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REPORT OF FISHCULTURAL INVESTIGATIONS
IN INDIA

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by Improved Fishcultures

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REPORT OF FISHCULTURAL INVESTIGATIONS¹
IN INDIA

USAID-Auburn University Project (AID/c:d-1581) Increasing
Fish Production by Improved Fishcultures - Phase I

H. S. Swingle, Project Director, Auburn University
D. D. Moss, Asst. Project Director, Auburn University

February 16, 1968

Introduction

The total area of India is 1,261,597 square miles
(804,422,080 acres). The population in 1965 was 484 million.
The projected population estimates to 1985 are:²

<u>Year</u>	<u>Millions people</u>
1965	484
1970	542 to 552
1975	602 to 636
1980	677 to 739
1985	769 to 864

The average rate of increase is 2.7 percent annually. Food supply in India is currently deficient both in calories and in protein. Energy needs are approximately 2350 K calories per capita per day while average availability is approximately 2100. Total calorie needs are predicted to double by 1985. Adequate calories in the diet are necessary to prevent diversion of protein for production of energy. Present agricultural programs are expected to make India self-sufficient in grains within 3 to 5 years.

¹This report is based on a preliminary survey made December 1 to December 16, 1967.

²The World Food Problem, Vol. 2, Report of the Panel on World Food Supply, 1967.

Total protein in the average Indian diet was estimated by The United States Department of Agriculture for the period 1959-61 at 55.2 grams, with 7.2 grams from animal sources. The total protein was thus adequate if it could be equitably distributed. However, protein from animal sources was less than half that considered adequate. The present need of dietary protein with a Net Protein Utilization (NPU) value of 60 is 4,956 metric tons per day. This will need to be increased to between 11,000 and 12,000 metric tons per day by 1985.

The 1965 catch of fish by India is given by FAO as 1,331,300 metric tons, of which 507,100 metric tons (38 percent) came from freshwaters.¹ The per capita catch was 6 pounds per person per year, supplying 5.8 percent of the required protein from animal sources, or 1.9 percent of total protein requirements. It would thus appear that fish contributes a relatively small amount to the diet of the average Indian. However, fish are very important in many areas along the coast, and near rivers and reservoirs. At Calcutta, the average consumption is approximately 12 pounds per capita per year, thus supplying 11 percent of the required animal protein.

Freshwater areas available for fish production include reservoirs for irrigation, large impoundments, rivers, lakes, rice fields and ponds. Total area of these waters was estimated at 4,054,359 acres of "cultivable" water, of which 1,519,787 acres presently

¹Yearbook of Fishery Statistics 1965, Food and Agriculture Organization of the United Nations.

are being improved by stocking desirable fish species.¹ A total of 960,000 acres was listed as available for management, but presently is not being utilized. The total area in ponds is estimated at 850,000 acres with approximately 7,000 acres of this in brackishwater fish and shrimp cultures. No estimates are available as to the amount of increase possible in these categories.

The level of fishculture in India is rather primitive, consisting principally of stocking desirable species and harvesting them by seining when the fish reach a desirable size. Fertilization and/or feeding is practiced in a few areas, but only on a minor scale.

Thousands of acres of water are present in irrigation tanks and reservoirs located throughout India that contribute in only a minor way to fish production because no procedures have been developed for their management. These could be made to yield good crops of fish annually. Even the tanks that contain water for only a portion of a year can be utilized for fish production if they contain water for as long as 4 to 5 months. No estimates are available as to the acreage in tanks and reservoirs.

Fisheries Research in India

Fisheries research has been largely carried on by the Central Government, although limited studies are carried on in

¹Report of the Fish Seed Committee, 1966. Ministry of Food and Agriculture, Government of India. 209 pp.

some of the States. No university is presently involved in fisheries research, except to a very minor degree, and none gives training in fisheries at the undergraduate or graduate levels.

Central Fisheries Division

The Fisheries Division is under the Ministry of Food and Agriculture, with a Joint Secretary and Joint Commissioner under the Secretary of Agriculture.

The Fisheries Division operated the Central Inland Fisheries Research Institute at Barrackpore and a Marine Research Station at Mandapam Camp, South India. Beginning last October, all research activities formerly in the Fisheries Division were transferred to the India Council for Agricultural Research, leaving in the Fisheries Division only management activities, fishery development planning and the Institute for Fisheries Education.

