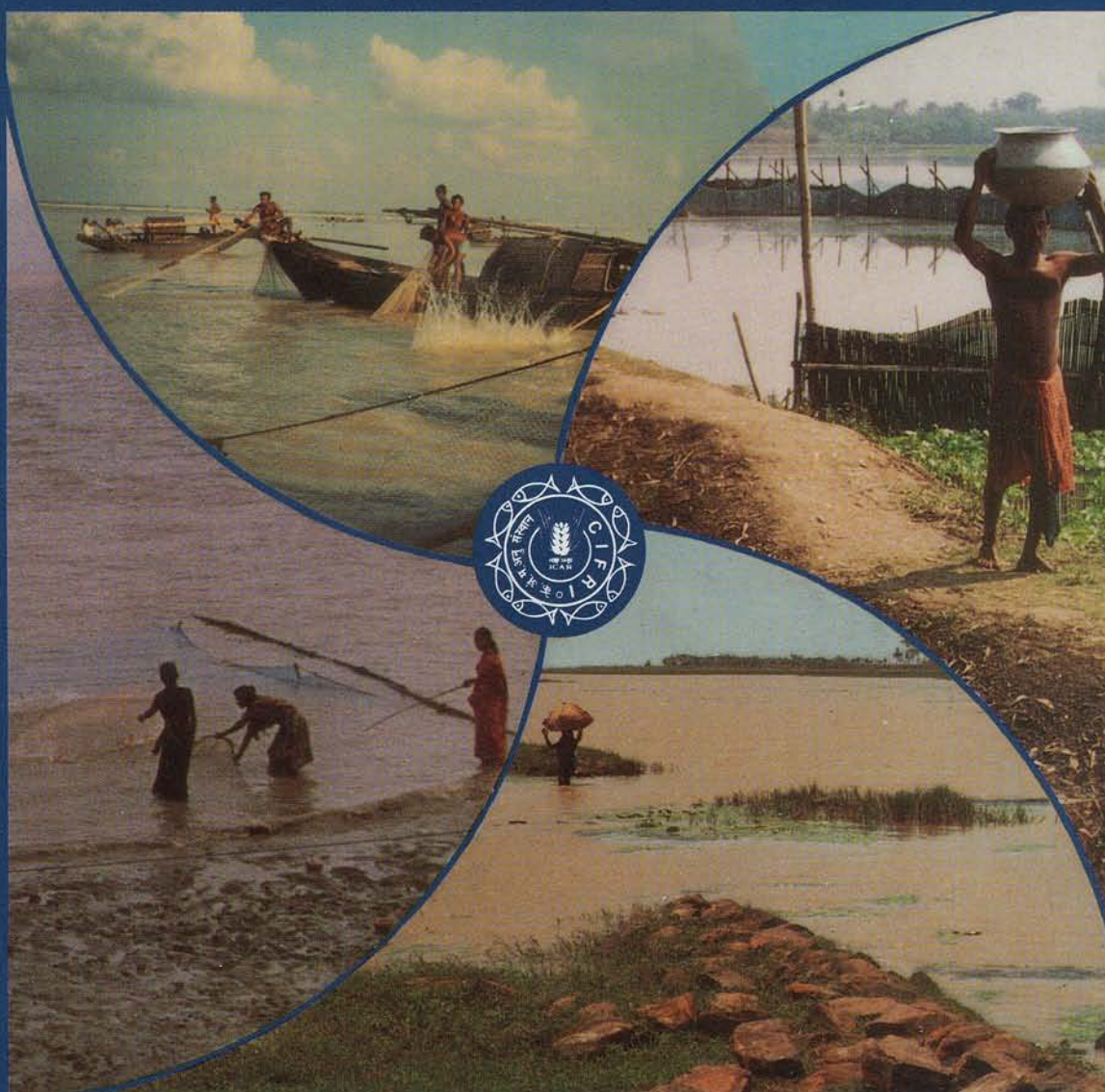


ANNUAL REPORT

1998-99



CENTRAL INLAND CAPTURE FISHERIES RESEARCH INSTITUTE BARRACKPORE

वार्षिक प्रतिवेदन ANNUAL REPORT 1998-99



केन्द्रीय अंतर्स्थलीय प्रग्रहण मात्स्यकी अनुसंधान संस्थान

(भारतीय कृषि अनुसंधान परिषद्)

वैरकपुर -743101 : पश्चिम बंगाल

CENTRAL INLAND CAPTURE FISHERIES RESEARCH INSTITUTE
(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)
Barrackpore-743101 West Bengal INDIA

Edited & compiled by	:	Maniranjana Sinha Manas Kr. Das
Assistance	:	H. Chaklader A.K. Banerjee
Composing	:	H. Chaklader
Hindi Section		
Translation	:	P.R. Rao
Composing	:	James Murmu Md. Quasim
Cover design	:	P. Dasgupta
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CONTENTS

Page No.

