shallow reservoirs, gill nets having greater entangling capacity are more effective whereas in deep reservoirs simple gill

nets are more efficient. Standard gear for the capture of catla, rohu and mrigal have been evolved as a result of experiments carried out with different designs of gill nets. Methods have also been devised to increase the catch per unit effort from inland waters. A technique for estimating the landings from Hirakud reservoir has been developed. A survey of the problems relating to fishing in Brahmaputra river system has been completed and based on this, a scheme has been evolved for the improved exploitation of the fishery resources of that region.

A number of equipments have been designed and developed at this Institute for use in various operations relating to fish processing and related industries. A number of specifications of engines and propellers for different sizes of boats have been developed. A regular engine testing service has been established at this Institute for testing marine engines used in fishing boats and for their certification accordingly. When the air-cooled engines were introduced in this country, provision of suitable cooling and ventilation arrangements was a serious problem. These problems were investigated and suitable ducting arrangements were suggested which have been adopted by the industry. Standard specifications have been laid down to provide guidelines for the selection of engines suitable for fishing boats. The substitution of an imported wood Lignum vitae for making stern bearings by certain Indian timber such as Andaman bullet wood and red cutch has been recommended as a suitable alternative. Many designs of different sizes of trawl winches suitable for boats in the size range of 9 to 30 metres have been developed. Designs of other mechanical fishing accessories like gallows, gurdies, line haulers for different sizes of fishing boats have been evolved and many of these accessories are now manufactured in the country according to these designs. A power take-off clutch for the transmission

of power from main engine to drive fishing aids in small and medium sizes of fishing boats has been designed and developed at this Institute. It is now being manufactured in the country by a private firm under an agreement through the National Research and Development Corporation of India.

A machine for harvesting floating and submerged weeds from inland water areas has been designed and developed successfully at this Institute. This is also being manufactured in the country under an agreement through the NRDC. A process for the production of spherical beads from the shells of the Indian conch Xancus pyrum, has been developed by this Institute. These beads are required as nuclei for cultured pearls. The finished beads compare favourably with those used in the pearl culture trade abroad. This Institute has developed the technology for the use of electricity for fish catch; an electric shrimp trawl has been developed in addition to under water lamps and impulse generator. A technique has also been developed for the eradication of predatory fish from nursery ponds before stocking, by electrical means.

Cheap and effective containers for short and long distance transport of fish by road and rail have been developed at this Institute. The method is now being used for the transportation of fish on some routes in the country.

As the export of sea foods assumed increased importance in the country, the quality and pre-shipment inspection became very vital for the processed fish and prawns. This Institute laid down the standards of quality of different varieties of fishery products and these have formed the basis for checking of quality in these products.



The pre-shipment inspection of frozen and canned prawn products and frozen froglegs was handled by the Institute in its earlier stages. When the procedure got stabilized, the work was handed over to the Government of India. In the earlier stage of the development of the industry, the Institute helped many enterprising industrialists in processing sea foods of an international quality and used to assist them in many ways in tackling the day-to-day technical problems associated with such processing. Such assistance is continuing to this day. This Institute undertakes analysis of various fishery products with a view to improve the quality and also as a part of its research programmes. The results obtained at the quality control laboratory are internationally recognised. This Institute also undertakes analysis of water and ice, and sanitary surveys of processing establishments, and other similar activities aimed to assist in the maintenance of quality and hygiene in fish processing assembly-lines.

Investigations at this Institute have resulted in the standardisation of freezing conditions for different varieties of commercially important fish and shell fish. These methods are now being adopted widely by the processing industries. A simple and cheap method of harvesting froglegs in a hygienic and humane manner has been developed by this Institute and this is now being followed. During freezing or ice storage, some times whole and headless prawns develop black spots. A simple method of dip treatment or glaze with sodium metabisulphite has been developed to prevent this. Methods have been worked out to overcome problems like drip-loss, desiccation, changes in texture and development of rancidity. The industry is already aware now of these technological developments and they have adopted these methods in their routine work. For handling prawns hygienically and for saving labour, a mechanised prawn-peeling

table has been developed at this Institute. A method has been developed for production of frozen fish fillets out of low-quality fishes.

Methods have been worked out to prevent the cut-end blackening of prawns canned in brine; it has been shown that in the case of marine prawns, this could be prevented by maintaining the titratable acidity of about 0.6% in the fill brine. Standard methods for canning different varieties of fish and shell-fish like seer, sardine, mackerel, clam, mussel, crab, froglegs, anchoviella, tilapia, smoked sardine, eel etc., in different packing media have been worked out. The cost of canning sardine has been cut down by a technique evolved for canned sardine in its own juice which also retains the natural flavour of the fish.

An automatic brine dispenser has been developed for the use in the prawn canning industry. It has a capacity of filling 30 cans per minute and delivers correct quantities of brine into the cans.

The CIET has worked out several improvements over the traditional technique of dehydration of fish. A package of practices has been worked out involving chemical preservation, improved packing and correct handling techniques etc., resulting in a much better product with/\* a multi-deck tunnel dryer has been perfected in two capacities of one ton and 1½ ton. A few such dryers are already in operation on a commercial basis. The design of a solar dryer has also been developed for drying of fish using solar energy and a very small amount of electricity.

/\* a shelf-life of atleast six months. The design of

For manufacturing fish meal and for the dehydration of prawns, a rotary type of drum dryer has been designed at this Institute. For prawns it has the additional advantage of cooking, drying and deshelling in a single operation.

In order to obviate the necessity of carrying ice on board the vessel, a refrigerated sea-water plant has been designed to preserve fish by chilled sea-water immediately after catch. It can preserve 150 kg of fish at a time and the cost of operation is about Rs. 50/- per ton. It is useful for operation from big fishing vessels.

This Institute with the help of the All India Co-ordinated Research Project on transportation of fresh fish and utilisation of trash fish, has developed various by-products from several kinds of low cost fish having a good nutritive value. Out of this line of research, several products having commercial promise are now offered to the industry, the chief among these being, a fish protein concentrate (FPC) containing 80% protein. The design of a-pilot plant for the production of FPC has also been developed.

Using the process of microbial fermentation, a method has been found to convert low-cost fish into fish ensilage which has a high nutritive value and could be used as cattle feed. It does not require very elaborate equipment, and can be easily prepared under our rural conditions. For human consumption, several products have been developed using low-cost fish as raw material; namely, fish flakes incorporating tapioca, fish soup powder, fish paste, edible fish powder for child feeding, etc. These processes are now being transferred to the interested entrepreneurs and some of these products are already being manufactured.

Peptone is commonly used for bacteriological work in the laboratory. A process has been developed at this Institute for the manufacture of peptone from miscellaneous fish by controlled enzymatic hydrolysis. Peptone for the Institute's own laboratories has now been started to be manufactured at CIFT, using the same process.

Research in the extraction of sardine oil has led to the development of a process which results in a better product than that by conventional means. The improved product has excellent characteristics and is similar to some vegetable oils used in industrial preparations.

At present, a considerable quantity of prawn shell waste is available from peeling sheds and this is not put to any use. The CIFT has developed processes for manufacturing various items from such waste. Chitosan, with a number of industrial applications, is one of these, and a number of industrial workers have shown interest in this. A poultry feed has been compounded using prawn shell powder and other ingredients, and this feed has been found to compare favourably with the standard feed in experimental trials. Technology has also been developed for the preparation of shrimp protein extract from prawn shell waste.

A number of electronic instruments have been developed at this Institute for the testing and standardisation of fishing gear, for various types of commercial fishing, for fish processing factories, for fishery hydrographic investigations, and for behaviour studies of marine animals. Arrangements have been made to make some of these instruments available to the research workers and also to fishermen.

Technologies in Development - Field testing -  
Adaptability - Economic viability

So far this Institute has been concentrating mainly on developing technologies suitable mostly for the export-oriented fisheries industries and for the organised sector in fisheries. There is now an urgent need to slightly shift the emphasis and orient the research programmes more towards the needs of small-scale and artisanal fishermen. There is also a need for developing the harvest and post-harvest technology suited to different inland water resources. Accordingly, a number of technologies are under development for this sector.

We are trying to effect improvements to the existing traditional fishing crafts and to develop fishing boats suitable for Indian rivers, lakes and estuaries. We are also trying to introduce newer construction materials for fishing boats which would be cheaper and more efficient. Studies are being undertaken to select suitable additives such as copper naphthenate, copper acetoarsenite and other similar compounds for the fortification of oil-borne wood preservatives for fishing boats.

In recent years the off-shore fishery resources like squids and kalava have become important commercially and as such, studies are being undertaken to exploit these resources by developing suitable gear. Similarly, fishing methods are being developed for the exploitation of pelagic fisheries comprising sardines, mackerel, and anchovies from off-shore area. Extensive studies at various points along the coast are in progress to investigate the suitability of various trawl gears for inshore waters with special reference to mid-water trawling.

On the inland side, studies to develop appropriate gear for harvesting different size groups of major carps, predators, and uneconomical fishes, are in progress. The operational efficiency of fishing gear fabricated with knotless webbings is being studied. The amenability of commercially important fishes of Saurashtra, Bombay, Kakinada and Kerala coasts and some Inland fishes to icing, freezing, and cold storage is being studied. Feasibility studies on canning of squids, horse mackerels, oyster etc., together with the economic utilisation of squilla, are being undertaken.

Experiments are under way to study the effect of packaging materials on the shelf life and quality of fishery products and to develop suitable packagings for different varieties of fishery products for export as well as for internal consumption. It is hoped that these studies will lead to the formulation of standards for packing materials.

Investigations are being undertaken for curing, smoking, and dehydration for better utilisation of fishes like dhoma, shark, rays, ribbon fish, kati, Lactarius, Bombay duck, dai (silver bar) etc., which are available in substantial quantities along the Saurashtra coast. Improved methods of their processing and preservation by various scientific techniques will lead to their better utilisation and will get better returns to the fishermen.

Several fundamental studies in microbiology as applicable to fisheries are also in progress together with investigations on the occurrence and sources of microbial and chemical health hazards associated with fish. Such studies assume importance from the public health point of view. It is also planned to study the occurrence of toxic amines in common food fishes. The comparative studies of nutritional value of different fishes are also in

progress. The changes in enzyme systems during various types of deterioration in fish are also being studied.

Studies have been taken up to design and develop various machines and equipment for fish handling, storage, and processing. Investigations have also been taken up to develop several electronic instruments such as electronic boat log, water current meter etc. A buoy telemetry system for automatic transmission of marine environmental data is being developed and installed.

Several aspects relating to the economics of fishing vessels and processing factories are being studied. Investigations to study the adoption of innovations developed at CIET are also in progress.

The question of field testing and adaptability of the technologies developed at CIET is very important because the primary responsibility of this Institute is not directed towards fundamental research in particular, but towards the application of various scientific disciplines for the improvement of the current practices in fishery technology. In this connection much has been done and much more remains to be done. In general it may be said that there is a need for a continuous liaison with the field and there is considerable scope for increased collaboration between various state governments and this Institute. In the matter of field testing of technology the lack of full technical information with regard to the economic viability of the various technologies developed in this Institute is now perhaps the single most important bottleneck in their widespread adoption. The Government of India and the Council of Scientific and Industrial Research have also indicated that the preparation of feasibility reports or project reports, as they are often called, is what is most required by the new entrepreneurs intending to start new industries or to

modify or expand or diversify the existing process of manufacture. In this connection we have also received several requests for such project reports in respect of various items of products developed by us. It is now proposed to go into the details of economic viability of such products in a systematic manner and to develop project reports of a few promising items at least to begin with. This work has been hampered because of the lack of trained economists at this Institute. It is hoped that this lacuna would be filled in the immediate future but in spite of that a beginning can be made in this direction. On the basis of such self-contained project feasibility reports, the financing institutions may also find it easier to advance loans etc. for the educated self-employed and others.

In this context it may also be mentioned that the fisheries departments in various states are giving various forms of subsidies, loans, craft etc. in addition to the technical expertise provided to the fishermen. It is suggested that a system may be evolved containing an arrangement in which the fishermen taking advantage of various facilities provided by the department, may be required to furnish important data regarding their craft, gear, fish catches, or peeling shed or processing factory etc. as the case may be, together with an authenticated statement of income and expenditure in the enterprise. This information from the field can be passed on to CIET and could provide a valuable source of information with regard to the economic viability of various technologies involved and how improvements could be effected in the same in terms of the overall benefit taking the enterprise as a unit. Needless to add that the identity of the fishermen or industrialists involved would be kept confidential.



Appropriate technologies and low cost technologies  
for small-scale fisheries and average fishermen

In the field of fishing boat construction, cheaper indigenous materials for the construction have been developed and are under field testing. It is hoped that with the perfection of this technology using pressure treatment and related techniques, it would be possible to construct fishing boats at a much lower cost besides saving the costlier types of timber. Methods of preservation for fishing craft have been developed which can be easily applied to the country crafts operating all along the coast. The preservative treatment works out to be much cheaper than the method being followed traditionally at present.

In order to increase the fish catch using local fishing crafts, a purse seine has been developed using two local craft at a time for capture of pelagic fisheries like sardine and mackerel. The over-all cost of the purse seine works out to be much cheaper than two 'thanguvala' an encircling type of gill net used locally. The traditional type of nylon boat-seine used locally in Cochin area has been modified using knotless nylon and polyethylene webbings which effect a saving in the total quantity of material used in the fabrication of gear without sacrificing strength. Special gill nets designed for fishing for sharks and suitable for operation from the Saurashtra coast, are under field testing in that area. For inland fishing in reservoirs, improved designs of entangling nets and long lines have been developed which bear a promise of better returns from the reservoir fisheries. Improved types of gill nets have also been developed for operation off the Andhra coast; these are being operated now under field conditions. An improved method for hanging of gill nets has also been developed with a view to increase the efficiency of the gear.

Improved fish handling methods, modern methods of preservation and packing of fish and better systems for fish packaging and transportation are some of the other technologies which can be easily applicable for small-scale fisheries. Fish curing is being undertaken by fishermen all over the coast and cured fish also forms an item of export from this country. At this Institute, a number of improvements have been found out for making the final product from curing more hygienic, more attractive and with greater shelf-life. With a little support from government and other organisations like cooperatives, it should be easy for the fishermen to improve the product and thereby bargain for a better price for it.

Some of the poor fishermen in Kerala are engaged in the collection of clams from the backwaters. It had been a regular practice to discard the clam meat and to utilise the shell for the cement industry. With the help of investigations carried at this Institute it has now been possible to utilise the protein-rich clam meat by various methods of preservation like home canning, pickling etc. A few people have now taken up this technology on a commercial stage for internal consumption. The Marine Products Export Development Authority is now investigating the possibilities of exporting some of these products. Similarly, methods have been worked out for the pickling of mussel meat and this technology has also generated some new cottage industries. The method of preparing shark-fin rays from dried fins, evolved at this institute is also applicable under rural conditions. Several people have been trained in these techniques as also in the production of other fish products.

Identification of priorities for need-based technologies

As has already been mentioned the technologies under development at this Institute are mostly need-based.

The setting of priorities would depend mostly on the amount of economy these are able to produce in the present production system. Probably the export-oriented portions of the industry will continue to receive a high priority with deep sea fishing assuming greater importance. The National Commission of Agriculture have recommended that fishing operations can be expanded 5 to 7 times their present extent without draining away the non-replaceable resources, provided the fishing is done judiciously and scientifically. This Institute is now acquiring a 17.5 metre fishing trawler which can stay out in the sea for about one week. This will help to undertake studies for exploiting the resources of the deeper sea.