The Central Inland Fisheries Research Institute is located at Barrackpore, near Calcutta. Under this Institute, research on fishculture is conducted in freshwaters at the Pondculture Research Substation at Cuttack, Orissa State, and for brackishwaters at a small research station at Kakdwip, near Calcutta. Following the transfer of research activities of the Institute to the Council for Agricultural Research, the direction of research was changed, with emphasis placed upon increasing fish production. Good, comprehensive plans for this research were developed by Dr. V. G. Jhingran, Director of the Institute.

Pondculture Research Substation at Cuttack

While very good plans for research on increasing fish production have been developed, the physical facilities at this Research Station are so inadequate that very little can be accomplished toward the rapid development of improved fishcultural methods. The Station has inadequate laboratory space, inadequate research equipment and only 56 ponds that can be utilized to solve the many fishcultural problems of India. Despite these conditions, very good research is being done by the staff of research workers.

The group on fishculture, having only a few ponds available, stocked several ponds with 5,000 fish per hectare using a combination of 7 species of fish. One pond was fertilized with 25,000 kg cow manure, plus 1,000 pounds mixed fertilizer, and the fish were fed 3,000 pounds rice bran and mustard oil cake. These treatments resulted in fish production between 3,000 and 4,000 kg per hectare. This is an indication of what might be done. However, to develop procedures that can be used throughout India will require evaluation of simpler combinations of species of fish. Spawning and supplying 7 species will be quite expensive and probably unnecessary as most of the production may be due to 2 to 3 species. Evaluation of the kinds and amounts of fertilizers and fish feeds also will be required. To develop this information in a short time with adequate replication will require 100 ponds for about a 3- to 5-year period. At present, only 10 to 15 ponds are available for such research.

The group studying pond fertilization has no ponds for research and was evaluating fertilizers in glass jars by measuring plankton production. Since plankton production is only one stage in production of fish-food organisms, and since bottom soils of ponds have a great effect upon fertilizer requirements, earthen ponds must be available for effective research on this problem. Small, plastic-lined pools partially filled with various types of soils would be useful for preliminary research, but there is not even sufficient space on the Station to set up an adequate number of pools.

The group working on hybridization of fish also has so little pond space that it is impossible to evaluate the potential usefulness of the hybrids in comparison with the parent species. Consequently, only changes in morphological characters of hybrids have been studied.

The aquatic weed control group is housed in a separate building, also with inadequate research space and facilities. Every desk surface and every window sill was covered with jars containing aquatic plants for tests with herbicides. Much of this basic research could be conducted in plastic-lined pools to determine the effectiveness of herbicides with various bottom soils and various pond weeds, prior to their usage in large ponds.

The lack of space, ponds and other facilities was especially distressing because of the good caliber of the research workers

who were trying to conduct fishery investigations under these difficult conditions. Much of the research had to be inconclusive because of lack of facilities for carrying out the work on a scale with adequate replications.

In a report¹ to the Government of India in 1961, the need for an adequate pondcultural station with a minimum of 300 experimental ponds and suitable laboratory facilities was emphasized. Following this report, an area for a new station was selected at Choudwar, but was later abandoned because of the high cost of land. Another site at Panna subsequently was selected, but the rocky soils were found unsuitable for ponds in 1967. Consequently, conditions are the same in 1968 as in 1961--a new research station (or stations) is urgently needed to develop methods for increasing fish production.

It is recommended that steps be taken as soon as possible to locate several suitable alternate sites, and that examination of soils and water supplies be carried out promptly to select the one most suitable for development. If this is not done, improved management methods will be developed too slowly for the inland waters to supply their share of the increased amounts of protein necessary in the next several decades.

Consideration should be given, because of the diverse conditions throughout India, to the establishment of several research stations by the Central Government, or to the development of a

¹"Research Evaluation Report on the Central Inland Research Station, Government of India", H. S. Swingle, Fishery Advisor to the Indian Government under the Rockefeller Foundation, March, 1961.

Central Research Station supplemented by research conducted at substations operated by State Fisheries Departments or by Agricultural Universities. The latter plan probably would be most effective as it would help in training students in fisheries and produce greater diversity of background knowledge for planning future advances in fisheries management.