1	PREFACE	1
2	EXECUTIVE SUMMARY/SALIENT ACHIEVEMENTS	2
3	INTRODUCTION	5
4	RESEARCH ACHIEVEMENTS	13
	Project No. RI/A/1	13
	Project No. RI/B/1	15
	Project No. ES/B/1	22
	Project No. ES/B/2	25
	Project No. RS/A/1	26
	Project No. FW/A/1	31
	Project No. FW/A/2	35
	Project No. EM/B/1	37
	Project No. EM/B/2	40
	Project No. HL/A/1	42
	Project No. RA/A/1	45
5	TECHNOLOGY ASSESSED AND TRANSFERRED	46
6	EDUCATION AND TRAINING	49
7	AWARDS AND RECOGNITIONS	50
8	LINKAGES AND COLLABORATION IN INDIA AND ABROAD INCLUDING EXTERNALLY FUNDED PROJECTS	50
9	AICRP/COORDINATION UNIT/NATIONAL CENTRES	51
10	LIST OF PUBLICATIONS	52
11	LIST OF APPROVED ON-GOING PROJECTS (TITLE ONLY)	66

12	CONSULTANCY, PATENTS, COMMERCIALISATION OF TECHNOLOGY	67
13	RAC, MANAGEMENT COMMITTEE, SRC, QRT ETC. MEETINGS	67
14	PARTICIPATION OF SCIENTISTS IN CONFERENCES, MEETINGS, WORKSHOPS, SYMPOSIA ETC. IN INDIA AND	69
15	WORKSHOPS, SEMINARS, SUMMER INSTITUTES, FARMERS' DAY ETC.	73
16	DISTINGUISHED VISITORS	73
17	PERSONNEL (MANAGERIAL POSITION ONLY)	74
18	ANY OTHER RELEVANT INFORMATION SUCH AS SPECIAL INFRASTRUCTURAL DEVELOPMENT	75
19	SUMMARY IN HINDI	77

(ii)

CENTRAL INLAND CAPTURE FISHERIES RESEARCH INSTITUTE
(Indian Council of Agricultural Research)
BARRACKPORE-743101, WEST BENGAL

1 PREFACE

The Annual Report of CIFRI for the year 1998-99 is presented before you. It contains a comprehensive information on the achievements of the various research projects and other activities undertaken by the Institute.

The major emphasis of the Institute during the period has been on i) assessing the production potential and fisheries resources of Indian reservoirs, the floodplain wetlands and the rivers viz. Ganges, Yamuna and Godavari, ii) monitoring the pollution status of river Ganges and Yamuna, iii) standardising the various parameters for monitoring fish and prawn health and controlling disease outbreak.

Consultancy assignments were taken up regularly by the Institute for resource generation. External fund mobilisation was also done through ad-hoc schemes supported by different funding organisations. Resources were also generated by organising training programmes on various specialized topics.

The Institute further strengthened its research activities through linkages with other national/international organizations. The technologies developed by the Institute were effectively transferred.

M. Sinha
Director

2 EXECUTIVE SUMMARY/SALIENT ACHIEVEMENTS

Assessment of production potential of reservoirs in the states of Haryana, Punjab and Himachal Pradesh

Scientists of CIFRI through a rapid survey conducted scientific investigations in 7 small reservoirs in the states of Haryana, Punjab and Himachal Pradesh, to characterize the reservoirs based on their ecological characteristics, biodiversity and fish yield potential. In Punjab the fish catch from these waters mainly depended on sustained annual stocking, as natural fisheries did not exist. The study suggested (i) optimum stocking rate (250 fingerlings per ha), (ii) appropriate harvesting practices over the year, and (iii) need for suitable steps to check fish escape at spillway and channel mouths, for development of reservoir fishery in the state. It further emphasised conservation of snow trout and mahseer in Nangal lake, alongwith checking the growth of macrophytes through heavy stocking of *C. idella*. In Himachal Pradesh, ongoing stocking of cold water fishes has been further recommended for the fishery development of Chamera reservoir.