Side by side with the increasing mechanisation of fishing operations, attention will have to be paid increasingly to the problems of traditional fishermen however simple they may seem to be at first sight. Worthy of mention in this connection is the organisation of country crafts using important out-board/in-board drives or out-board motors for propulsion, and the development of gear which is more efficient than what is being used now. Newer gear materials may have to be developed as the current price of nylon is assuming prohibitive limits. Prototypes of fishing crafts using newer types of craft materials like fibre glass re-inforced plastic will have to be developed and tested under different conditions.

The economics of fishing operations in the traditional as well as the mechanised sectors has remained a rather neglected area and as a result of this, many difficulties are being faced in research as well as in development, notwithstanding a few studies having already been made in this area. As such, a considerable amount of work remains to be done on a priority basis in this sphere.

At present there is no system in our country by which the price of the fish may be linked to its quality, with the result that the consumers do not get adequate protection and full value for the money, nor is there any incentive for the producers or middlemen or traders to provide a quality product or at least a product of graded quality for the market. This often renders at naught the technology developed and specifically meant for quality control at least for internal consumption. This is a matter for the Central and State Governments to take up urgently in the interest of all concerned. Unfortunately the lack of vigorous action in this matter is precluding the utilisation of more advanced technology in this direction for a long time now.

At present there is no regular system by which the problems of fishery technology as they arise under various conditions in our oceanic waters as well as in our inland areas, could be regularly communicated by the state governments to the CIFT. Under the present system, such problems are being communicated to the Institute only on an ad-hoc basis or when the State Government may be taking up new schemes or projects to augment the harvest and post-harvest technology in a particular area. Most of the fishermen in our country are not organised and as such it is not possible to note the practical difficulties faced by them from time to time in the application of various types of technology or the defects noticed in the traditional or not-so-traditional type of technology. Thus there is a need for an organised effort which can monitor this information all along the coast and for the fresh water areas in the entire country and act as a problem-repository with the active role of passing on the needs for improvements in the technology to the CIFT on a regular basis. At first sight this may appear to be a rather ambitious plan, but it may be realised that at the present stage the scope for guessing the needs in diverse conditions obtainable in the country is reducing by and by.

The technological progress can be achieved faster and with lesser wastage if there is a realistic basis based on close contact and day to day observation, for the needs of the various sectors involved in fisheries.

The situation is much better with respect to the organised sector such as the fish processing factories and export houses. They are in regular contact with this Institute and vice versa, and in this connection the more important recommendation of diversification has been made by this Institute from time to time which is now being received favourably by the processors. It is hoped that there will be greater offtake in the coming years of the newer technologies developed at this Institute for the canning and other types of processing of fish and other marine animals like squids etc. which have been developed successfully at this Institute. The problems with respect to fish processing for the internal consumption do not appear to pose a serious scientific challenge at present although the problems of development may be hampering the adoption of such technology. The main reason is the low level of exploitation of our fishery resources, with the result that most of the fish is consumed in the fresh state in coastal as well as inland areas. About 20% of our fish is going for curing and by far that appears to be the preferred means of preservation throughout the country. In order for the need-based technology to be developed in fish processing for internal markets, there is thus an urgent need to increase the fish production several times to the extent of even flooding the markets and making the fish available to all those who need it and who can buy it.

With the advent of larger fishing vessels having on-board facilities for fish processing including fish meal production, the current arrangement is that the infra-structure is already provided in the vessels at the time of purchase. However we have to develop expertise in the maintenance of these fishing vessels as well as for the accessories and fishing aids used on board these vessels. Ultimately, however, if our country has to become self-sufficient in this respect, we have to develop designs of deep sea fishing vessels suitable to our hydrographic conditions for fishing for the resources available in our Exclusive Economic Zone. For this it is highly essential that a strong division of fishing craft design is re-established at this institute with the immediate priority for designing such vessels. It may be recalled here that such a section was already established in this institute at the time of its inception, but when the Ministry of Food and Agriculture handed over this institute to the Indian Council of Agricultural Research in 1967, this section was retained in the Ministry with the result that the development of improved designs of fishing craft suffered a setback since then. It is high time now that immediate steps be taken to re-establish this division at this Institute.

The processing of fish on board the vessel in the case of such large deep sea fishing vessels is obviously different in design, operation etc. as compared to the terrestrial. There is apparently a genuine need for developing such technologies especially for fish meal production, fish fillleting, freezing etc. on board the vessels and to develop expertise in this area which can cater to the needs of all the maritime states.

Linkages and coordination of research activities  
in the area and with the development sector

The concept of all India coordinated projects so successfully worked out in the crop sciences, has been used to advantage in the case of the research work on transportation of fresh fish and utilisation of trash fish. This project, with its headquarters at this Institute and 10 other centres, enabled the experimental testing and field trials of a number of important research ideas generated earlier by various scientists, on a very large scale all over the country. The bacteriological and organoleptic superiority of the fish packed and transported as per the methods recommended, was clearly demonstrated under field conditions. A need for laying down Indian standards for fresh fish for internal consumption and its strict enforcement was found to be suggesting itself, the details whereof have been discussed earlier in this paper. In addition to generating many important findings, the All India Coordinated Project enabled scientists and technologists from various diverse fields of interest to get together and study particular problems from various angles in a truly inter-disciplinary approach. A number of regional problems could also be tackled in this All India Coordinated Project.

As already mentioned, this Institute has been having linkages in research with the FAO of the United Nations from its very inception. In addition to the generation and training of indigenous expertise in many important areas of fishery technology, this collaboration in the initial stages has led to a number of important developments which were especially important then, in the area of fishing craft design, fishing gear and fishing methods, and fish processing. The association with the FAO is still continuing through active collaboration of our Scientists

in the FAO project on the development of Small-scale fisheries in the Bay of Bengal.

In collaboration with the International Development Research Council of Canada, this Institute is developing methods of fish processing aimed at providing better quality fish to the Indian consumer, and to provide an opportunity for field testing of various innovations already developed in this area. A programme of collaboration in various areas of fish processing including studies in fishery economics has been worked out between this institute and the Tropical products Institute, London.

Back home, we are having collaborating research programmes with the sister organisations, namely, Central Marine Fisheries Research Institute, Central Inland Fisheries Research Institute, Central Institute of Fisheries Education, and various state governments and the Central Government in various fields of research, education, and training in fishery technology. There is an Industrial Liaison Committee drawing its membership from various industries relating to fisheries, and members from within the Institute, who meet periodically and discuss the research programmes of the institute with special reference to their industrial relevance.

This Institute often participates in regional, national and international seminars, symposia, conferences and scientific meetings, etc., where the results of various researches undertaken here and elsewhere are discussed by scientists, technologists, fishermen and others drawn from various sectors of the economy, and suggestions are given to identify priorities and programmes for research. This also provides an opportunity for the scientists of this Institute to keep abreast of the latest developments in their respective fields and to discuss their



problems at first hand with the experts from other organisations.

There is however a need for increasing the linkages of research activities of this Institute to the development sectors which has been partly discussed earlier in this paper.

Programme on transfer of technologists/Information transfer/consultancy/training - details - follow-up-impact

From its very inception this institute has had strong programmes on transfer of the technologies developed here. In the earlier stages of pre-shipment inspection when this work was handled by this institute entirely, there used to be a regular face-to-face contact with the processors who were just beginning to export marine products at that time. The problems faced by them were studied intimately and tackled in the laboratory and subsequently whatever solutions were obtained, were communicated to them immediately. In many cases the scientists of this Institute personally visited the factories to help them overcome the day-to-day problems especially in conformity with the requirements of different overseas buyers. This type of contact is continued, although the nature of problems has now shifted.

In the same way, there was an intimate contact with boat builders from the very early stages when the fishing craft designs developed at this Institute were tested and tried in several different ways to lead to the desired results. In a similar manner, there has been regular contact with gear and gear material manufacturers and fishermen in connection with the transfer of technologies related to fishing methods and gear.

This institute had been conducting regular training courses on various aspects of fisheries technologies until the Central Institute of Fisheries Education and the Central Institute of

Fisheries Nautical and Engineering Training, took up these functions. Now there are a number of agricultural universities with fisheries faculties taking up this important job of training the youngsters in various branches of fisheries technology at various levels in a formal manner. This institute is also collaborating with Cochin University in its regular training programmes in industrial fisheries as well as in mariculture.

A number of ad-hoc training courses are being organised at this Institute for various types of personnel as will be dealt in detail in the succeeding section.

This Institute has developed a programme of consultancy with the Centre for Earth Science Studies for developing an arrangement by which important data of the marine environment would be transferred regularly to the shore where it would be monitored and analysed for important parameters like temperature, salinity, direction of current, and several other factors which are important not only for fisheries but for oceanographic studies in general. A consultancy service has also been established for providing technical information and guidance for entrepreneurs in collaboration with the Small Industries Service Institute, Trichur.

An operational consultancy service is functioning at this Institute for providing assistance on the basis of a malady-remedy analysis for about 2000 mechanised fishing boats at the Cochin fishing harbour.

The regular programmes of extension education have been going on at this Institute for quite a long time now. This Institute participates regularly in exhibitions and open house discussions arranged by various organisations where the experts at this

Institute explain the working of various machinery developed at this institute as also technology involved in the production of various fishery products. Such arrangements help to make the public aware of the techniques available to them for fruitful investment and also acquaint the fishermen with advanced technology. Several demonstrations are conducted to show at first hand various methods, formulae, and recipes developed at this Institute; this works on the principle of 'seeing is believing'.

A number of persons engaged in the trade are facing several problems from day to-day; besides, many new entrepreneurs want to know the details about the various processes worked out at this Institute. Those people write to the Institute and their queries are attended to and replied so as to furnish them the latest information available on the subject. Design drawings of various types of fishing craft, gears, winches, dryers etc., are supplied regularly to the parties desirous of taking up the manufacture or fabrication of these items. In some cases this is followed by personal visits by the experts at this Institute to the site of fabrication or installation to help in the work to be executed satisfactorily.

This Institute collaborates with the manufacturers of marine engines in testing the engines for their fitness for use on fishing vessels and issues certificates for the same. These tests are conducted both at the test bed at the workshop as well as after actual field trials on fishing boats. As a result of this, different types of engines have been recommended to be suitable for different types of fishing boats.

A number of fish processors, government and semi-government authorities are helped by this institute in the analysis of various frozen, dried, canned and other types of fish products. Samples of these products are tested in the laboratories of this institute and certificates issued with regard to their chemical composition, bacteriological characteristics, etc., which helps the producer to be informed about the quality of his product and also enables him to convince the buyer. Of late, manufacturers of packaging products have also been helped by the testing and analysis of various products in relation to their suitability for packaging fish and fish products.

Various fishnet twines, metals used in the fishing craft construction, marine paints and other such craft and gear materials are also being tested at this Institute with regard to their suitability for the use in the respective industries.

This institute is bringing out a monthly publication entitled 'Fish Technology Newsletter' which acts as a mutual platform for the discussion of problems related to fisheries technology. This newsletter is being published in English and Hindi. "An account of Inland fishing gear and methods of India" is another publication brought out by this institute and this details the various types of fishing gear used for exploiting the inland waters with suitable illustrations. Recently, the publication entitled 'Quality control in fish processing' has been brought out for the use of government and semi-government departments, fish processing establishments and others, and it deals with the maintenance of hygiene and general standards of sanitation and quality in dealing with fish products from capture onwards. A special bulletin entitled 'Catalogue of

implements/machinery for fish harvest and post-harvest technology' has been prepared and is available. A bulletin giving details of aluminium alloy sheathing for wooden hulls of fishing boats has also been prepared for the use of boat builders and fishermen. This institute issues regularly a Bibliography of Fishery Technology for the use of research workers in this area. Besides, a number of specialised bibliographies are available in fish behaviour, trawl gear, marine fouling organisms, etc.

A major thrust in the programmes of transfer of technology has been made with the Lab-to-Land Programme synchronous with the Golden Jubilee of the ICAR under which several families have been adopted for intensive application of technology in different fields of crop science, animal science and fisheries. This programme, which began in 1979 has been extended for a period of 3 years now. For this Institute 200 families had been allotted, but due to the increasing demand from the fishermen, we have far exceeded the demand. Under this programme a benchmark survey is conducted for the fishermen on the basis of a special proforma prepared by the Institute with a view to know the level of existing technology used by the fishermen at present and also the socio-economic characteristics<sup>ic</sup> of the families adopted under the programme. Various technologies have been transferred under this programme; namely, the motorisation of fishing craft, the popularisation of the various types of newer gear including purse-seining from country craft, scientific methods of handling, packaging and transportation of fish; fishing for sharks, processing of molluscs like clams and mussels, appropriate methods for preservation and use of traditional nets, multi-mesh sized gill nets for diversified fishing, improved designs of entangling nets and long lines for fishing in inland waters, cheaper materials for the construction of fishing boats, scientific

methods of preserving fishing craft, fabrication of modern types of gear, preparation of squid rings etc. Many of these technologies are being welcomed by the fishermen and some of them have led already to the establishment of manufacturing concerns on a commercial basis even though on a small scale.

Facilities available for technical training of  
Extension personnel - level of training-expected  
requirements of qualifications

The transfer of skills has been the constant feature of the educational activities of this institute. Ad-hoc training of one to three months' duration are conducted occasionally on specific requests in various subjects for representatives of the fish processing industry and State Departments of Fisheries. In this way the industry has been helped to build up its trained manpower in various spheres depending upon the demand arising from time to time. Thus there have been training in boat building, fishing methods, gear fabrication, freezing and canning of fish, canning of froglegs, extraction of shark-fin rays and other diverse subjects. Several entrepreneurs approach the institute for training in special processes such as manufacture of Chitosan, production of dry fish, etc, and training programmes are also arranged for such people. Since the introduction of the self-inspection scheme by the Government of India recently in the case of marine seafood products, this institute has undertaken two-month-long training courses to train people sponsored by the industry in the work of quality control. The idea is to develop manpower which will be able to take advantage of the self-certification scheme and develop standard laboratories in different areas for competent inspection and careful certification thereby realising a long felt need of the industry.

The qualifications expected from the trainees are usually a reasonable amount of experience in the field in which they desire to get trained. Since the syllabi are not formalised, and no degree or diploma is awarded for such trainees, a considerable flexibility exists to suit the training to individual requirements. Thus it has been possible to pay individual attention to trainees and being in small numbers, an intimate and close contact is developed between the trainer and the trainee so essential for almost apprentice-like training of this sort.

There is a comprehensive programme for training of the scientists recruited under the Agricultural Research Service and it also includes a programme of rural orientation training for 4 months. The CIPT has been authorised to conduct this training for the scientists allotted to this Institute. Under this programme, so far 16 scientists have been trained and they have come in contact with a number of processors, peeling shed workers, fishermen and fisherwomen, and came to know at first hand their problems and their resources. In some cases they were also able to help them solve some of their problems with the technologies developed at this institute and elsewhere. For example the techniques of utilising the special deodorant developed at this institute for use in peeling sheds and prawn processing factories, was demonstrated by the scientists under this programme with the help of experts at this Institute. Similar demonstrations were organised for the manufacture of poultry feed from prawn-shell wastes, and in fish soup powder. It is hoped that under this programme it will be increasingly possible to generate not only a rural outlook among the new scientists, but also to make expert manpower available for helping the fishermen in the remote rural areas to help in a mutual dialogue.

Under the Lab-to-Land Programme, several training programmes have been organised at various places in fabrication of modern trawl gear, quality control of seafood products, processing of clam and mussel meat, production of dried fish, utilisation of sharks, skates and rays, curing of ribbon fish and shark by the improved methods, improved entangling gill nets for reservoir fishing, etc. This type of training has been given to fishermen and fisherwomen who, although they may not possess any degree or diploma, are sufficiently experienced in these matters since fishing or fish processing is their profession.