The Kakdwip Brackishwater Station

This Station has approximately 30 acres of land for pond construction and 43 ponds with approximately 2 acres of water already have been built. The Station was not visited, so its adequacy could not be evaluated. However, if the entire area available is developed into ponds, this should be suitable for development of methods for culturing shrimp in ponds. It is possible that a much larger brackishwater-seawater station may be needed, but this could only be determined after an extensive survey.

Fisheries Education

At present, no university in India offers formal training in fisheries. In the past, research workers in fisheries were traditionally graduates in Zoology, who learned fisheries while on the job, or by a short course offered by the Research Institute at Barrackpore after they were hired for fisheries research. A limited number of research workers received graduate training in fisheries abroad.

In recent years, on-the-job fisheries education within the Fisheries Department has been placed under the Central Institute for Fisheries Education, located at Bombay under the direction of Mr. K. H. Alikunhi. At this location, a large, well-equipped building has been constructed by joint funds of FAO and the Indian government. The contribution from the United Nations was \$751,800. India agreed to contribute roughly three times this amount.

In addition to the large building for teaching, which has three floors and is made of concrete and brick, two other buildings provided approximately 60 to 70 rooms for students during their period of training. Each student had a separate room but communal bath. In addition, two houses are being built, one for the director and one for the FAO manager. UN participation stops in 1968.

The teaching building was quite well equipped. It has a nice laboratory for teaching water chemistry and quite a large laboratory for the processing of fish. This includes pilot-plant equipment for processing fish from the time they are received on through the various methods of processing, including canning and freezing. The equipment in this laboratory was estimated to cost approximately \$70,000. There are two walk-in freezers, one kept at 0° F and the other at -40° F.

The course lasts for a period of two years and is equivalent to a Master's degree. Students of the Institute are already

members of State or Central Fisheries Departments and have usually a B.S. degree in Zoology, with no fisheries training.

The fisheries training here is divided into two sections, marine fisheries and freshwater fisheries. All students take both. The Institute has a seaside station and a 50-foot training vessel. After the lectures, the students go out on the vessel and harvest the various types of fish. They are then brought to the laboratory and started through the processes of cleaning, packaging, and marketing. The class working on fish technology takes charge as the fish are brought to shore. After the fish are processed, part of the fish go to the class in microbiology to determine the quality of the fish. The class in fisheries economics has the task of selling the fish. The Institute is also taking over from one of the States a fishery farm for inland fishery training. Classes have the lectures at the main Institute and then are picked up and carried on field trips to various parts of India where fish farms and marine fisheries are centered. Cost for the course for each student is paid half by the Institute and half by the State from which he comes.

Most of the trainees are from various State Fisheries Departments. All students then have training in the management of freshwater ponds, the collection and raising of fry obtained from the rivers, fingerling production and commercial fish production in the inland ponds. In the marine areas, they study

various types of fishing gear, gear repair, fishing, tagging of fish for experimental purposes, and the accumulation of the necessary data for appraising the state of the fisheries.

Thirty new students are taken in each year making a total of 60 at any one time. Teachers for this group of students included 3 professors, 6 assistant professors, 3 lecturers, 1 director, and 5 UN personnel specializing in biology, economics, fish technology, and fishing gear. This totaled 18 instructors for 60 students. The Institute has been in operation for approximately 5 years. The first class graduated in 1963. The course begins in August and ends in August two years later. No data was available on the annual cost of operation of the Institute. Additional information relating to the operation of the Institute is appended to this report. This is certainly an excellent education in fisheries and would be quite desirable for use in many countries.

The Institute also operates a school at Barrackpore. This is a one-year course for officers coming into the State Fishery Departments at the lowest grade. The Institute does not train people at the research grades and most of the personnel brought into the Department are graduates in the field of Zoology. They know little about fisheries, and, very often, do not have the background necessary for research work in this area.

The Institute would be an excellent place at which to train extension personnel. Mr. Alikunhi has had personal experience in

the management of ponds and is determined to give all people going through the program field experience in pond management.

Indian Council for Agricultural Research

Fisheries research here is under the direction of Dr. K. K. Iya, Deputy Director General for Animal Sciences. He plans to select a specialist in fisheries as advisor on fisheries research.

He thought the AID Fishcultural Project could be of great help if annual visits by a team of specialists could be made to his Department for advice and planning of research. He also expressed the opinion that training in fisheries should be offered in various Agricultural Universities.