Assessment of production potential of reservoirs in Tamil Nadu

CIFRI scientists surveyed nine reservoirs in Tamil Nadu. The investigations revealed low to medium productivity and poor fish species diversity of the reservoirs. Their fish yield varied from the range of 48 kg ha⁻¹ at Amaravathy to 197 kg/ha at Varattupallam. Only *Oreochromis mossambicus* bred in all the reservoirs. The absence of natural stocking of Indian major carps necessitated their stocking from outside in all the reservoirs except Varattupallam. The wide gap between estimates of potential and existing fish yields indicated the immense scope to enhance fish productivity through judicious stocking based on area and primary productivity of reservoirs followed by optimum exploitation.

Rapid Survey of River Godavari

The Peninsular rivers like Godavari hold distinct fish fauna which need to be conserved. CIFRI scientists completed the programme of rapid survey of river Godavari. Investigations reveal it to be the least utilized river of Peninsular India. At present there is no serious habitat degradation and deterioration of water quality in its 1465 km long course. The plankton group chlorophyceae occur throughout the river course indicating the fitness of the environment. The river is being exploited intensively especially in the lower and middle stretch. The indigenous carps, *L. fimbriatus* and large catfishes, *M. seenghala*, *S. childreni*, *P. pangasius* and *B. bagarius* are in an over fished state. At present fishing is mainly targeted at prawn and hilsa, the former by intensive seining and the latter by drift gill net. Some fishermen communities wholly depend on the river for their sustenance, over exploiting the limited resource of the river. It is essential to wean them away from over exploitation by providing alternate source of fishing. The improvement of economic condition of fishing communities holds the key to the conservation of this riverine fish stock which are under severe stress.

Present status of fishery resources of Kerala backwaters

The fishery resources of ten backwaters viz. Kadinamkulam, Anchuthengu, Ashtamudi, Kayamkulam, Azhikode, Chettuva, Ponnani, Mahe, Valapattanam and Neleswaram were assessed. A systematic data base was created for the first time for the fishery of these ecosystems. Ninetyfour species of fish and shell fishes (excluding molluscs) were identified contributing to the fishery of these backwaters. Of these 63 were recorded from marine waters earlier, thereby establishing a close relationship of the backwaters fishery with that of the marine system. The average yield ha^{-1} varied from 246 kg to 2747 kg. An analysis of the income distribution of the fishermen showed that they receive only 48-78% of the market price at the landing site. Over 30 type of gears were observed during study and their density (no. km^{-2}) ranged from 52 to 174 nos. The fishing in these backwaters suffer from both intensive fishing and irresponsible fishing thereby harvesting tremendous quantity of undersized fishes.