Training courses are also organised to help for imparting advanced training to technical personnel like technologists and technical supervisors from fish processing establishments and others connected with fisheries, in the various improved and new methods evolved by this Institute. Training has been given under this category to more than 200 candidates in maintenance of hygienic conditions in fish processing plants, quality control of frozen prawns, in-plant inspection, utilisation of miscellaneous fish, processing of various types of fish and froglegs, production of speciality products, maintenance of fishing boats, etc.

Two summer institutes were conducted at this institute -- one on coastal fishing methods and the other on fish processing technology. These imparted advanced training to candidates sponsored by State Departments of Fisheries, Agricultural Universities and related institutions.



The electronic instruments developed at this Institute have also been taken up for the transfer of technology programme but their promotion presents some peculiar difficulties. However, the fabrication of some instruments has now been approved through the National Research Development Council. Training would also be given to the entrepreneurs who come under the scheme for fabrication of such instruments.

#### Feed-back data collection and utilisation

With regard to the fish processing establishments, peeling sheds and similar fish utilisation organisations, due to intimate and close contact there has been a reasonably good amount of feedback from these industries, with the result that problem-oriented research projects could be initiated for that in time. Besides, there is contact with the processors from all over the country through correspondence, which provides regular information about their day-to-day problems at various stages of operation. Moreover, this provides information also regarding the problems involved in processing of new export items.

In respect of boat building and related industries, there had been ample scope for feedback during the time when the designs developed at this Institute were tested and tried under field conditions. Even now fishermen are approaching for solution of their problems with respect to boat building, but the lack of a division of craft design is seriously hampering work in this respect. There is sufficiently satisfactory feedback information available from the gear manufacturers and fish-net twine manufacturers.

Under the Lab-to-Land Programme, in view of the increased fact-to-face contact between the scientists of this Institute and the fishermen, it has been possible to collect at first hand the feed back data essential for the improvements to be made; and, what is more important, the time lag has been considerably reduced. Of particular mention in this respect is the technique of clam meat pickling which resulted in a series of visits by the processors to this Institute and contacting the scientists directly, and vice-versa, on several occasions for testing, retesting and flavouring several different formulae and recipes for clam meat pickles suited to various types of consumers and bringing different kinds of flavours without sacrificing the quality. With the use of in-board/out-board drive tried on country crafts, a similar feedback has been obtained in a very short time. In fact, the experiences gained in the lab-to-land programme suggest very strongly the desirability of a closer contact of our scientists at this institute with the fishermen and fisherwomen, which needs to be established on a more regular basis.

A few months back, in a seminar on mechanised fishing organised by the All Kerala Federation of Mechanised Fishing Boat Owners' Association, it became clear that off and on there should be such seminars where scientists and fishermen can exchange ideas in a cordial atmosphere. Sometimes things recommended from the laboratory may not be followed to a 't' as per the recommendations, with the result that some deficiency in achievement may be noticed. On the other hand, some things may work well in the laboratory but not so well when taken to the field. For example, in the seminar mentioned above, there were conflicting claims with respect to the horse power rating of engines required for bottom trawling in mechanised fishing boats of 32' OAL; therefrom emerged a need to study the horse power ratings once again under the changed circumstances so as to come to a

conclusive recommendation. It is therefore, suggested that there should be more exchanges of this type in various parts of the country. In fact, it is hoped that even the present seminar would generate a number of ideas for further research in fisheries technology.

In spite of what has been stated above it is felt that a feedback organisation or an arrangement by which the feedback data could be supplied regularly to this institute, as already pointed out earlier in this paper, is essential so as to serve exclusively this function.

Evaluation of the Research system as the  
means for development through Extension

All over the world, science has gradually emerged as a social responsibility rather than as the individual interest and untiring effort of a few selected scientists working in isolation. Simultaneously Scientific institutions have also become increasingly responsible to the society for expenditure of public funds. This is particularly true of institutions like the CIFT who are responsible mainly for applied research rather than for the development of a particular discipline. In this context the Estimates Committee of the Lok Sabha has pointed out that the research conducted at this Institute should be evaluated in terms of the impact it has had on the industry and the fishermen. A Committee appointed by the Indian Council of Agricultural Research has devised broad guidelines in terms of the methodology to be followed for undertaking such studies.

As a follow-up action of the same, a project has been developed to study the adoption of different innovations developed at this institute on the craft and gear side, to begin with.

This study will be followed up by similar studies in various other technologies developed at this institute. The economic and social impact of the innovations is also being studied in this project, and the reasons for non-adoption or partial adoption of innovations in particular areas will also be studied. It is hoped that such studies would be useful in bringing out not only the information desired by the Parliament, but will also act as a strong feedback for research workers in fisheries technology.

It is hoped that the impact of the work done in research as well as in development, with respect to fisheries technology by various organisations will also be subject to similar studies by the organisations concerned. Basically, it is an appraisal of the working of the institute or organisation vis-a-vis the community to whom it is responsible.

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SEMINAR ON FISHERIES EXTENSION

8-10 December 1980; Cochin

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FISHERIES EDUCATION AND EXTENSION TRAINING

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INTRODUCTION

There has been many fold expansion in inland and marine fisheries development programmes, both at Central and States levels, during the past 25 years. The extent of progress and achievements in fisheries Research and Development, which has been more than substantial, could be visualised from the facts and figures that fish production from confined waters is claimed from 3000 to 9000 kg/ha/annum, against 600 kg/ha/annum from wild waters. Hypophysation of Indian and exotic carps, has become a reality and is adopted by all States. Breeding and hatching can be controlled like a factory, with latest Hatcheries and Spawneries (with 90% survival) set up in air conditioned halls. One to ten million spawn could be reared per ha. in intensively prepared nurseries, with possibilities of raising more than one crop. Rate of survival from spawn to fry stage has increased from 5% to 80%. Integrated fisheries with poultry, piggery and duckery etc. has shown promising results. Air breathing fish culture has made a very good beginning with production of 1200 to 3159 kg/ha/9 months.

With the widespread and unlimited fisheries resources in the shape of inland, marine and brackish waters, fisheries forms a very important subject. For planned development, proper conservation and judicious exploitation of the fisheries resources, in a vast country like India,

Fisheries Education should be dealt on top priority basis. The staff recruited at Central and State levels are invariably under graduates, graduates and post graduates, all freshers. The senior officers too had joined as freshers. Fishery being a highly technical subject and a discipline by itself, it could hardly be expected that such freshers and new recruits can do full justice to their jobs. Training and Education in fisheries is, therefore, a must for technical officers at all levels.

Hence Fisheries Education has also been initiated well in time and enlarged appropriately. At the Central Level, I.C.A.R. is conducting Degree and Certificate courses for post graduate 'in-service' nominees from all the States.

"Fish and Fisheries" at M.Sc. level has been introduced in many Universities like Banaras, Allahabad, Agra, Meerut, Madras, Delhi, Osmania, Kakatiya, Andhra University, Nagarjuna (A.P), Rewa, Bhopal, Vikram(M.P) Gwalior (M.P), Kanpur (U.P), Jabulpur (M.P), Annamalai (T.N), Cochin, Calcutta, Kalyani (W.B), Ranchi (Bihar), Jodhpur, Udaipur, Rajesthar (Rajasthan), Punjab (Chandigarh), Krukshetra(Haryana), and Mysore etc.

#### LEVELS OF FISHERIES EDUCATION IN THE COUNTRY AND ORGANISATIONS ENGAGED

Fisheries education in India is mostly at post-graduate level upto graduation, the subjects akin to and prescribed for fisheries are Zoology/Botany/Chemistry.

Students having graduated in these subjects are eligible for admission to M.Sc. Fish & Fisheries in different Universities, all over India. Mostly, method of examination is by theory papers and practicals but some universities permit M.Sc. by 'Thesis' under recognised guides.

Very few colleges are offering Fisheries as specialised/

optional subject at B.Sc. level (eg. New Science College, Osmania University, Hyderabad).

The exact number of Universities & Colleges having facilities for B.Sc. & M.Sc. in Fish & Fisheries is not known, as there is no single agency to provide the required information. Reference have however been made to the Heads of the Departments of Zoology of a large number of Universities, but the information is still awaited.

Facilities for work leading to Ph.D. in Fisheries are also available in most of the Universities conducting post-graduate course in the subject.

The subjects however vary from one university to another. While Andhra University (Waltair) teaches 'Marine Biology', M.P. University 'Ichthyology', the University of Madras offers post-graduate Diploma in 'Aquaculture' & 'Fishery Biology' as optional subject in its affiliated colleges.

Some Agricultural Universities have also added Section, Department of Fisheries and are offering M.Sc. Fisheries (Jullunder Agricultural University) and Fish & Fisheries as optional subject for B.V.Sc. (A.P. Agriculture University, Hyderabad) and the College of Fisheries imparting training upto B.Sc. & M.Sc. level in Mangalore (Karnataka Agricultural University). A Fisheries section is also established by Jabalpur University since long, for fisheries Research & Extension in rural areas. B.Sc. (Fisheries) is also run by the Tamil Nadu Agricultural University at Tuticorin (Tamil Nadu).

The Department of Fishery Science has been started under Veterinary Faculty of the Agricultural University, Rajender Nagar, Hyderabad in 1980-81, with three Research Centres at Kakinada (for brackish water prawn culture), Kovalali (for fresh water prawn research) and Pallair (for air breathing fish culture).

'Fish Culture' as optional subject can now be offered by B.V.Sc. students. The other optional subjects are Poultry/Dairy/Meat technology. The teaching in Research & Extension based so that the veterinary graduates can assist in planning and supervision of fishery development programmes.

A four year Diploma in Fishery Technology & Navigation was offered by Andhra Polytechnic, Kakinada (closed since 1965) and Madras Central Polytechnic is continuing similar but short course.

The syllabus for M.Sc. (Fish & Fisheries) is greatly varying from place to place, due to the fact that the University authorities have no liaison with each other. Some excerpts taken from the syllabus of the Osmania University are as under:-

Systematic Ichthyology - Origin and evolution of fishes and their classification; the structure bionomics and evolution of Ostracoderms; Cyclostomes; Placoderm (Aphetchoidea); Elasmobranchs - Cladoselachii, Pleurocanthodii, Protoselachii and Euselachii, Holocephali, Actinopterygii, Chondrostei, Holostei and Teleostei, Crossopterygii (Choanichthyes), Coelacanthini, Dipnoi.

Special Group II: Introduction to Fisheries - Introduction to fisheries, history, classification, economic importance and biographical zones.

Practical - I

1. Systematic study of fishes belonging to major groups of Cyclostomata, Elasmobranchii, Actinopterygii and Crossopterygii.
2. Dissections, Microscopic slides and Osteology.

Practical - II.

1. Systematic study of the commercially important fresh water and marine fishes of India.
2. Identification of the important fresh water fishes of Andhra Pradesh. This will be continued in IV Term also.

IV Term Theory : Special Group I: Fish & Fisheries

Fish Anatomy and physiology - Basic fish anatomy: Skeleton; Integument &



scales - The digestive tract, glands, respiratory organs, statocoustic organ, olfactory organ, endocrine system, pituitary, circulatory system, urinogenital organs, fish development, parental care & migration.

Special Group II : Fisheries

Inland fisheries : Riverine, lacustrine, Estuarine, brackish water and pond fisheries of India; Pond culture.

Practical - I

Dissections of fishes, Prawn, crab and mollusc.

Microscopic slide preparation and study of permanent microscopic slides, Microtomy.- I

Practical - II

Identification of the commercially important fishes of Andhra Pradesh and preparation of keys for identification. Induced breeding. A study tour to a marine and fresh water fisheries station in Andhra Pradesh.

Elective Theory - Pisciculture - Introduction to Pisciculture:

Fish culture in fresh waters ecology of fish ponds with reference to physical conditions of water; Biological conditions of water (Aquatic vegetation, plankton, fauna embedded among weeds). The soil (soil fertility, chemical condition of soil).

Thus it would be seen that the syllabi are neither job oriented nor meant for self employment. This is precisely because the syllabi are not planned and outlined in consultation with fishery technologists, experts and specialists.

In addition to above, some seats for M.Sc. & Ph.D. by Research are available at ICAR's Central Institute of Fisheries Education, Bombay; the Central Marine Fisheries Research Institute, Cochin and Central Institute of Fisheries Technology, Cochin, through the recognised guides of respective Universities.

The University of Cochin has fisheries at B.Sc. level as also some seats for Ph.D, whereas M.Sc. in Mariculture is entirely conducted by the Central Marine Fisheries Research Institute.

Of late, ICAR has granted generous scholarships to private candidates under training at CIFE Bombay and for the Research Scholars doing M.Sc. & Ph.D, at CIFE Bombay, CMFRI Cochin, CIFT Cochin and CIFRI Barrackpore.

At the Government level, fisheries education is being organised and conducted by the Indian Council of Agricultural Research, through its main Institute in Bombay and three sub Centres at Barrackpore, Hyderabad & Agra.

The Central Institute of Fisheries Education, Versova, Bombay established in early sixties, is the pioneering Centre for fisheries education in India, where two years' Diploma course in Inland and Marine fisheries is conducted for in-service officers from all State Fisheries Departments and Centrally administered areas, as also for nominees from developing countries. Few private candidates are also admitted, subject to availability of seats. The total capacity is 80 (i.e. 40 trainees in each Sr. & Jr. batch).

It has seven divisions, viz - i) Marine Fisheries, ii) Inland Fisheries, iii) Aquaculture, iv) Fisheries Technology v) Fish Processing vi) Fisheries Economics & vii) Project Planning.

The syllabus covers important aspects of inland and marine fisheries etc. like

Fishery Biology - Marine fisheries, Oceanography & limnology, pelagic & demersal fisheries, populations, and physical, chemical and biological aspects.

Inland Fisheries - biology, natural fisheries of rivers, estuaries and back waters, breeding & management.

Fishery Technology - Craft & Gear Technology and Fish processing technology.

Fishery Administration & Economics - Legislation, treatises, planning, management, principles of economics, Fish marketing & Cooperatives, Socio economics, and Statistics.

The CIFE Diploma is equivalent to M.Sc. in Fisheries for the purposes of recruitment and promotions in fishery jobs in States and Centre.

The Inland Fisheries Training Centre at Barrackpore is the oldest one in India, established as early as 1947. Imparting one year Certificate Course in Inland Fisheries & Administration, it caters to the needs of State Fisheries Departments, neighbouring countries and private candidates, with an intake capacity of 40.

The subjects covered are

Biology of fishes, classification, identification, inland fish culture, induced breeding, riverine and estuarine fisheries, conservation and management, marketing, socio-economics and administration.

The Certificate awarded by IFTC Barrackpore is considered as an additional qualification, by some State Fisheries Departments, for promotions.

The Central Fisheries Extension Training Centre, Hyderabad, established in 1947 is the exclusive Centre in India and perhaps in East Asia, imparting 10 months training (certificate course) in Inland Fisheries Extension (methods & Techniques). It is entirely meant for nominees from all the States in India and the neighbouring countries, with full strength of 25.

The important aspects covered are :-

Fish culture, fisheries extension (methods & techniques) for development, principles and concepts of extension - visuals - mass media - objectives.

The certificate obtained at CFETC, Hyderabad after successful completion of the course, is neither recognised as qualification for fishery jobs, nor for departmental promotions.

The Regional Fisheries Training Centre for Inland Fisheries Operatives at Agra provides 9 months training (Certificate course) to State nominees at operatives level. Functioning since 1967, it has an intake capacity of 80.