State Departments of Fisheries

Only 3 State Departments of Fisheries could be visited in the time available. These were in West Bengal, Orissa and Maharashtra. Each of these States has considerable pond areas under their management, and each has a limited amount of research in progress.

West Bengal has over 2,000 acres in ponds devoted principally to production of fingerlings for sale to fishfarmers. The Kalyani Station, under the direction of Mr. N. K. Chowdhury, conducted minor investigations on fingerling production, aquatic weed control by grass carp, food habits of shrimp, toxicity of insecticides to fish and on raising tilapia in cages. Mr. Chowdhury expressed the hope that the Auburn University Fishculture Project

could furnish help in planning research on fish production. His Station trains 20 extension workers per year in pond fishculture.

At Orissa, the Fisheries Department has for a number of years conducted research on pond soils and fertilizers and upon production of fingerlings for stocking. They also pioneered in the renovation of swamps into fish ponds. In recent years, they have been less active in research. At Kausalyagang, in Poory district of Orissa, they operate a station of 260 acres, 140 acres of which are in ponds. There are 76 nursery ponds, 17 one-acre ponds and the rest of the area is divided into larger ponds. This Station was built by renovating an old swamp at a cost of 350,000 rupees (w. a 4 rupees = \$1). Work was begun in 1949 and finished in 1952, at an original cost of \$625 per acre. In less than 15 years, many of the dams dividing the swamp into ponds have sunk below water level and at the present time, all dams need to be rebuilt if the Station is to serve any useful purpose. The cost of reconstruction was estimated at over \$150,000.

The Station is used to raise fingerlings for sale to fish-farmers, and to train extension personnel. About 30 extension personnel have been trained annually, with a 10-month training course. During this period, each trainee learns spawning of carps by pituitary injection, collection of fry from rivers and production of fingerlings. Production at the Station was 2,000,000 fingerlings annually selling for 46,000 rupees. The money is turned into the State treasury, and 25,000 rupees is allocated to

the Station for annual operation and maintenance. This is apparently insufficient for operation and maintenance of the ponds. Mr. B. Das, Superintendent of Fisheries, hoped that assistance could be obtained in renovating the Station.

The Maharashtra State Fisheries Department, directed by Dr. C. V. Kulkarni, is located at Bombay, and operates several fish farms for production of fingerlings. It conducts little research, but does cooperate with universities by providing research facilities with laboratories and supervision for graduate and special students majoring in Zoology and desiring to work on fisheries problems. The Department was interested in setting up an adequate research station, possibly in connection with some university.

University of Agricultural Sciences in Bangalore

Discussion was held with Dr. G. Rangaswami, Dean of Agriculture of the University of Agricultural Sciences at Bangalore. Here they are planning to establish a School of Fisheries within the University, because throughout India, there was no university where research workers could be trained in formal fisheries courses. He pointed out that, in general, the research workers in the Department of Fisheries were trained as classical zoologists, and they had little or no formal training in courses relating to fisheries. He thought that the training would be much better in a School of Agriculture where various related sciences would contribute to the

fisheries education. At the start of their program, the University would have fisheries as electives for those interested in this field, and would gradually expand to full undergraduate training. This would grow into a fairly large department having approximately 5 professors and an equal number of assistants. This Department eventually would offer M.S. and Ph.D. degrees.

Also discussed with Dr. Rangaswami was the possibility of establishing a Research Station in fisheries at the University that would serve multiple purposes of providing facilities for good research and improving teaching by allowing staff and students opportunities to participate in fisheries production and research.

Also the establishment of a Station at the University would make for better training of those involved in fisheries extension. It was suggested that if this were done, a number of larger ponds should be made available so that each extension worker would have to raise at least one crop of fish before he was sent out to tell other people how to do this. At the present time, the University has no one trained in fisheries. However, under the University of Tennessee AID contract, a specialist in fisheries is to be furnished to the University. One student has already been sent from Bangalore to Auburn University for fisheries training. He will later return to the University to do research and teaching. It is planned for all members of the faculty to do both.

At the University proper, there is available approximately 1,300 acres for agriculture and fisheries. However, the suitability of this area for fisheries has not yet been determined. It would appear from the discussions that there will be considerable possibility that the area could not supply enough water for a large Research Station. However, before this can be decided, a map of the area will be sent to Auburn, showing the contours and the total drainage area above the proposed site for the ponds. This will further require an on-the-site visit for testing with a soil auger to determine suitability for pond construction.