Decline in fishery of River Yamuna and its canals

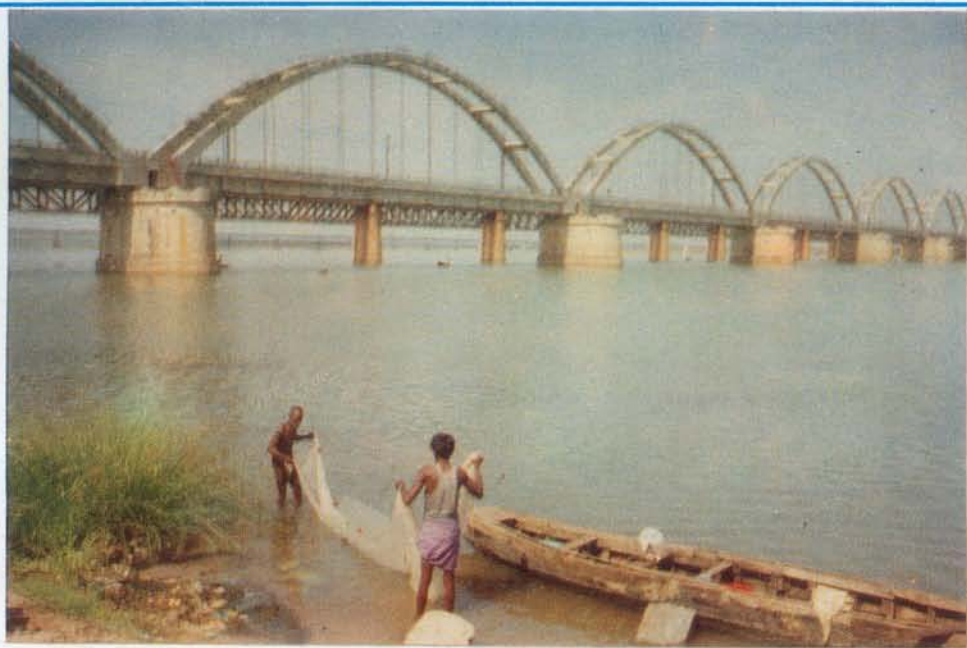
During 1998-99 the total fish catch of river Yamuna in its upper stretch (Yamunanagar to Panipat) was 21.08 t. The population was dominated by miscellaneous group (14.42 t) followed by catfishes (2.77 t), major carps (1.57 t), common carp (1.20 t) and Mahseer (1.12 t). There has been a decrease of 0.70 t from last years estimation of 21.78 t. The fish estimation from the canal showed substantial decrease of 2.22 t from last years estimation of 15.63 t. As a result the total landing from natural open water system, i.e. river and canal, showed a gradual decrease from 39.27 t (95-96) to 34.49 t (98-99). The exotic fishes, *C. idella* and *H. molitrix*, showed their continuous presence in some stretches and *A. nobilis* showed sporadic presence. The major causes of decline in fishery are (i) water abstraction, (ii) negligible recruitment of major carps, (iii) fishing practices.

Determination of the normal ranges of blood parameters of fish

The estimated normal ranges of blood and tissue parameter (haemoglobin, haematocrit, leucocrit, clotting time, plasma chloride, glucose cholesterol, protein, liver glycogen) of clinically healthy fish (*L. rohita*) under optimum water quality conditions were statistically determined for stress diagnosis. This study would help in evaluating the general state of fish health, to evaluate the physiological effect of environmental toxicants and to diagnose specific disease.

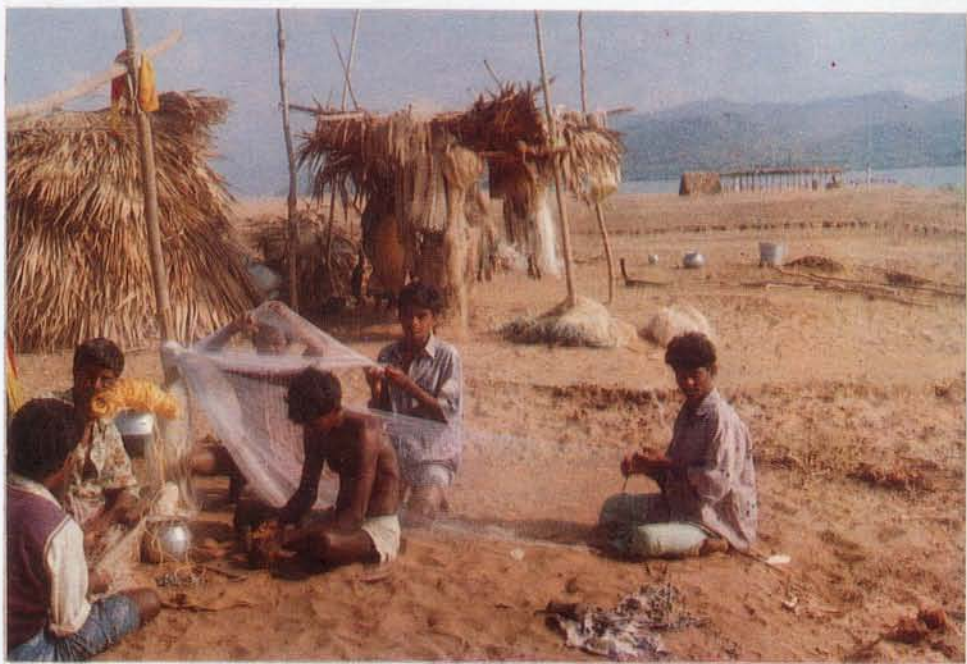
Evaluation of oxygen stress in fish

Absolute lethal concentration of oxygen was ascertained for major carp spawn and fry under laboratory condition. The absolute lethal limit (LC_{100}) of dissolved oxygen for spawn was recorded between 0.4 mg l^{-1} and 0.7 mg l^{-1} at temperature $28.5^{\circ} - 30.5^{\circ}\text{C}$ and pH 6.85-7.33. In case of fry the tolerance limit was higher compared to spawn and LC_{100} of dissolved oxygen was in the range of 0.18 mg l^{-1} to 0.35 mg l^{-1} at 30°C temperature and 6.75-7.39 pH.