The aspects of inland fisheries dealt with are :-

Bund breeding, Induced spawning, Intensive fish culture, Nursery management, Common carp culture, weed control, spawn collection and seed transport and reservoir fisheries.

The Certificate granted by RTC for IFO Agra is also not usable for employment in fisheries or for promotions.

The basic qualification for admission to above ICAR Institutes and Centres is graduation in subjects basic to fisheries (i.e. Zoology/Botany/Chemistry), except at R.T.C. for I.F.O. Agra where S.S.C.s and Intermediates are considered. No fees are charged. The age limit is preferably below 40. The medium of teaching is English. Stipends ranging from Rs. 150 to 300 p.m. and lump-sum T.A. @ 1,000/- to 2500/- are paid by the sponsoring States.

The training comprises of class room lectures, laboratory practicals, and field work (at fish farms and on trawlers) and study tours. Qualifying examinations are held at the end of respective training courses and comprise of theory papers, practicals and viva voce.

I.C.A.R.'s National Academy for Agricultural Research and Management (NAARM) at Rajender Nagar, Hyderabad imparts 6 months' training to the Agriculture Research Service Probationers where fisheries is taught as a specialised subject. This is a pre-requisite for all India Agriculture Research Services.

The Ministry of Agriculture's Central Institute of Fisheries, Nautical and Engineering Training, Cochin is conducting different courses for sponsored and private candidates. The courses are job oriented for employment in marine fisheries.

### Role expectancy

Graduates and post-graduates in Zoology and Fish & Fisheries from various Universities have been employed by fisheries and allied departments since early forties. Many have joined in past few years and more will be recruited in future. The role expected to be played by them is to assist in development of fisheries in their areas.

The fishery education imparted by the Centre i.e. ICAR's Education Institutes & Centres, is meant for updating the knowledge in fishery technology, through experienced and qualified teaching officers, specialised in different disciplines. This education being for fishery officers, who have basic qualification and some experience, they are bound to improve their knowledge and information manifold and are expected to play a positive role in achievements of targets as well as guiding their subordinates.

The goals of the College of Fisheries, Mangalore and Centres' C.I.F.N.E. T. are specifically and entirely job oriented and their syllabi are also defined keeping in view the respective job requirements. These graduate and trained personnel are therefore much in demand and quickly absorbed.

### Need for improving standards

A complete re-orientation, re-organisation and re-shuffling of Fisheries Education, both at University and Central levels is needed.

Some suggestions for improvement are:-

1. Providing appropriate and suitable accommodation for buildings and Hostels.
2. Setting up of self contained campus with fish farms, with Hatcheries & Spawneries.
3. Training the teaching staff in subjects like philosophy & psychology of teaching, Teaching aids and techniques as also in Project Planning & Information, Management, Evaluation and Administration.
4. Maintaining close liaison between sister Institutes, Universities, Fisheries Research, Development & Extension, both in India and abroad.

5. Arranging frequent seminars and workshops.
6. Decentralisation of administrative and financial powers for quick and efficient working.
7. Programme Planning & Target allotment should be with confidence of the concerned staff, at all levels.
8. Ample provision of transport and communication (telephones, telex etc).
9. Recognition of efficient and outstanding workers.
10. Close relations between teachers and taught.
11. Re-orientation of syllabus to make it upto date.
12. Excellent lodging and boarding conditions, at subsidised rates.
13. Providing of all necessary facilities to trainees, to avoid mental, physical and financial discomforts.
14. Funds, facilities and space for Research work.
15. The university staff should be compulsorily trained at CIFE and its Sub Centres.
16. They should be in touch with Research Institutes and Development Departments.
17. The syllabus should be revised and made uniform, all over India, keeping in view the job requirements in the States.
18. Field tours to places of fishery interest to be included in their course.
19. Students should be properly guided as to the prospects and type of job and work.

#### LEVELS OF FISHERIES TRAINING IN THE COUNTRY

Apart from educating higher fishery officials and staff, among the ranks of Inspectors, Senior Inspectors, Assistant Directors, Marketing Officers etc., the need for training the lower categories of field workers was also realised by the State Departments and most of them have set up Fishery Schools and Training Centres, within their States.

The lower level category includes fishermen, fieldman, watchers, supervisors and field assistants etc. who are directly working in the field i.e. at fish farms, reservoirs etc. Their exact designations and grades however vary from State to State.

Though not well defined, the duty of training the lower categories of staff has fallen to the States, who have set up the training schools and also running and managing the same since long.

In the context of training of lower level staff, the I.C.A.R.'s Regional Training Centre for Inland Fisheries Operatives, Agra, which imparts 9 months' training to the Operational staff, could be treated as Fisheries Training Centre.

Apart from their own staff, private fishermen, members of fishermen cooperatives and Fish Farmers Development Agencies etc. are also trained. Some states even train their fresh recruits.

The duration of the course varies from few days to few months, but some are longer, upto a year. Stipends and incentives are given from Rs. 5/- per day/person to Rs. 150/- p.m. The medium of teaching is the local language (mother tongue). The Training comprises of theory, discussions and field work and certificates are issued on completion.

Though exact nature and type of training is not known, the syllabi of some Centres indicate that the courses are field oriented. The intake capacity varies from 10 to 50.

I.C.A.R.'s Central Institute of Fisheries Education, Bombay has been organising and conducting a number of short term training programmes, in various aspects of Fresh Water and Brackish water Fish Farming, for State Fisheries and Corporations' nominees, private entrepreneurs, educated unemployed, fish farmers, fishermen, rural youth and candidates sent by fish farmers, industry and social organisations. Total number of participants is 25-50 per batch.

After completion of the training, which is of 2-3 weeks duration, certificates are awarded to the participants.

In the recent past, I.C.A.R. has established Krishi Vigyan Kendras (K.V.K.s) mainly for imparting field training in agriculture and allied subjects, including fisheries, to weaker sections.

The period of training is short i.e. 5-6 days but it is a continuous process. An allowance @ Rs. 5/- per day/person is given, along with certificate on completion of training. The programme is field oriented and in local language.

The KVKs are self contained, with staff, equipment, land and fish ponds for field demonstrations. Mostly they are attached to Agricultural Colleges and Universities and Research Institutes.

In order to train the teaching staff of KVKs, separate Teachers Training Centres (T.T.Cs) are also set up by I.C.A.R. All the subjects taught at KVKs are covered by respective experts at T.T.C.

Organisations engaged

- i. State Governments - Almost all States have established their training centres for imparting training to staff at operational and lower level, which are entirely run and maintained by the Fisheries Departments. The examples are :-
  1. Fisheries Training Institute, Kakinada - Andhra Pradesh.  
Fisheries Training Institute, Machilipatnam (Inland) - A.P.  
Fisheries Training Institute, Machilipatnam (Marine) - A.P.  
Inland Fisheries Training Centre, Warangal - A.P.
  2. Chinhat Fishery School, Lucknow - Uttar Pradesh.
  3. Fishery Training Centre, Nowgong - Madhya Pradesh.
  4. Fishery School, Udaipur - Rajasthan.
  5. Inservice Fishery Training, Achabal - Jammu and Kashmir.
  6. Staff Training School (Veraval), Fisheries Training School (Ukai) & Marine Fisheries Training Centres (Porbander, Veraval and Bulsar) - Gujarat.
  7. Fisheries Training Centre, Balugaon - Orissa.
  8. Fisheries Training School, Kaperthala, Gudraspur and Nagal - Punjab.
  9. Staff Training Institute and Six Fisheries Training Centres - Tamil Nadu.
  10. Fishery Training Centres, Krishnaraja Sagar, Kabari and Bethamangla - Karnataka.
- ii. The Indian Council of Agricultural Research is also actively engaged



in imparting training in fisheries, by way of short training programmes, through the Central Institute of Fisheries Education, Bombay, which has conducted over 20 such programmes during last 4 years and trained about 350 personnel, of the categories indicated above.

The K.V.K.s & T.T.C.s established by I.C.A.R., though mainly concerned with Agriculture, also impart training in fisheries and some examples are:-

1. K.V.K. Kosbad, Maharashtra.
2. K.V.K. Dhauli, Orissa (Also T.T.C)
3. K.V.K. Hyderabad, Andhra Pradesh (Also C.T.C)
4. K.V.K. Narakkal Cochin, Kerala.

The K.V.K. at Dhauli (Orissa) is attached to Central Inland Fisheries Research Institute, Barrackpore and K.V.K. Narakkal (Kerala) to Central Marine Fisheries Research Institute, Cochin.

#### Goals of training at different levels

The purpose of training at State's Fishery Schools and Centres is to apprise the lower staff with the type of work they have to do in field and make them proficient for better handling of fish, equipment, gear and tackle and their maintenance as also to make them aware of the duties and responsibilities.

The short term training programmes of the Central Institute of Fisheries Education, Bombay are aimed to:-

- i. Provide basic knowledge of fish and fisheries, mode of working of the State Departments, and the duties and technical jobs, to be handled by the fresh appointees in the States.
- ii. Provide technical and field knowledge regarding commercially viable projects, to fishermen, fish farmers, educated unemployed and rural youth for self employment.

The goal of the I.C.A.R.'s K.V.K.s is to infuse the knowledge of field work and broad techniques of fish culture in the weaker sections, to enable them to earn appropriate living. All the above training programmes, directly or indirectly, are also aimed at increased fish production by transfer of scientific technology.

#### Role Expectancy

The field staff, trained at State Fisheries Schools are expected to be better and more efficient workers than untrained hands.

The fishermen, farmers, educated unemployed, rural youth and weaker sections, when trained, are expected to be more efficient for petty jobs than raw hands, if employed by the Departments, industry or private entrepreneurs or they could take up the commercially viable projects, individually or in group, for self employment.

#### Constraints

1. The staff at State Fisheries Training Centres are themselves not trained.
2. The teachers are not in touch with Research & Development, hence unaware of latest techniques.
3. Many Centres are not fully and appropriately staffed nor well equipped.
4. There are no fish farms etc. attached to the Centres.
5. The teaching staff is frequently transferred, disrupting the work.
6. There is no liaison between one State to another regarding type of training and syllabus etc.
7. There is also no contact between State Training Centres, CIFE & KVKs.
8. The private fishermen, fish farmers, educated unemployed and weaker sections don't get the land/waters, for pisciculture, after training.
9. If they have the waters, they don't get the inputs like breeders, fry, fingerlings, feeds and fertilizers from the Departments.
10. The medium of teaching at KVKs is the local language, whereas at TTCs it is English.
11. Appreciable incentives are not given to trainees.

12. No method of evaluation and feed-back, as to the knowledge gained and performance of the trainees, after training.
13. The Centres are not equipped with Audio-Visuals for effective training through visual impact.

#### TRAINING OF FISHERIES EXTENSION PERSONNEL

The Fisheries Education and Training, as described in the previous chapters, is entirely conducted by the Central and State Governments and the Colleges and Universities,

The study of the syllabi of the above Institutes, Centres and Universities would show that Fishery Extension is not included as a subject in any of them, except at the Central Fisheries Extension Training Centre, Hyderabad.

Some Centres and Schools at State level do impart training on Fishery Extension, but that would not be appropriate due to the staff being neither trained nor experienced and Centres not fully equipped with Extension material.

Established in the Central Fisheries Extension Training Centre (CFETC), Hyderabad, is exclusively meant for imparting training in Fisheries Extension and caters to the needs of State Departments, by training the Fisheries Extension Officers. Other Technical officers like Inspectors, Senior Inspectors and Fisheries Development officers etc. are also trained. Fishery officers from developing countries are also deputed to this centre though not regularly. CFETC is thus the only Centre imparting training in Fishery Extension, in India and perhaps in South-East Asia.

#### Levels of Training

The minimum qualification being graduation in subjects basic to fisheries (viz. Zoology/Botany/Chemistry), the State Departments accordingly nominate suitable officers who are freshers or having 6-10 years experience and in the age group of 25-35 years.

Details of courses conducted

- i) The ten month's course (June-March) in Inland Fisheries, with full emphasis on Fishery extension, is imparted to 25 in-service personnel. The medium of instruction is English.
- ii) The subjects covered are :- 1. Extension Techniques, 2. Extension methods, 3. Fish culture (Biological aspects) 4. Fish Culture (Chemistry), 5. Fish Culture (Engineering) and 6. Photography.
- iii) The training being for in-service and experienced officials with appreciable knowledge and background of fish culture, it is limited to updating their professional skills. The emphasis is entirely on Extension techniques and methods to be adopted for promoting fish culture. Nominees are trained in handling and operation of audio visuals, preparation of posters, pamphlets, slides, filmstrips, exhibition material, as well as in planning and holding Result and Method Demonstrations.
- iv) Full record of field, laboratory and Extension work, including Dissertations, Project work and case studies, are maintained by them and evaluated during the qualifying examination held at end of the course.
- v) The practical field work, pertaining to fish breeding and nursery management, is conducted for 4-6 weeks at CIFE's fish farms at Kakinada and Balabhadrapuram, during monsoon season.

An all India general study tour is planned for 3-4 weeks during winter, to places of fishery importance for observation of fishery development programmes of States and to update the knowledge at Research Institutes, Corporations and Industries.
- vi) The Central Fisheries Extension Training Centre thus differs from other fisheries Institutes and Centres as it imparts training with specialization in Fisheries Extension and the in-service nominees from the States return as full fledged Fishery Extension Officers, after 10 months training at the Centre.

### Role Expectancy

All nominees whether Fisheries Extension Officers or Fishery Officers, as they are fully trained in all aspects of fishery extension, are expected to attend to entire extension work with confidence and satisfaction. By motivating individuals and groups of fishermen and farmers for adopting the proven technologies, by employing various extension methods like individual and group contacts, discussions, display films and demonstrations, the extension officers will be of great help in development of fisheries in the area. Fishery extension being a very specialised subject, which covers human behaviour and psychology, it is impossible to hope that officers not trained will be able to deliver the goods.

### Strengthening Fisheries Extension Training

There being only one Training Centre in fishery extension in the country, with a capacity to train only 25 candidates per year, it reflects the gross inadequacy of the Extension Education and Training.

Expansion of the CFETC, Hyderabad alone will not suffice nor would meet the requirements. Establishment of Extension Education, Training and Services at Centre, State and University levels on all India basis, will strengthen the Extension as a whole.

Moreover, there being no recognised Education at University or at Central and State Institutes in Fishery Extension, it would not be possible to build up the qualified cadre to teach extension education.

The pattern of Extension Education may be planned on the lines of the already existing Extension Education Institutes, where education in Agriculture Extension is imparted at B.Sc., M.Sc., and Ph.D., levels. There are three E.E. I.'s in India at Hyderabad (Andhra Pradesh), Anand (Gujarat) and Nilokheri (Haryana) and are attached to the respective Agricultural Universities.

The E.E. I.'s are under 'Part-B' scheme and are entirely financed by the Government of India, Ministry of Agriculture, but

are placed under the administrative control of the Agricultural Universities.

To begin with Fisheries Extension at B.Sc. and M.Sc. levels may be introduced at the above three E.E.I.'s which are established on Zonal basis, taking candidates (private & Departmental) from 6-8 States in Southern, Eastern & Northern Zones.

Extension should be given equal, if not more importance and status as Research and Development. Because without Extension Research has no value, as it does not reach the field, fishermen and farmers and Fisheries Development becomes stagnant.

Until and unless there is genuine liaison and close coordination between Fisheries Research, Education, Development, Industry, Planners, Administrators, Fishermen and Farmers, the progress and development of fisheries will not be feasible. And this liaison and coordination can only be maintained through a strong, well knit and properly organised Extension Sector.