In the city of Bangalore the Central Government also has a Station on fishery technology. The University plans to use this in part for training and possibly for research. The Fisheries Division in the State of Mysore has already turned over to the University a small station of unknown size for fisheries training and research. Dr. Rangaswami stated that if the area on campus were not suitable for a fisheries research station, the University would be in a position to buy land elsewhere. The University already has a site along the coast which they are hoping to develop into a marine research and training center. There were, in fact, several places along the coast which he stated could be used. The difficulty in any university being able to support two research stations of this magnitude was pointed out. It was suggested that it would probably be better if the University specialized in either freshwater or marine research unless a large amount of money were made

available by the Central Government for both types of research.

For the Freshwater Station, it was also suggested that it would be highly desirable to have it operated on a cooperative basis with the Indian Council for Agricultural Research so that this organization could place research personnel at the Station who might also take some part in teaching. Such a Station also should be provided with certain amount of funds for research by the Central Government.

Summary of Recommendations for India

1. A new location should be found for development of a large freshwater fishcultural research station, having at least 300 experimental ponds and necessary supplemental research facilities. The present station at Cuttack is completely inadequate.
2. Consideration should be given to establishment of several fishcultural substations in cooperation with Agricultural Universities and/or State Fisheries Departments to broaden the research base and to more fully adapt fishcultures to local conditions.
3. A survey should be made to determine the desirability for establishment of a large brackishwater-seawater fishcultural research station for development of coastal areas suitable for culture of sea foods.

4. While the Institute for Fisheries Education in the Department of Fisheries serves a very useful purpose in providing on-the-job training in fisheries, it does not provide the basic training needed for research workers and teachers in the fisheries profession. It would appear desirable for one or more universities to set up formal fisheries training as part of their curricula.

APPENDIX

C O P Y

GOVERNMENT OF INDIA

CENTRAL INSTITUTE OF FISHERIES EDUCATION, BOMBAY-58.

Established: In July 1961.

Under: The Ministry of Food and Agriculture,
Government of India.

Organization and Development: Jointly by the United Nations Special Fund and the Government of India as per Plan of Operations for a 4-year period (1964-1968).

Executing Agency: Food and Agriculture Organization of the United Nations.

Management by: Standing Committee established by the Government of India.

Offers: A two-years' Post-graduate Diploma in Fishery Science.

Recognized by: Government of India and several of the State Governments as equivalent to the Master's Degree of Indian Universities in the subjects covered by the Diploma.

Admits: Every year 30 candidates who are graduates in Zoology, Botany or Chemistry and who may be (1) Government employees nominated by the State Governments or Central Institutes, (2) directly recruited by State Governments for training and later employment in service; (3) scholarships holders selected by State Governments; (4) private candidates selected on merit; (5) candidates from neighboring countries under different International Aid Programmes.

Instruction Imparted by: Experienced full time teachers - U.N.D.P. experts and Indian counterparts - in the disciplines of Fishery Biology, including Fish Culture, Oceanography and Limnology, Fishery Technology including Fishing, Fishing Craft and Gear Technology and Fish Processing Technology; and Fishery Economics including Fishery Administration, Fishery Statistics; Fish Marketing and cooperation with the following staff pattern:

Division - Fishery Biology

Professor (Fisheries Biology).
U.N.D.P. Expert on Fishery Biology.
Asst. Professor (Inland Fisheries).
Asst. Professor (Oceanography and Limnology).
Demonstrator (Fisheries Biology).

Division - Fisheries Technology

Professor (Fisheries Technology).
U.N.D.P. Expert in Fish Processing Technology.
U.N.D.P. Expert in Fishing Gear Technology.
Asst. Professor (Fishing Craft and Gear Technology).
Asst. Professor (Fish Processing Technology).
Demonstrator (Fish Processing Technology).
Demonstrator (Fishing Craft and Gear Technology).

Division - Fisheries Economics

Professor (Fisheries Economics).
U.N.D.P. Expert in Fisheries Economics.
Asst. Professor (Fisheries Statistics).
Asst. Professor (Fish Marketing and Cooperation).

Division - General Administration

Director - In over all charge of the Institute;
actively participates in instruction
work, particularly in fish culture and
fishery biology field programmes.

U.N.D.P. PROJECT MANAGER/ADVISOR TO DIRECTOR.