Drag netting operation in river Godavari at Rajahmundry

Migratory fishermen in the downstretch of river Godavari at Pollavaram





Fishers with thermocole raft in the mid stretch of river Godavari

Fish catch from mid stretch of river Godavari





A Chinese dip net operation in backwaters

The small meshed stake nets extensively used in backwaters



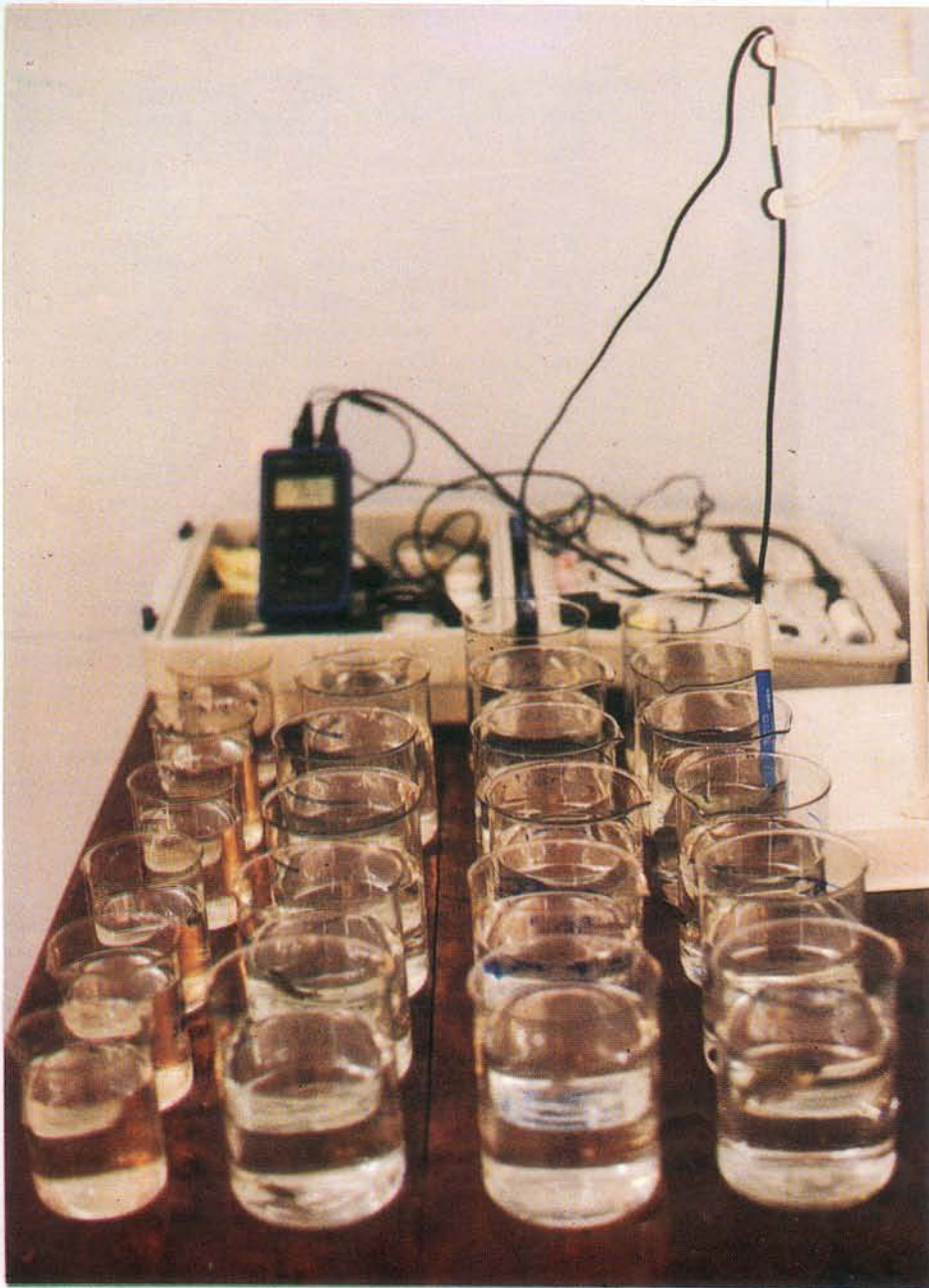


A coconut husk retting site at Kayamkulam Lake

Stagnant water upstream of Okhla covered with floating weeds



Oxygen stress studies in fish



3 INTRODUCTION

The Government of India, in a memorandum brought out in 1943, stressed the need for having a separate central department in the best interest of the development of fisheries resources of the country. This memorandum was later endorsed by the Fisheries Sub-Committee of the Central Government Policy Committee on Agriculture, Forestry and Fisheries. Based on this, the Central Inland Fisheries Research Station was formally established on 17th March, 1947 in Calcutta under the Ministry of Food and Agriculture, Government of India. From the modest beginning as an interim scheme, the organisation has since grown to the status of a premier research institution in the field of inland fisheries in the country and has completed 52 years of its existence on March 16, 1999. By the year 1959, the Station acquired its status as Central Inland Fisheries Research Institute (CIFRI) and moved to its own buildings at Barrackpore, West Bengal. Since 1967, the Institute is under the administrative fold of Indian Council of Agricultural Research (ICAR).

The main objectives of the Institute were to conduct investigations for a proper appraisal of inland fisheries resources of the country and to evolve suitable methods for their conservation and optimum utilization. While fulfilling the above objectives, the Institute directed its research efforts towards understanding the ecology and production functions of inland water bodies available in the country like the river system, lakes, ponds, tanks, reservoirs and floodplain wetlands. These studies have unravelled the complex trophic structure and functions *vis-à-vis* the environmental variables in different aquatic ecosystems. During the early 1970s, the Institute expanded its activities by initiating various All India Coordinated Research Projects such as composite fish culture and fish seed production, airbreathing fish culture, ecology and fisheries management of freshwater reservoirs, and brackishwater fish farming.