A broad outline of the set up of FISHERIES EXTENSION SECTOR IN INDIA IS given in Appendix 'A' enclosed.

Extension is not only a subject but a discipline, and a sensitive and delicate one, as it involves dealing with human beings. It precisely means selling the ideas and motivating people for taking fish culture on scientific lines. It is therefore both an art and a science.

An extension worker, therefore, has to be an extra-ordinary person, a rare combination, with sixth sense like an artist, dramatist, poet, philosopher, with qualities of leadership very social, interested in sports and cultural activities, generous and helping, broad minded, healthy and smart with a smile. He should have a sense of appreciation, a meticulous eye for details, capable of quick decisions, forthright, vibrant and eloquent and very tactful.

Although it is next to impossible to get persons with all above qualities, but some of the requirements could be found at the time of recruitment and some infused through Extension Education.

#### Need for Extension Research

At the present stage, when there is no well developed Fisheries Extension Service/Education, research in extension has no meaning. Only when a full fledged extension Sector covering Education and service at Central, State, University and Industries level is set up, can Extension Research be planned and implemented.

However the main objectives under Extension Research would be 'Feed-back and Evaluation' of the performance of the Fisheries Education and the Extension workers on one hand and of the requirements and difficulties of the State Departments, Fishermen, Farmers, educated unemployed, rural youth and the industries on the other.

#### Constraints

The following are the constraints at the present level of Fisheries Extension, in the country.

1. Fisheries Education very limited and only at one Centre of ICAR, for only 25 in-service nominees.
2. Teaching officers and staff themselves are not educated or trained in Extension.
3. No suitable buildings and hostels, vehicles and equipments.
4. No coordination with Fisheries Research, Development and Industry etc.
5. The important subjects like Project Planning, Management, Evaluation, Leadership, Personality build-up, Communication and Public speaking etc., not included in the course.
6. The syllabus is old and not adequate to cover all aspects of extension.

7. The officers though trained in Extension are not utilized as Extension officers on return to the States.
8. The Extension Officers placed under B.D.O.s are frequently used for other than fisheries work.
9. All Extension officers are not sent for training.
10. Providing of Extension Equipment i.e. Projectors, Cameras, Tape Recorders, Epidiascopes, Films, Visuals, Art material and Photography kits, etc. is essential at District/Block levels.
11. No Seminar and Workshop on Fishery Extension being organised by Centre/States etc.



BROAD OUTLINE OF SET UP OF FISHERIES EXTENSION  
SECTOR IN INDIA

I G A R	MINISTRY OF AGRICULTURE	STATE FISHERIES DEPARTMENTS	UNIVERSITIES
<p>A. Director of Extension (one) Deputy Directors (five) Asst. Directors (Twenty) (and other technical and Admini- strative staff &amp; equipment.</p>	<p>1. Deputy Commissioner Fisheries (Extension)- one (already existing)</p> <p>2. Research Officers (Extension) -Two (with other Techni- cal &amp; Administra- tive staff &amp; equipment)</p>	<p>Deputy Director Fisheries Exten- sion (one); Asstt. Director Fisheries (one for every Four districts) (with relevent Technical &amp; Ad- ministrative staff &amp; equipment)</p>	<p>One Professor &amp; one Asst. Professor to work as Extension Officer, in addition to their work (with other technical staff &amp; equipment)</p>
<p>The Head quarters of Director &amp; Deputy Directors will be New Delhi &amp; the Asstt. Director will be posted 4 each in five Zonal Extension Centres (in South, North, East, West &amp; Central).</p>		<p>Fisheries Exten- sion officer at District/Blook level depending on the fishery potential/number of fisherman, farmers etc., Providing of Extension equipment up to lowest level, is of utmost importance.</p>	
<p>B. Extension office one each at- Central Institute of Fisheries Education, Bombay, Central Marine Fisheries Research Institute, Cochin, Central Inland Fisheries Research Institute, Barrackpore Central Institute of Fish- eries Technology, Cochin (with two Asstt. Extension Officers other staff &amp; equipment at each Institute)</p>			

FISHERIES EXTENSION PROGRAMMES OF EDUCATIONAL  
AND TRAINING ORGANISATIONS

The CFETC, Hyderabad, organises the following Extension programmes through its Teaching Officers and trainees:-

1. Research Projects in collaboration with private farmers and fishermen,
2. Field Demonstrations for benefit of fish farmers and their workers.
3. Consultancy and advice to entrepreneurs, institutions and industry.
4. Short-term training programme for State Fisheries, Private entrepreneurs, educated unemployed, rural youth and weaker sections.
5. Preparation of folders, posters, and Visuals for publicising fishery projects.
6. Dissemination of information regarding latest technologies through film shows, exhibitions, Radio & T.V.
7. Arrange workshops and seminars on subjects akin to extension, to provide forum for discussions and recommendations.
8. Adopt fishermen/weaker sections under 'Lab to Land' programme and assist them in scientific pisciculture.
9. Guide trainees of the Centre to write and publish 'Dissertations' on important aspects of field achievements.
10. Contribute research papers and popular articles to fishery journals and magazines etc.

Case studies

The above diversified activities are continuously in progress. Some case studies of assisting private fish farms in hypophysation and nursery management, continuously for last three years, are given hereunder.

Case study I - Manchikalapudi Fish Farm, District Guntur, A.P.

The Manchikalapudi Fish breeding farm was constructed in June 1977. But actual fish breeding operations were started in the monsoon of 1978. Since then the farm has been receiving guidance, actively from the CFETC, Hyderabad on different aspects of pisciculture in general and in Induced breeding and Nursery pond management in particular.

The farm measuring 6.842 ha in area, belongs to Shri K. Venkateshwar Rao and is situated in village Manchikalapudi (Tenali Taluqua) of Guntur district, A.P. Technical assistance so far rendered, has been entirely by CFETC Officers and trainees.

In 1978, induced breeding work was taken up at the farm almost at close of the season and only 15 experiments were conducted and successful breeding was obtained in 10 sets (7 Rohu and 3 Catla). The total production of spawn was 6,91,000 (Rohu 4,96,000 and Catla 1,95,000). During the current year general instructions on preparation and management of nursery, rearing and stocking ponds were given to the party and a project for result demonstration of Composite fish culture was taken up at the farm, in December.

In 1979, the entire Induced breeding and nursery pond management were arranged by the staff and trainees of CFETC, Hyderabad. In all 90 experiments were made, of which 48 sets bred successfully producing 67,42,000 spawn, comprising of 67,32,000 Rohu and 10,000 Catla. Twenty cement nurseries (0.3 ha total area) and 25 earthen nurseries (0.44 ha total area) were prepared and stocked with the above spawn and 40,70,000 fry obtained during 10 to 15 days rearing. The survival rate in individual nurseries ranged from 12% to 85%, with an average of 60.5%.

In December 1979 the result demonstration of Composite fish culture was conducted. In spite of less than 1 metre water depth in the pond during major part of the year, the production came to 4375 kg/ha in 12 months.

In 1980, 148 experiments were made and 1,08,01,000 spawn were produced. This comprised of 84,64,000 Rohu, 8,10,000 Catla, 13,42,000 Mrigal, 1,35,000 silver carp and 50,000 grass carp spawn, 20 cement nurseries of total area 0.3 ha and 28 earthen nurseries of 0.48 ha total area were prepared, stocked and managed by the trainees and staff of CFETC and about 50 lakhs of fry were raised.

Case study II - Godavari Modern Fish Seed Farm, Kakinada

Shri M. Venkateshwara Rao of Kakinada was having 2 ha of paddy field in the village Patherlagadda, about 10 km from Kakinada town. The land had excellent irrigation facilities by Godavari canal. In April 1979, he happened to visit CIFE Bombay in connection with the inauguration of the 'Lab to Land' programme of the Institute. He was convinced about the economic viability of Fish Seed Farms and approached the Institute for necessary technical guidance.

The Project report was formulated by the Institute and a loan of Rs. 90,000/- was provided by the Bank of India, Kakinada for construction of the Farm. The Farm was constructed in a very short period of two months (May & June 1979) with 3 breeder ponds of 0.15ha each and 62 Nursery Ponds of 0.102 ha each. The cost of construction was approximately Rs. 40,000/-

Both Indian and exotic carp breeders were procured from nearby perennial ponds and maintained in the farm during the months of June-July and the fish breeding, and fry rearing programmes were undertaken in August 1979 by the CFETC under the guidance of its officers and staff and trainees.

1979

Due to adverse climatic conditions during the entire season, results of breeding were not satisfactory. Altogether 37 experiments could be conducted of which 21 were successful (Rohu-16, Mrigal-3 & Silver carp-2). Temperature being high, hatching was badly affected, even though the percentage of fertilisation was good. Only 8 lakh of hatchlings could be salvaged. After 15 days of rearing, approximately 3.5 lakh of fry were obtained from the nursery ponds.

1980

A demonstration of controlled breeding of common carp by hormone injection and stripping under high range of water temperature was undertaken at the farm, during March-April and more than 40,000 fry produced

during the process, in spite of adverse temperature. During induced breeding programme in July 1980, 41 experiments were attempted of which 22 were successful. The high range of water temperature again affected breeding and hatching. Out of approx. 50 lakh of fertilized eggs, only 17 lakh of hatchlings could be salvaged. One hatchery complex was temporarily installed at the farm, which however gave much better result (about 80% hatchling survival). 50 Nursery ponds were stocked @ 3 million/ha. and 8 lakh of fry produced after 15 days rearing. The greatest problem experienced during both the seasons was the high range of water temperature during the breeding seasons. This adversely affected both fish breeding and hatching of eggs. It was observed that the problem of high temperature in humid climatic conditions, near coastal belt could be overcome by installing hatcheries and spawneries in shade and with running water.

#### Evaluation

The worth of any Institute, Centre, Department or Industry etc. lies in its planning, activities and achievements. This however could be known only by objective assessment and unbiased evaluation.

For extension evaluation, feed back from trainees, farmers, fishermen and traders etc. is the only solid method to estimate the achievements.

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SEMINAR ON FISHERIES EXTENSION

Cochin, 8-10 December 1980  
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ROLE OF MASS MEDIA IN FISHERIES EXTENSION

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Developing countries throughout the world are attempting very hard to narrow or bridge the existing gap between their population busy in farming and technical experts who possess technical know-how. To achieve this, they are launching and carrying forward nation-wide programmes of change and taking assistance from experts all over the world to strengthen these programmes. Change-agents/ Extension workers who are basically responsible for this have been planning various strategies to motivate the farmers to adopt new technology.

We are also very much concerned about the dissemination of technical know-how to have-not's. Today, we have a gigantic extension machinery which is extensively and intensively busy in bringing about all round development in the community. We have also implemented various types of Rural Development Programmes such as Intensive Agriculture District Programme, Intensive Agriculture Area Programme, High Yielding Varieties Programme, Small and Marginal Farmers and Agricultural Labourers, Drought Prone Areas Programme, Tribal and Hill Areas Programme and Integrated Rural Development Programme, etc. Small Farmers Development Agency (S.F.D.A.) and Fish Farmers Development Agency (F.F.D.A.) are also working for rapid spread of the techniques aimed at the uplift of the rural people. Indian Council of Agricultural Research as an agency in-charge of Research and Education has basically developed

three mechanisms convincing the field extension workers the economic viability of the fisheries projects. One of them is Operational Research Project. This is intended to involve the people themselves in the exploitation of technology and to assess the operation problems in the transfer of technology. The second important device is the National Demonstration Programme which is based on the principle that is 'seeing is believing'. This programme helps in developing the confidence amongst the farmers. The third important mechanism is the Krishi Vigyan Kendra. These are based on the principle 'Learning by doing'. Through these institution innovations such as induced breeding or fish seed bank and aquaculture are imparted to the fisherman. It has been experienced that in all these development programmes communication of technical know-how is an important input along with others such as supply of seeds, fertiliser, insecticides etc.

Communicators have been facing number of problems in dissemination of technical know-how to 'have-not's'. Communication experts are of the opinion that mass media, if properly used, can be of great help in fisheries extension. Therefore, let us critically examine the role that can be played by each mass media i.e. Radio, T.V., Film and Newspaper.

#### SOUNDS IN THE AIR

Radio today is the most popular channel of mass communication. We are aware that the main advantage with the radio is that message can be quickly conveyed to a large group of audience, irrespective of distance and their literacy level. It has been proved that, through radio, awareness regarding technical know-how can be easily developed, interest can be aroused and the will to adopt the information among the farmers can be generated. It has also been observed that the farmers can be made conversant with the sophisticated and changing technology in the shortest duration.

sophisticated and changing technology in the shortest duration.

Presently, we have Farm & Home Units at All India Radio Stations to plan, prepare and broadcast programmes for rural audiences. Almost all the stations of AIR have allotted time for rural broadcast. A countrywide scheme of Radio-Rural Forums have been launched. These forums organised in the villages regularly discuss the weekly broadcasts and send their suggestions and criticism to radio stations. Forums have proved very useful in dissemination of information especially to people who are poor and illiterate. Several studies conducted regarding effectiveness of radio have indicated that the knowledge of the farmer is increased to a significant level and the information is retained to a desired extent.

As a communicator we must see that the message for radio should be prepared in such a way that its intelligibility is very high. Listener should be able to understand the message immediately after hearing. Technical words should be avoided; doses should be repeated and translated in their language. In one of the research studies subject matter specialists, farmers and other speakers of AIR were asked to rate the factors associated with the effective broadcasts. Factors have been classified into mainly four groups, i.e. speaker, subject matter, manners of presentation and publicity of radio programmes. Responses were received from 54 out of 119 respondents. On the basis of rating of respondents factors of different categories have been ranked in Tables No. 1, 2, 3 and 4.



Table 1

Rating of Factors Related to the Speakers Responsible for  
Effective Broadcasts by Judges (N-54)

Sl. No.	Factors	Mean Scores	Ranks	Degree of Importance
Speaker should:				
1.	Have clear and systematic thinking on topic	4.771	I	M.I.
2.	be fully prepared for the talk in advance	4.346	II	M.I.
3.	be able to speak language understandable and appealing to rural people	4.321	III	M.I.
4.	have good power of expression	4.000	IV	V.I.
5.	have rural background and knowledge of working with rural people	4.111	V	V.I.
6.	voice of speaker and pronunciation of words should be clear	3.923	VI	V.I.
7.	not have 'mike frightness'	3.673	VII	V.I.
8.	know local way of speaking	3.547	VIII	V.I.
9.	have normal speed of delivery	3.264	IX	Imp.
10.	have sense of humour	3.077	X	Imp.
11.	know 'microphone techniques'	2.803	XI	Imp.

M.I. = Most Important = 4.200 to = 5.000

V.I. = Very Important = 3.400 to = 4.200

Imp. = Important = 2.600 to 3.400

Table 2

Rating of Factors Related to the Subject Matter of Effective  
Broadcasts

Sl. No.	Factors	Mean Scores	Ranks	Degree of Importance.
1.	Subject matter should be related to the felt-needs.	4.623	I	M.I.
2.	The dialogue should be able to create a clear mental picture in the minds of the listeners regarding the subject matter.	4.283	II	M.I.
3.	Clear summaries should be given at the end of the radio talk	4.262	III	M.I.
4.	Thinking and talking should be done in terms of wider applicability	3.943	IV	V.I.
5.	Subject matter should consist of only specific points	3.902	V	V.I.
6.	Complex sentences and difficult words should be avoided	3.811	VI	V.I.
7.	Main and important points should be repeated	3.788	VII	V.I.
8.	Economics of the practices should be included in the talk	3.774	VIII	V.I.