In charge of U.N.D.P. experts, equipment and supplies.

Administrative Officer: In charge of day to day
administration of the Institute, assisted by secre-
tarial, ministerial and other staff as specified
in the Plan of Operation.

Accommodation:

Located in a 4.23 acre plot of land gifted by the
Government of Maharashtra, the Institute is housed
in a 3 storey building covering an approximate area
of 30,000 sq. ft. with a 60 room hostel (20 rooms
under construction) for trainees; quarters for re-
sidential staff in the premises (under construction)
and a workshop and gear store (under construction).
Airy lecture rooms, laboratories for Fishery Biology;

Oceanography and Limnology, Microbiology and Biochemistry; Craft and Gear technology; and fishery statistics, a large library, a museum etc. are parts of the Institute building.

Equipment and
Facilities:

All the laboratories are fully equipped on most modern lines with U.N.D.P. assistance and counter-part contributions by the Government of India.

The fish processing laboratory - canning as well as freezing sections - is equipped at pilot plant level.

One 50 ft. ocean going vessel 'Harpodon' supplied by the U.N.D.P. has been commissioned for regular training program on fishing techniques and marine fishery biology and oceanographic studies.

One larger 90 ft. training-cum-research vessel is expected to be provided to the Institute by the Government of India early.

Inland Fisheries work is to be developed at two sub-centres, for fresh water and brackish water fish culture respectively and for these two working fish farms offers by the Government of Andhra Pradesh have been accepted.

Four vehicles including a 42 seater bus have been supplied by the Government of India while 2 more are to be supplied at the sub-centres. The U.N.D.P. is to provide 4 vehicles, including two live fish carrying vehicles to the Institute.

A photographic laboratory has been fully equipped for all types of photographic, copying, printing, developing and enlarging work.

A museum is being developed for instructional purposes.

A fairly good library has already been acquired, with nearly a hundred current journals being received regularly. Adequate funds have been set apart for further equipping the library under the U.N.D.P. assistance.

Field Programmes: Field programmes where the trainees are given full opportunities to work in the field/factory/vessel/market/landing centre constitute one of the most important features of the training offered. Such programmes in fish culture practices, breeding of fish by injection of pituitary hormones, weed control; fish population estimates by marking recovery studies; tagging of fish to study their growth; migration and population dynamics; fishing in the sea; socio-economic and fish marketing surveys; apprenticeship training in fish processing factories; etc. are regularly arranged every year with the active cooperation of sister fishery Institutes and State Directorates of Fisheries.

Achievements: With the active assistance of the U.N.D.P. experts it has been possible within a relatively short period of 3 years to organize probably the most modern fisheries training-cum-research Institute in the country. The Central Institute of Fisheries Education is the meeting ground for all aspects of fisheries work and the sophisticated and modern equipments meant for imparting training can and are being used for fisheries research work also. It is now the highest fisheries educational centre in the country and is attracting candidates from neighboring countries in an increasing manner.

Five batches of trainees numbering 116 have so far completed training and left the Institute. Two batches numbering 47 trainees are now undergoing training. The details of these trainees are as per appendix I.

For the first time in the history of Indian Fisheries the Institute last year (December 1966) pioneered the first organized programme on tagging of marine fish - mackerels and sardines, from off Goa, using the training vessel 'Harpodon'.

At the Symposium on Indian Ocean organized by the National Institute of Sciences and National Institute of Oceanography the Institute suggested that the mackerel and sardine tagging be taken up as a national programme from different centres, by all concerned agencies.

The Government of India has now accepted such a national programme of tagging mackerels and sardines on priority and the C.I.F.E. is taking its due share in this programme by continuing operations from Goa. The tagging techniques and procedures demonstrated by the Institute have been accepted as the common methodology of all centres in this national programme. This is the first instance of the C.I.F.E. spear heading a national programme of fisheries development.

During the fish culture field programme several species of carp hybrids have been produced and are being tested in the fish farm with a view to producing fish with better cultural qualities than natural species.

A programme of intensive cultivation of fish in selected waters in different States, utilizing the services of candidates trained at the Institute has been approved by the Standing Committee to be initiated early. This is calculated to keep the Institute in touch with the trainees after they go back to their respective States and thereby guide them in their work and also popularize intensive fish culture for enhanced fish production.

Sudhir:18/10.

Encl.(1).

C O P Y