The Institute has the distinction of evolving and popularising the technologies on fish seed prospecting from rivers; fish seed transportation; induced breeding and nursery management of carps; bundh breeding of Chinese carps; composite fish culture; aquatic weed control; air-breathing fish culture; integrated fish farming; sewage fed fish culture; fisheries management of small reservoirs; brackishwater fish farming and farming of edible snails. The country has witnessed a phenomenal increase in production of inland fish (0.28 million t in 1950-51 to 5.25 million t in 1997-98) which can be mainly attributed to the above technologies.

At the beginning of Seventh Five Year Plan three Institutes (Central Institute of Freshwater Aquaculture, Central Institute of Brackishwater Aquaculture and National Research Centre on Coldwater Fisheries) were carved out from this Institute and the parent Institute was rechristened as Central Inland Capture Fisheries Research Institute (CIFRI) with effect from 1st April 1987. Under the changed set up, CIFRI is entrusted with the responsibility to conduct research on open water bodies where the fisheries management norms are closely associated with environmental monitoring and conservation.

Mandate

The CIFRI is presently mandated to :

- 1 study fish population dynamics of exploitable inland water bodies exceeding 10 hectare in water area;
- 2 evolve management systems for optimising fish production from such water bodies;
- 3 investigate causes, effects and remedies of their degradation/pollution and provide research support for mitigation and conservation of such resources;
- 4 study the impact of river valley projects on the fisheries of the basins concerned and evolve strategies for their management;
- 5 act as a national data centre on inland fisheries; and
- 6 conduct training and provide extension/consultancy services.

Organisational set-up (chart)

In tune with the above mandate, the research activities of CIFRI have been organised under seven divisions, corresponding to the major fishery resources and other research needs of the country related to fisheries development.

The ***Riverine Division***, with its headquarters at Allahabad, strives to develop systems for effective management of the vast riverine fisheries resources of the country with adequate emphasis on the conservation of riverine environment. The research projects under the Division cover the rivers Ganga, Brahmaputra, Mahanadi, Narmada and Godavari and their important tributaries.