(Table 2 cont'd)

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9. Flowery and literary metaphors should be avoided	3.660	IX	V.I.
10. Any principle or abstract point should be clarified by using examples	3.604	X	V.I.
11. Scientific words should be translated in the local language	3.585	XI	V.I.
12. Major teaching aspects should be limited	3.453	XII	V.I.
13. Examples from actual life should be used	3.445	XIII	V.I.
14. Examples should be within the listeners' experiences	3.415	XIV	V.I.
15. Clear summaries should be given at the beginning of the radio talk	3.335	XV	Imp.
16. Interesting stories related to the subject matter should be used.	2.980	XVI	Imp.

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M.I. = Most Important = 4.200 to 5.000

V.I. = Very Important = 3.400 to 4.200

Imp. = Important = 2.600 to 3.400

Table 3

Rating of Factors Related to Manners of Presentation Responsible  
for Effective Broadcasts (N=54)

Sl. No.	factors	Mean Scores	Ranks	Degree of Importance
1.	At the time of speaking, key ideas should be tactfully stressed so that they may easily be detected by the listener	4.481	I	M.I.
2.	Programme should be carefully rehearsed and timed	4.241	II	M.I.
3.	Talk should be presented by discussion method	4.188	III	V.I.
4.	Talk should be given in fluent way	3.943	IV	V.I.
5.	Use of 'voice fading' style should be avoided	3.580	V	V.I.
6.	Sound effects be used sparingly in an amateur educational radio production and avoided unless necessary	3.245	VI	Imp.
7.	For maintaining showmanship local songs and music should be given	2.673	VII	Imp.

M.I. = Most Important = 4.200 to 5.000  
V.I. = Very Important = 3.400 to 4.200  
Imp. = Important = 2.600 to 3.400

Table 4

Rating of Factors Related to the Publicity of Radio Programmes  
(N = 54)

Sl. No.	Factors	Mean Scores	Ranks	Degree of Importance
1.	Radio programmes should be published in local paper	4.037	I	V.I.
2.	Future Radio programmes should be announced over radio a week in advance	3.556	II	V.I.
3.	Leaflets of radio programmes should be printed and properly distributed in advance	3.396	III	Imp.

V.I. = Very Important = 3.400 to 4.200

Imp. = Important = 2.600 to 3.400

**NEWSPAPER, JOURNALS AND MAGAZINES**

The other important mass media is Newspaper and other types of publications which are being used to disseminate information. According to Annual Report of the Press Registrar of Newspaper of India, this country has nearly a thousand dailies with a circulation not exceeding 10 million copies. Nearly ninety per cent of these are sold in urban areas. Hardly 10 per cent are circulated in rural areas. The projected ratio of newspaper circulation in the country is 1.7 copies per 100 persons. The reach of printed material in rural area is affected

by low-economic level, lower level of functional literacy and the physical distance from the place of its publication.

A study conducted by the Division of Agricultural Extension, I.A.R.I., New Delhi has indicated that our Farm Journal and Magazines carry articles which are written in a scholastic manner, full of technical words and jargons. Readability of these articles is very low. Some time sentences run into paras. Difficult and ambiguous words are used. Following paragraphs taken from a publication meant for farmers will illustrate these points.

PARA-1

CAGE CULTURE OF CARPS

Mrigal, fringe-lipped carp, Silver carp and common carp at a ratio of 4:2:3:1 stocked at a density of 22,500/ha in a cage of 2.5 x 1.6 x 1.2 M with a nylon netting of 0.5" mesh size gave a production of 5535 kg/ha/5 months. Feeding was done with rice bran and groundnut oil cake at a rate of 5% of body weight. Among the species stocked fringe-lipped carp and common carp have shown rapid growth and the silver carp the least.

PARA -2

The eradication of predatory fish can effectively be carried out by poisoning the pond with fish poisons like "Tafdrin--20" at the concentration of 0.01 ppm i.e., 0.5 kg/ha area or with any other locally available fish poison of plant origin like mahua oil cake at the rate of 200 ppm i.e. 2000 kg/ha/year. When the dewatering facilities are available, poisoning the pond can be avoided in view of their dangerous toxic nature and their persistence in water for a long time. When fish poisons are used, the detoxification of pond water

should be ascertained by observing survival of limited number of stocking material for about 48 hours before stocking. If manna oil cake is used as fish poison, it serves as a fertilizer after its toxic effect is over".

### FILM

Film is another important and popular channel of Mass Communication. Today we have about 9,000 theaters out of which about 7,000 are in urban areas. In the country we have 4.5 seats available for 100 persons. Most of the theaters which reach rural areas are touring type having no infrastructure for organising effective film shows.

Film related to agriculture and fisheries are also being screened in the villages by the Directorate of Field Publicity, Development Blocks, Educational Institutions and Social Organisations. Films are being produced by ICAR in collaboration with Films Division and other agencies.

It has been observed that it is easier to learn things if film as a medium of communication has been properly used and timely screened. Research studies have indicated that the films screened/\* in a drab style. Communicator while using the medium forget that this medium is being used mainly for entertainment and recreational purposes. Therefore, the message should be treated in a humorous style and keeping in mind the entertainment value of the medium. It is desirable that the actors and situation should not be foreign to them.

/\* in the rural areas are out-dated and subject matter has been presented

### TELEVISION

Television is one of the powerful media of mass communication which combines all the benefits of a radio, newspaper and film and thus is capable of dissemination of information, entertaining, educating and influencing the thought and attitude of viewers. Television being an audio-visual medium, the message reaches to an individual with the help of ears and eyes and hence gets a lasting impact. In most of the developing countries it is used as an instructional tool for direct teaching, supplementing formal education developing psycho-moto skills, adult education, and eradicating illiteracy. We are also using television as a medium of mass communication for fisheries extension.

The first TV Station put up in Delhi started telecasting programmes for the rural audience. Today, TV Stations are mainly feeding programmes for urban audience. It has been reported that as soon as "Krishi Darshan Programme" starts, the viewers switch off the TV sets. They use this time as interval between the earlier and later telecast. The question is why this happens. It is mainly because most of our rural programmes on TV are not timely, not much of educational value and boring. Of course, efforts are being made to put on TV better programmes. We as a communicator forget that TV is an audio-visual medium and it can be called electronic blackboard for the communicator. When we prepare a script for TV, it is to be prepared in different style than the radio and newspaper, In this medium there has to be perfect combination of pictures and wordage. We have to see how this combination can be worked out most effectively.



To develop an effective television programme it is essential that one must follow logically the steps given below:

- (i) The subject matter field should not be vague. It should be made specific and felt-need based from audience point of view.
- (ii) Determine main points to be made in the programme. Prepare a list of items that you will make to support the point.
- (iii) Consult resource material or a resource person if you need more information or if you need to check the information for accuracy.
- (iv) Select a format, or a method of presenting the programme. This may be a demonstration; an illustrated report; a dramatic presentation; an interview; a forum or a variety format; using several of these methods combined. (The interview and the forum tend to present problems in visualising).
- (v) Determine the need for other participants and contact possible participants (farmers, homemakers, boys and girls, specialists and other persons).
- (vi) Determine the visual aids, equipment, material and properties that best show the points to be made. Make a list of all of the visuals.
- (vii) Make an outline of the programme. Divide a sheet of paper into three columns. In first column (timely segment) will give the time duration of a shot. What things you want to show to viewers such as visual aids or the scene is to be put down in second column and label it Video. The third column will have commentary or dialogue. In other words you will put the things you want to say. This column is called Audio column. The things you want to show and

things you want to say about them should be written opposite each other on the page.

It is often necessary to use a special device to get from one segment of the programme to another. This is called a transition. It may be done visually, orally, or both. It ties the whole programme together, giving it the polished, professional touch, and results in a programme that flows smoothly. Transitions must be indicated in the script if used.

Write the opening and the closing of the programme including the action and talk that will take place. Put an attention getter in the opening and make the end equally strong.

- (viii) Outline of the script in view of the programme producer's suggestions may be modified. Provide a copy of the script to programme producer, the participants and others as needed. (This should be done at least one week before the programme is to be televised).
- (ix) If give-away material (a publication) is to be offered, check to make sure that enough copies are available to meet the expected requests.
- (x) Collect the visual aids, materials, properties, and equipment and lay all out in the order each will be used. Check again to make sure all of the visuals are at hand.
- (xi) Rehearse the programme at home, office, or some other convenient place. Time the rehearsal for the total length and for each important segment. Add or subtract material to fit the script into the desired time. Rehearse the programme as it will be done at the station.
- (xii) Arrive at the station well ahead of telecast. (Check with the programme producer for the time you should arrive).

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SEMINAR ON FISHERIES EXTENSION

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THE FISHERIES COOPERATIVES IN INDIA - PERFORMANCE,  
PROBLEMS AND PROSPECTS

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India is one of those countries in South East Asia which are rich in fish resources. However, fishery activity has not been properly organised in this country on systematic lines. As a result, the production efforts are not commensurate with the potential that this country possesses in this sphere. In the wake of shortages of food products, lack of developmental efforts in the field of fisheries has only added seriousness to the problems. Whatever fish that is collected today is also not satisfactorily distributed, with the result, both the fishermen and the consumers are at a loss. In many countries, having the coast line, fishery products have been an important item in the diet of the people. They provide necessary animal protein. Against this background importance of increasing production of fishery products for improving both the quantum and quality of consumption in India can be easily recognised.

Reasons for under development

What have been the different factors responsible for inadequate exploitation of fishery resources in India? The most outstanding feature that would strike the attention of any-body has been the primitive method of conducting fishing

operations. Along the coastal line, barring a few places, by and large, harbour facilities do not exist. For the tropical climate, as it is obtaining in India, lack of facilities has made procurement and marketing, storage, preservation, processing and transportation of sea food very difficult. In recent times some development is being noticed in the provision of refrigeration and cold storage facilities but these are very expensive and inadequate. At any rate, these are not yet within the convenient reach of the small fishermen. The interests, especially of the small men in fishery sector, are, therefore, not safeguarded. This has been a serious bottleneck which has adversely affected marketing of fish products on competitive basis. In the field of marketing, the middle-man/traders have been dominating the scene to the disadvantage of both, the fishermen and the consumers. These have exploited the situation always to strengthen their own position and to the neglect of organisational and operational developments on modern lines. The middlemen exercise control over the marketing of fish products through financing. The cost of finance is very high and disproportionate to the risk involved. All these factors have contributed all along to deterioration and decline in the sea-food activities. It is time a comprehensive and well integrated institutional structure is set up which would take care of various facets of the fishery industry in India.

#### Why Cooperatives?

A cooperative structure would be quite appropriate for these areas of business especially, for small fishermen engaged in this activity for generations. The conditions obtaining in the fishery sector are almost comparable to those in the field of agriculture. The small people predominate. They are poor, illiterate and helpless. Their product is extremely perishable.

They need guidance and assistance at all the stages in their operations. But this is possible only if they are provided with an institutional structure, adequately modern and responsive to their needs. A cooperative would be their own organisation, most appropriate, managed by them for themselves.

In recent times, the need for organising the fishery activity on cooperative lines has been recognised in many developing countries especially, at the official levels. This development, however, has been three decades old (excepting in a country like Japan). Most of the countries in the South-East Asian Region have been lagging behind in providing a modern cooperative structure to their fishery sector.

Cooperative structure in fisheries as seen in India is particularly three-tiered - (a) Primary Cooperative for a village or a group of villages (b) District or regional Federation, wherever possible and (c) a State Level Apex Fishery Cooperatives Federation for the entire structure within the State.

#### Production Position

The organisational structure of fishery cooperatives in India consisted of 5324 primary fishermen cooperatives with a membership of 5.51 lakhs and paid up share capital of Rs. 36,269 lakhs as on 30th June, 1978. 23 per cent of the fishermen are covered by the cooperative sector. This has been hardly 4 per cent more than those covered in 1974. The 6th Five year Plan aims at 50 per cent coverage of the fishermen. In the share capital, the State governments had provided Rs. 2.07 lakhs. The total annual business turnover of the primary fishery societies was over Rs. 943.42 lakhs (exports Rs. 7.2 lakhs). 1,586 primary fishery cooperatives were in profit while 2,429 recorded losses.

Others were either dormant or working on no profit no loss basis. There were 72 central/district fisheries federations of the primary societies, They had recorded turnover of Rs. 668 lakhs (exports Rs. 39 lakhs). Of these 26 federations recorded profits and 42 were working in losses. Remaining were dormant. Besides there were 8 state level federations existing in some states with business turnover of Rs. 471.15 lakhs (export Rs. 98 lakhs). Of these 5 Federations were working in profit and 2 recorded losses. The remaining one was practically dormant.

The development of cooperative fishery sector has been un-even, Maharashtra, Gujarat, Karnataka accounting for 80 per cent of the total turnover. In recent years the programme of fishery development is being developed on 'Project' basis. The project approach implies intensification of fish production through introduction of mechanised vessels, made available to groups of members of fishery cooperatives on credit, provision of fuel and oils and other requisities as also common facilities and services like curing yards, ice plants and cold storage, canning plants, fish meal plant, transport vehicles etc. Marketing of fish products and recovery of loans through the sale price of fish products has been made an integral part of the whole scheme. The integrated projects are financed by the Agricultural Refinance and Development Corporation. These are spread over Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh, Pondicherry, Goa, etc. The National Cooperative Development Corporation is also providing sizable assistance to fishery cooperatives. A total of Rs. 269.54 lakhs was provided by the NCDC by 1979, to fishery Cooperatives in Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra and Tamil Nadu. Large sum of this assistance has gone to the States of Maharashtra, Andhra Pradesh and Karnataka.

The fishery cooperatives are being developed in the marine sector and the inland sector. The inland fisheries production has recorded a rise from 2 lakhs tonnes in 1951-52 to 9.3 lakh tonnes in 1977-78. Similarly, the marine fisheries production also has gone up from 5 lakh tonnes to 16.10 lakh tonnes over the same period. The Fish Farmers' Development Agencies (FFDA) have been set up in the inland fishery sector to coordinate the functions of different agencies connected with the development of fishery activities and to popularise and conduct intensive and integrated fish culture in tanks and ponds.

Primary Cooperative Society

The Primary Fishery Cooperatives, however, are seen largely engaged in the provision of loans only to the fishermen. A few cooperatives have arranged to provide supplies and exceptionally some are undertaking construction of fishing boats and mechanised processing activities. The Japanese fishery cooperatives have undertaken most comprehensive variety of functions listed earlier and they should provide a model for development of cooperatives in India too.

District/Regional Federations are engaged in assistance to the member primary cooperatives, especially in regard to provision of supplies, preservation in transportation, storage facilities for marketing operations, etc. However, these have to be located conveniently and for areas that would give them sufficient business of all types to make them viable as reported earlier. Weaknesses all the same of these units have contributed to underdevelopment of the central societies.

The State Level Apex Federations should be considered as the most important agency in the fishery cooperative sector because of its location, size, capacity to command resources,

of men, money, material and market. It should provide the necessary leadership to the entire movement in its area of operation. Keeping in mind the interest and aspirations of the relatively weak fishermen, it has to plan imaginatively and endeavour to implement the programme in a business like manner. Thus, the apex federations should be able to provide not only financial and managerial resources to the member organisations but also the required inputs and guidance for modernisation of fishing operations, effectively and efficiently. These activities logically would cover, apart from preservation, processing, marketing, modernisation of by-products, construction of well-equipped fishing boats, also technical guidance, research and consultancy, to the extent possible.

The above mentioned scope of activities of fisheries cooperatives operating at different levels should bring out clearly the need for re-vitalisation of training of personnel as also the education of members. Perhaps, equally important is the need for training the government and other institutional officials concerned with growth and development of fishery cooperatives. Insufficient arrangements on these accounts and lack of awareness are some of the basic handicaps from which the fishery cooperative sector seems to suffer. In India, at present there are very few independent training and education programmes organised for people from this sector. In recent years the Vaikunth Mahta National Institute of Cooperative Management, Pune and the State Level Cooperative Training Colleges located in the fisheries area have been organising and conducting training programmes for the personnel of fishery cooperatives. The National Cooperative Union of India has also been managing training and education projects at the junior level cooperative training centres and the National Cooperative Development Corporation has



been assisting in conducting these programmes. Andhra Pradesh, Gujarat, Karnataka, Kerala and Maharashtra have completed 19 such training programmes out of a total number of 30 sanctioned programmes and had trained 352 persons working at the primary level. The member education programme is conducted by the NCUI in collaboration with the NCDC in 9 maritime States and Union Territory. By March, 1979, 8,893 individual fishermen were trained and educated through 8 projects located in Kerala, Tamil Nadu, Pondicherry, West Bengal, Orissa, Maharashtra, Andhra Pradesh and Karnataka. The pace of the training and education programmes has to be intensified in order to provide very much required orientation to the fishermen in favour of cooperative action and management of cooperatives on sound lines.

Organisationally and operationally, cooperatives in fishing industry must be managed on modern lines to put them on even keel in the sphere of collection, modernisation and use of mechanised boats. Provision of landing jetties, boat building yards, curing yards, canning factories, fish meal plants, ice factories and cold storage etc. are all integrated parts of modernisation. The re-organisation of the marketing system would imply a fish assembling, grading, transportation, storage, processing and selling operations. The entire process is no doubt formidable and challenging against the background of a large illiterate and conservative mass of fishermen at the primary level. As stated earlier, therefore, the federations would have to provide enlightened leadership up to the primary level. The fishermen have to be involved to make cooperative activity progressively rewarding. At the higher level, modern methods and techniques would have to be employed by the federations to meet the claims of discriminating consumers.

In the face of increasing marketing costs, the federations can do a lot to keep costs under control by increasing the scale of business through processing and promotional efforts. A judicious integration of all the operations in the fishery cooperative sector would alone ensure sustained development on sound basis, bringing larger share of price and profits down the line up to the primary fishermen level.

In the whole process of cooperative management, the characteristic features of cooperative activities must be clearly discernible. Whether the fishing activity should be organised on collective basis or on basis of provision of services only to independent groups, may have to be decided with reference to local conditions and capacities of the fishermen. At any rate, the contact with the modern market would have to be maintained by taking re-course to latest methods in assembling, preservation, processing, distribution etc. and these can be looked after better by the federations of fishery cooperatives.

In certain areas, owing to the lack of facilities for organising a cooperative federation at the apex level, it might be necessary to think of setting up of a fisheries corporation. However, in due course of time this could be converted into a cooperative federation. The advantage of this process is that lot of time may be saved and benefits of modernisation could be brought within the reach of the primary cooperative units at the lower levels, early through such corporations. The primary fishery cooperative has to be considered as a foundation of the entire structure, It is also to function as a multi-purpose agency which would provide credit, supplies, including essentials, elementary guidance, supervision of utilisation of loans, assembling the fish catch, its transportation to the marketing centre etc.

It has also to conduct member education and extension programme in collaboration with the other concerned agencies. It is equally important that the primary unit is given a larger share in the profits earned by the entire fisheries structure in order to strengthen its financial base and improve its capacity to offer multifarious services required by the members.

Regional federations may act as convenient growth centres, paving way for planned development with the assistance and help of their apex federation. As far as possible, these should be located at important market points. Many of their functions would be similar to those of primary fishery cooperatives, yet their scope will be much larger and over a wider area in order to secure economies in operation. It is possible that, with progressive modernisation, in due course, the regional federations might themselves become primary units or eventual branches of the State Federation in order to function efficiently and effectively in the contemporary competitive business conditions. The necessary flexibility and cooperative elements would have to be preserved for the purpose with an eye on the future. The apex federation is expected to function as the mouth-piece of the entire structure in regard to formulation of policies pertaining to organisation and development of fishery sector on cooperative line. It will have to secure coordination with the official and other non-official agencies concerned with development of fishery industries. Within the structure, the federation has to act as a balancing centre, both for business and development. It has to allocate and reallocate resources at its end, whether of man, money and material to secure this ultimate objective. There is vast potential available for fishing and exports of fish products, both in the marine and inland area and the federation should be strong enough to be able to exploit this potential for the benefit of fishermen at the primary level.

Finance

In order to strengthen the cooperative structure of fisheries, it is highly necessary to mobilise financial resources by way of share capital, deposits from members and their cooperatives. In the face of weak economic conditions, the task would appear to be rather difficult. But in the interest of self-reliance this job would have to be done to increasingly attract revenue receipts to cooperatives which can be re-invested for expansion of cooperative services and business operations. Appropriate incentives and compensations could be provided to members in order to encourage them to retain their savings with their own cooperatives. All the same there will still be need for the central and state governments to provide financial aid and partnership in share capital, and subsidies in the initial stages. Insurance assistance also would be necessary as risk involved in fishery activity is substantial. The size of external assistance would be largely determined by the scale of resources that could be mobilised by the cooperative structure from within. Hence, the need for mobilisation of internal resources. This would also develop the stake of fishermen in their activities in order to keep them alert loyal to their own cooperative organisation.

All this means that management of fishery cooperatives has to be strengthened at all levels and in all essential directions. The personnel must be trained and properly compensated. The members and the board of directors may have to be well-educated in methods and management of cooperative operations. There is particular need to separate direction from management, as the size of the organisation grows in response to the needs of technology and large resources. A better appreciation of the

situation by both the elected and the executive management of cooperatives would facilitate the process of professionalised management in the fishery sector.

Wherever local or non-official leadership may be lacking for reasons of social, cultural factors, the important role of the government department in providing fair leadership cannot be minimised. Continued guidance and assistance in matters of finances and procedures would be required to both the managers and the members of the board. The cooperatives also must be assisted by providing guidance in formulating workable projects through carefully conducted surveys by the agencies of the Government or professional institutions. The finance has not been a problem. Various developmental financing agencies are coming forward to provide funds even for such purposes as research, consultancy etc.

The need and potential for developing fishery industry on cooperative lines is recognised. The job is no doubt difficult; yet in order to avoid the unfavourable back wash effects of large private combines, it would be desirable that the fishermen are organised on cooperative basis to retain their independence while the modern tools and techniques are brought within their reach, to ensure higher returns for themselves as also for the society at large.

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SEMINAR ON FISHERIES EXTENSION

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FISHERIES EXTENSION PROGRAMMES OF  
FACULTY OF FISHERIES OF ANDHRA PRADESH AGRICULTURAL  
UNIVERSITY

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INTRODUCTION

The Faculty of Fisheries, Andhra Pradesh Agricultural University came into effect during the year 1976. The Government of Andhra Pradesh transferred four research schemes to the control of the University with effect from January 1977. These are:

- 1) Brackishwater Fish Farming, Kakinada, 2) Air-Breathing Fish Culture, Palair, 3) Freshwater Prawn Culture, Kovvali and 4) Freshwater Biological Station, Nagarjunasagar, now functioning at Rajendranagar, Hyderabad. The first two are coordinated Projects of I.C.A.R.

The extension activities undertaken by the faculty in the 3 years of its existence, centre around these four research wings. The teaching course also lays emphasis on freshwater aquaculture.

Due to policy decisions, all the teaching, research and training activities have been devoted to fresh and brackish waters only. Marine activities will be taken up shortly.

### ACADEMIC PROGRAMMES OF THE FACULTY

The programme of work for the Faculty of Fisheries has been envisaged with a view towards creating infrastructure for development of inland fish culture and to attract fish farmers to take up fish culture on commercial lines. Therefore, no teaching programmes for graduate and post-graduate courses were undertaken, so far. For the first time an elective course has been offered to the final B.Sc. students in Veterinary science. The elective course is for a duration of one semester and the syllabus covers only inland aquaculture with particular reference to major carps and pond management. This is now being undertaken at the Rajendranagar centre of the faculty.

There is a proposal to undertake such elective course for veterinary students located at Veterinary College of A.P. Agricultural University at Tirupathi and Bapatla for the next academic year.

### RESEARCH PROGRAMMES

The Research programmes are of a wider scope with broader base. Two of them are covered under the I.C.A.R. Coordinated Research Projects entitled;

1. Coordinating Project on Air-Breathing fish culture - located at Palair in the District of Khammam, A.P. (Initiated in 1976).
2. All India Coordinated Project on Brackishwater Fish Farming - located at Kakinada, East Godavari district, A.P. (Initiated in 1975)

The other two projects directly under the Faculty are:

3. Freshwater Prawn culture - located at Kovvali, West Godavari district, A.P.
4. Freshwater Biology - currently located at Rajendranagar.

The Air-Breathing Fish culture unit located at the Palair fish farm in Andhra Pradesh, in 0.957 acre waterspread concentrated on (i) location of the natural seed collection centres of the important Air-Breathing fishes of the area viz., Murrels (Channa marulius, C. striatus and C. punctatus) in and around the Palair reservoir in a radius of 100 kms; (ii) the rearing of spawn to fry and fingerling stage in cisterns and plastic pools; (iii) study of proper feed technology based mostly on forage fishes and tadpoles; (iv) induced breeding by hypophysation; and (v) high density culture. All the first four targets were achieved excepting for the high density culture which is being attempted now. The farm itself is located in a 'command area' of Nagarjunasagar and also adjacent to a tribal area.

The brackishwater farming project had, as its objectives, (i) seed prospecting for brackishwater prawns and fishes, (ii) nursery rearing of the seed, (iii) culture of brackishwater prawns and fish with different stocking densities feed manipulation and mono and mixed culture and, (iv) study on brackishwater pond ecology.

The technology for seed prospecting, especially suitable gear, areas of collection and times of collection have been established for Kakinada coastal area. Nursery rearing techniques were developed with proper densities and feeds raising the survival to about 85%. In culture trials monoculture of Penaeus monodon yielded 215.5 kg/ha/280 days to 430 kg/ha/270 days under a technique of single stocking and single harvesting at stocking sizes of 0.8 g to 1.5 g and stocking densities of 20,000 - 30,000/ha. Survival was 22.6% to 52.0% and average production was 314 kg/ha/257 days.



The next important culturable fish of this area Chanos chanos also was used in culture experiments using monoculture technique; 3-4 g fingerlings were stocked in identical ponds with feed (of rice bran, fish meal and groundnut oil cake) and without supplementary feed. The former grew to 140-190 g in 6 months.

Monoculture of Mugil cephalus yielded a net production of 1,067 kg/ha/annum at stocking density of 3,000 fingerlings/ha.

Mixed culture of prawns resulted in a yield of 280 kg/ha/6 months (Penaeus monodon, Penaeus indicus, M. monoceros and M. dobsoni).

Poly-culture of fish (Mugil cephalus, Chanos chanos) and prawns (Penaeus monodon and Penaeus indicus) resulted in 990 kg/ha/246 days with different stocking/harvesting trials.

Pond ecology, physico-chemical characteristics of soil and water, plankton and benthos were analysed. Different feeds were used for experiments in cement cisterns. Estuarine blood clam, Anadara granosa gave high growth ratio and survival.

This centre, as part of the studies of the Faculty of Fisheries proposes to develop a brackishwater hatchery and large (commercial type) pond management.

In the Freshwater prawn culture Unit, Kovvali, monoculture of Macrobrachium rosenbergii and M. malcolmsonii and mixed culture of M. malcolmsonii with major carps (Catla catla, Labeo rohita and Cirrhina mrigala) were carried out. The research at this centre was centered around different stocking densities and different supplementary feeds to increase the total yield per water area. The centre has established the feasibility of culture of freshwater prawns. Techniques for identification of natural collection grounds, collection and transportation with high percentage survival, and maintaining

reservoir seed stock in the absence of hatchery-based seed, have been developed.

For the culture of M. rosenbergii, seed supply was made from the Central Inland Fisheries Research Institute Prawn Breeding centre at Kakinada, the natural supply source being yet undiscovered. Attempts are being made to identify this source since the culture has proved to be highly feasible, if only continuous seed availability is possible.

The meat of Pila globosa, the field snail, has been proved to be highly suitable supplemental feed for growth in these experiments on prawns. Survival of 57 - 87% was also noted. Experiments using controls in field conditions are being continued along with other experiments on culture and pond management techniques.

The Freshwater Biology centre is making limnological studies and ecological studies in freshwater ponds in and around Rajendranagar. This year the centre is also taking up intensive studies on gonad maturity in major carps in pond-grown forms and also intensive collection of pituitary glands to develop a pituitary bank. This centre will further undertake studies on Collair Lake (West Godavari district) water resource utilization by way of aquaculture techniques. Research work will aim at the development of quality breeders, seed stock (by way of hatchery), hybridisation and pond management in large-sized ponds (the latter in collaboration with the State Government of Andhra Pradesh).

### TRAINING PROGRAMMES

Currently the training programmes undertaken by the University have centred around the Lab-to-Land Programmes of I.C.A.R. during 1980. This also covers the research extension to field.

In the field of Brackishwater aquaculture, the centre has extended training to:

- i) officials of the Department of Fisheries, Govt. of Andhra Pradesh - training them in the techniques of survey of brackishwater areas;
- ii) rural youth - short term training in brackishwater farming and management of seed bank;
- iii) helping the State Department of Fisheries (by way of leading discussion in group meetings of officials) to fix points for criteria for categorising brackish-water areas;
- iv) under the Lab-to-Land Programme of the I.C.A.R. the centre has conducted culture in salt water resources (receiving underground water); an yield of 1340 kg of Chanos and 216 kg of Penaeus monodon in 5 and 4½ months respectively, was shown.

Under the freshwater prawn culture scheme and the Air-Breathing Fish culture, the techniques of collection of seed and locations of the centres have been shown to the farmers of the adjacent villages.

Leaflets in local language(Telugu) was brought out on brackishwater prawn farming, freshwater prawn culture, Air Breathing fish culture, freshwater nursery and stock pond construction and artificial breeding of major carps.

Both trainees training as well as farmers training have been undertaken.

### FISHERIES EXTENSION PROGRAMMES

The extension programmes of the faculty have been very limited within the 4 years of its formation. The faculty proposes to take up immediately extension activities relating to training programmes at all levels, since trained teachers are now enrolled. The training will be given in both fresh and brackishwater aquaculture systems.

### TRAINING OF SUBJECT MATTER SPECIALISTS (SMS)

The faculty has got 4 laboratories and four well developed farms in the four areas of specialization mentioned above. The four centres are currently located at Palair, Kovvali, Rajendranagar and Kakinada. However, a centralised Freshwater farming system is under way at Pulla, West Godavari District where farm construction with technologies developed at the National Research Institutes (ICAR) will be effected. This farm will cater to (i) utilization of the Collair lake water resource (ii) dissemination of technologies on farm construction, maintenance, production oriented culture systems, seed production and nursery maintenance and, pond and fish health, and (iii) other disciplines such as soil and water analysis, biochemistry and genetics.

One farm located at Palair is in a "command area" of Nagarjunasagar canal and closely linked to the "balanced reservoir" of Palair. Further it also serves a tribal area. Therefore, a specialised field of study on culture system is being developed here. This combines a 'small' reservoir plus a 'balanced reservoir' and a 'command area' ecology wherein the culture system will emphasize breeder stock maintenance and utilization of natural seed.

The third system is the brackishwater culture system at Kakinda wherein a 45-acre area is available in a suitable location. Specialised studies on "large" ponds of 1 ha and more using known technologies of construction, culture and harvesting will be demonstrated.

Therefore, the faculty has a system for training specific subject matter specialists for extension and facilities for the same. The faculty has a Professor with extensive training in brackishwater aquaculture systems and freshwater prawn culture; an Associate Professor with training in all freshwater aquaculture systems; and 7 - 8 Assistant Professors trained in various fields of fisheries.

#### LINKAGES AND COORDINATION

Transfer of research Projects was originally effected from the State Department of Fisheries. However the linkages or liaison is limited to the field of Brackishwater fish farming. Training to fishery officials of Government of A.P. was given to enable them to conduct survey of brackishwater areas. The faculty has close liason with State by way of participation in group discussions, giving lectures to trainees, responding to field problems encountered by state officials. A couple of examples are:

- i) productive utilization of large (1 ha) to very large (16 ha) ponds dug in the Collair's basin for freshwater culture.
- ii) Development of a system of evaluating the brackishwater areas along the coast line of Andhra Pradesh on a set of criteria. This model will be used when brackishwater land allotment would be made to different categories of people (entrepreneurs) by the State.

The main linkage outside the State Fisheries Department is with Indian Council of Agricultural Research through its Central Inland Fisheries Research Institute, Barrackpore, by way of two All India Coordinated Projects, as mentioned above. In this connection, Lab-to-Land Programmes is also being conducted.

Linkages with the State's development programmes such as the Small Farmers Development Agency etc. are being developed. A close linkage is expected to be developed with other ICAR Institutes in Fisheries by way of operative training centres.

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SEMINAR ON FISHERIES EXTENSION  
COCHIN, 8-10 DECEMBER 1980  
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ACHIEVEMENT AND EXTENSION OF FISHERIES RESEARCH  
AT G.B.PANT UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

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The Pantnagar University is running a number of research projects under the fisheries research programmes. At present the research centre is in the department of Biological Sciences of the College of Basic Sciences and Humanities of this University. Some of the results of the research projects are as under.

Results

1. Under composite fish culture experiments a record production of 5,000 kg/ha has been achieved. Better techniques have been evolved to increase the fish seed production at this centre. The Indian major carps have been made to breed twice (by induced breeding) at interval of about 2 months in one breeding season. This study revealed a two fold increase in the seed production by an individual female in one season. Studies on biology and growth of common carps and their breeding behaviour have been conducted and a significant achievement in this area of study has been made.

2. Two lakh fish seed of common carps and Indian major carps has been stocked in Sattal tanks of Bhimtal Block of Distt. Nainital under the Pilot Project to study the rate of growth of Indian major carps reared alongwith the cold water fishes. A significant higher growth rate of Indian major carps (Table-1) has been found at Sattal during the year 1979-80.

Table-1: Average rate of growth during the year 1979-80 (July, 1979 to March, 1980).

S.No.	Name of species	Initial weight (gms)	Final weight (gms)	Growth achieved (gms)
1.	Mahaseer	50	200	150
2.	Common carp	50	250	200
3.	Catla	100	350	250
4.	Rohu	100	300	200
5.	Mrigal	100	350	250

This study indicates that warm water fishes get acclimatised to cold water conditions which favour their growth rate.

3. Feeding experiments on Indian major carps at the University ponds have revealed that supplementation of the natural food with rice polish and oil cake increases fish production 2-3 folds. Different live-stocks and agricultural by-products are under trials to screen and formulate a better artificial feed with a view to increasing fish productivity in Tarai.

#### Extension

The modern techniques of fish culture have been demonstrated to the fish farmers of Tarai in their ponds, and fish production of 3,000-4,000 kg/ha per year has been achieved.

The fish seed produced at this centre has been supplied to fish farmers, U.P. State Fisheries Department and other Govt. agencies and showed better growth and survival at different places.

#### Training programme

IAS, PCS and Bank Officers are given training on fish culture and are also shown activities/demonstrations of fisheries research at pond sites, apart from imparting lectures.



### Fisheries extension programme - evaluation

A few progressive farmers of Tarai areas have been given know-how for pond construction, pond preparation/manuring and method of stocking with desired fish seed. Their ponds have been properly stocked with the required fish seed, and the technical know-how is provided by the staff of this University.

Demonstration of induced fish breeding has been conducted in one of the farmer's tanks with great success. Due to induced breeding trial the farmer became self sufficient in seed production of the major carps during the year 1979-80.

### Training of Subject Matter Specialists

Fisheries training programme for subject matter specialists who are in service of the U.P. Fisheries/Fish seed corporation has been finalized and approved by the Govt. of U.P. The training centre will be located at G.B.Pant University of Ag. & Tech. Pantnagar and will have the following areas of specializations:

- a) Aquaculture Technology
- b) Fish breeding technology
- c) Gear Technology
- d) Nature of soil and water conditions
- e) Economics
- f) Extension and Communication techniques

### Linkages and coordination with State Fisheries Department

The specialists from State Fisheries Department will deliver invited talks/lectures to the trainees. Periodical meetings with the fisheries experts of the ICAR/Agricultural Universities/State Govt. will be held to disseminate the ideas and problems on fish culture etc.

### Linkage with other organisations

The evaluation of the research/training and extension programmes will be done by CIFRI, Barrackpore and CIFE, Bombay, and State Fisheries Department for better results and achievements.

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UTILISATION OF INFORMATION SOURCES IN THE ADOPTION  
OF RECOMMENDED SPECIES OF FISH IN COMPOSITE FISH CULTURE

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INTRODUCTION

The technology of Composite Fish Culture has been a major breakthrough in inland fish production. The average production of fish through traditional culture remains as low as 600 kg per hectare per year, but in recent years the production of fish in farmers' ponds could be increased at least 6 to 7 times through the adoption of the technology of composite fish culture.

Like high yielding varieties of crops, one of the basic components of this new technology is recommended species of fish which give high yield under suitable management conditions. Six species of fish - three Indigenous

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(Catla, Rohu and Mrigal) and three exotic (Silver carp, Grass carp and Common carp) species have been recommended by the Central Inland Fisheries Research Institute of the Indian Council of Agricultural Research for composite fish culture. It is presumed that other things remaining constant, the yield of fish in composite fish culture shall depend on the level of adoption of recommended species of fish by the fish farmers.

Information sources play an important role in the adoption of a new technology as Simon (1957) pointed out that action of an individual is a function of his exposure to the sources of information. In the present study, it was intended to investigate the utilization of some information sources in the adoption of recommended species of fish in composite fish culture.

#### METHODOLOGY

Area of study and selection of respondents: The study was conducted in Haringhata Block of Nadia district, West Bengal, in 1978-79 where considerable initiative has been taken by the Directorate of Extension of the Bidhan Chandra Krishi Viswa Vidyalaya for the past few years to introduce and popularise the technology of composite fish culture.

There are 88 villages in 9 Gram Panchayats of Haringhata Block. Two villages were selected at random from each Gram Panchayat. The total number of villages selected were 18.

From the 18 selected villages 200 fish farmers doing composite fish culture were selected at random, which formed the sample of the study.

Dependent variable: In the present study, adoption of recommended species of fish in composite fish culture was the dependent variable.

Rogers and Shoemaker (1971) defined adoption as "a decision to make full use of a new idea as the best course of action available". The level of adoption of recommended species of fish in composite fish culture was measured by the Adoption Quotient Formula developed by Chattopadhyay (1963). According to him "the adoption quotient is a ratio scale designed to quantify the adoption behaviour of an individual". He considered potentiality, extent, time and consistency to measure the adoption quotient. Differential weights were assigned to the various practices according to their difficulty of adoption.

The formula for adoption quotient was developed by Chattopadhyay (1963) to quantify the adoption behaviour of crop growing farmers. No modification of the formula was needed except that extent ( $e_j$ ) and potentiality ( $p_j$ ) were measured as amount of land in case of crop growing farmers,

whereas in the present study they were measured in terms of area under one or more ponds of individual fish farmers. The formula is:

$$\text{Adoption Quotient (A.Q.)} = \frac{\sum_{j=1}^N (Y_j W_j)}{\sum_{j=1}^N W_j} \times 100$$

where,

$$Y_j = \frac{1}{\sum_{p=1}^{t_p-t_1} (e_j/p_j)}$$

where, N = Number of practices for which the individual has the potentiality to adopt. In the present study six practices i.e., six species of fish - (i) Catla, (ii) Rohu, (iii) Mrigal, (iv) Silver carp, (v) Grass carp and (vi) Common carp, recommended in composite fish culture were taken into consideration.

$\sum_{j=1}^N$  = Summation over each of the N practices, of which any one is the jth practice.

$W_j$  = Weight to be given to a jth practice based on its difficulty of adoption. In the present study, practices (i), (ii) and (iii) related to the adoption of indigenous species of fish - Catla, Rohu and Mrigal.

As these were age old practices and were not difficult for the fish farmers to adopt, they were given weights of one each.

Practices (iv), (v) and (vi) related to the adoption of exotic species of fish - Silver carp, Grass carp and Common carp. As these were new items of technology and rather difficult to adopt, they were given weights of 2 each after consultation with the fishery scientists and extension specialists.

The summation of weights of all the six practices was 9 (1+1+1+2+2+2).

- $t_p$  = Time of investigation (year) i.e., 1978-79.
- $t_1$  = Time of first introduction (year) of the jth practice in a community. In the present study it means past year upto which the investigation is to be made i.e. 1976-77.
- $\sum_{1}^{t_p - t_1}$  = Summation over each year from  $t_1$  to  $t_p$ . In the present case it was 3 years.
- $e_j$  = Extent of adoption of any particular (jth) practice in a particular year. Extent of adoption has been defined as "the degree to which the farmer has actually adopted a practice". In the present study it means the area of pond in which composite fish culture is practiced.

$p_j$  - Potentiality of any particular (jth) practice from which  $e_j$  is calculated in that particular year. Potentiality is conceived "as the maximum degree to which the farmer can extend his adoption, if he so wills, depending on maximum utilization of the resources he commands or can command". In the present case, it means the area of pond where the technology of composite fish culture with six species of fish could be adopted.

Selection of Independent Variables: The information sources relevant for the area and selected for the present study were Radio, Newspapers, Educational films, Publications on composite fish culture, Demonstrations on composite fish culture and Krishimela/exhibition. The reason for selecting them was that they were manipulative variables and the extension worker could exercise some degree of control over the content and exposure of these media to bring about the desired change in the adoption behaviour of fish farmers.

To measure the degree of utilization of the information sources, each respondent was asked to indicate on a 4-point continuum as to how often he got information about composite fish culture from each of the sources. The scoring procedure for the responses was, most often - 3, often - 2, sometimes - 1 and never - 0. The score for an individual respondent was calculated separately for each source of information.

FINDINGS AND DISCUSSION

To find out the relationship between the dependent variables and the selected independent variables, coefficient of correlations were calculated (Table 1).

TABLE 1. Coefficient of correlation between adoption of recommended species of fish in composite fish culture and selected independent variables.

Independent variables	'r' value
X <sub>1</sub> Radio	0.81 **
X <sub>2</sub> Demonstrations	0.67 **
X <sub>3</sub> Publications	0.68**
X <sub>4</sub> Newspapers	0.54 **
X <sub>5</sub> Krishimela/exhibition	0.38 **
X <sub>6</sub> Educational films	0.42 **

\*\* Significant at 1 percent level

It will be evident from Table 1 that utilization of all the six sources of information - Radio, Demonstrations, Publications, Newspapers, Krishimela/exhibition and Educational films were positively and significantly correlated at 1 percent level with the adoption of recommended species of fish in composite fish culture.

The six independent variables were then fitted in a multiple regression equation to determine their predictive ability. The prediction equation is as follows:

$$Y = 35.756 + 6.444 x_1 + 4.172 x_2 + 3.860 x_3 + 3.042 x_4 + 9.252 x_5 + 3.680 x_6$$



where

Y = the estimated value of adoption quotient, and  
 $X_1, X_2, X_3, X_4, X_5$  and  $X_6$  are the scores of the fish farmers on the utilization of Radio, Demonstrations, Publications, Newspapers, Krishimela/exhibition and Educational films.

TABLE 2. Multiple regression analysis with six independent variables.

Independent variables	'bi' value	't' value	Standard regression	Rank
$X_1$ Radio	6.444	17.268**	0.3224	I
$X_2$ Demonstrations	4.172	12.175**	0.2439	II
$X_3$ Publications	3.860	9.837**	0.1791	III
$X_4$ Newspapers	3.042	8.214**	0.1745	IV
$X_5$ Krishimela/ exhibition	9.252	14.082**	0.1549	V
$X_6$ Educational films	3.680	8.692**	0.1262	VI

$R^2 = 0.759$

$F = 101.29^{**}$

\*\* = Significant at 1 percent level

It will be observed from Table 2 that all the six independent variables fitted in the regression model contributed to the prediction of adoption behaviour of the fish farmers.

On

The standard regression and the ranks indicated the degree of importance of the variables in the prediction of adoption behaviour. Accordingly, in the adoption of recommended species of fish in composite fish culture, Radio was the most important source of information followed by Demonstrations,

Publications, Newspapers, Krishimela/exhibition and Educational films in that order.

The coefficient of multiple determination ( $R^2$ ) with all the six variables explained 76 percent of the variation in the adoption behaviour of fish farmers.

#### ACTION IMPLICATIONS

1. To enhance the level of adoption of recommended species of fish and to spread the technology of composite fish culture, it is essential to use information sources like Radio, Demonstrations, Publications, Newspapers, Krishimela/exhibition and Educational films. The barrier to the mass involvement in the work of increased fish production through composite fish culture can be broken down through scientific use of these information sources.
2. For the technology of composite fish culture, Radio has been found to be the most important source of information. To obtain quick results, the frequency of radio broadcast and the time allotted for each broadcast on the technology of composite fish culture has to be increased.

The fish farmers are to be motivated to listen to the radio and radio forums are to be utilized for this purpose. This shall also create a general awareness amongst the people and motivate them to adopt the new technology.

3. Demonstrations on composite fish culture has been found to be the second most important source of information

for this new technology. The importance of demonstrations in the spread of new technology in crop production is well established in India.

To bring about a rapid change in the utilization of inland water resources like ponds, tanks and large water bodies in the production of fish, a massive programme on demonstration of composite fish culture has to be organised and implemented. Necessary infrastructure in the form of trained personnel and critical inputs are to be ensured for conduct of the demonstrations.

4. Publications have got immense value in the spread of a new technology as precise and documented information which can be used over and over again are available through publications.

The need for well written publications on composite fish culture in local language cannot be over emphasized. In addition to fish farmers, such publications are also of immense value to the Fishery Extension Officers and mass media like Radio and Newspapers and for training.

5. In respect of composite fish culture, newspapers generally furnish information to the fish farmers through advertisements, issued by the State Department of Fisheries. Articles by the fishery scientists, success stories of fish farmers, research review, service news are seldom published.

Fishery scientists and State Departments of Fishery are yet to fully utilize this strong medium of communication and public opinion for the spread of this new technology.

6. Krishimela/exhibitions are generally held once or twice in a year. In spite of their low frequency, they have become potent instruments of change in the rural society.

Not only the number of such Krishimela/exhibitions are to be increased, but they should also be held in remote areas so that more number of fish farmers can be involved in the programme. Such Krishimela/exhibitions are to be carefully planned and executed and should be accompanied with discussion session between fishery scientists and fish farmers.

7. Films are costly proposition and cannot be made too often. However, well prepared films can be dubbed in regional languages and shown to the fish farmers to create a general awareness and to motivate them to adopt this new technology.

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