The ***Reservoir Division*** is based at Bangalore with centres in Tamil Nadu, Andhra Pradesh and Madhya Pradesh. The investigations being carried out by the Division are aimed at developing management norms for optimising fish yield from large, medium and small reservoirs of the country.

The Barrackpore-based ***Estuarine Division***, presently works on the Hooghly-Matlah and Narmada Estuarine systems. The effluents from a number of industrial units, agricultural wastes, municipal wastes, etc. make the Hooghly estuary one of the most polluted stretches of the Ganga river system which is being investigated by the Division. Biotic and abiotic features of estuarine tributaries and mangroves of Sunderban region are also being studied.

ORGANIZATIONAL SET-UP OF CIFRI

DIRECTOR

**RIVERINE DIVISION
ALLAHABAD**

Karnal Research Centre
Lalgola Survey Centre

**RESERVOIR DIVISION
BANGALORE**

Coimbatore Research Centre
Eluru Research Centre
Hoshangabad Research Centre

**ESTUARINE DIVISION
BARRACKPORE**

Calcutta Research Centre
Vadodara Research Centre
Canning Survey Centre
Diamond Harbour Survey
Centre
Uluberia Survey Centre
Frasergunj Field Centre

**ENVIRONMENTAL
MONITORING & FISH
HEALTH PROTECTION
DIVISION
BARRACKPORE**

**FLOODPLAIN
WETLANDS DIVISION
GUWAHATI**

Barrackpore Research Centre
Alappuzha Research Centre

**RESOURCE ASSESSMENT
DIVISION
BARRACKPORE**

**HILSA DIVISION
MALDAH**

**OTHER SECTIONS
BARRACKPORE & KAKDWIP**

Krishi Vigyan Kendra, Kakdwip
Project Monitoring & Documentation
Library & Informatics
Extension, Research Support Service
Administrative, Audit, Accounts
Stores, Works & Utility

Director's Cell, Technical Cell
Hindi Cell

The ***Environmental Monitoring and Fish Health Protection Division***, stationed at Barrackpore, is mandated to monitor the man-made changes in the riverine, reservoir and estuarine ecosystems and to evolve suitable amelioration measures. Experiments are also being carried out under the laboratory conditions to substantiate the findings from natural resources. The studies under the Division include collection of basic information on habitat variables, impact identification through known indicators and biodiversity, screening of toxicants in controlled conditions, microbiological studies to ascertain organic load in aquatic environment and fish/prawn health stress and disease diagnosis and control in fish/prawn. Development of mitigation action plan for ecosystem restoration is also the responsibility of this Division.

The ***Floodplain Wetlands Division*** has its headquarters at Guwahati. The ecodynamics of wetlands spread over the floodplains of Ganga-Brahmaputra basins are being studied in order to evolve management norms for their sustainable development. The wetlands associated with the floodplains of Ganga and Brahmaputra rivers are not only unique in their rich biodiversity, but they also constitute an important fishery resource in the states of Bihar, West Bengal and Assam. The Division carries out research on the ecosystem processes and fish productivity from this resource with special attention on protection of biodiversity and development of environment-friendly technologies.

The ***Resource Assessment Division*** is located at Barrackpore and conducts research aiming at creating a database on the fish stocks and fishery resources. The Division is geared up to develop various population models that can lead to scientific exploitation of inland fisheries resources.

The main aim of the ***Hilsa Division***, located at Maldah, West Bengal is to carry out research on biology, and migratory behaviour of hilsa, leading to development of measures for the recovery of its fishery in the depleted stretches of the river Ganga.

The Institute's research activities have been organised under 11 research projects which are operated from the Headquarters at Barrackpore, 13 Research Centres, 5 Survey Centres and a Krishi Vigyan Kendra covering 10 states of the country. The distribution of research and survey centres and different sections are shown in the organisation chart.

Library services

CIFRI Library provides its services to the scientists of the Headquarters and centres, and research scholars, teachers, students and officials from other organizations. The library added 404 books, 152 miscellaneous publications and 650 loose issues of journals to its collection and subscribed 21 foreign and 50 Indian journals during the year. The current total holding of the library comprises : 8036 books, 4247 reprints, 945 maps, 3673 miscellaneous publications and 52 thesis.

The library maintained free mailing of the Institute's publications to various research organizations, Universities, entrepreneurs and farmers to keep them abreast with the latest developments in fisheries research. As a part of resource sharing, it extended inter-library loan of 20 publications to other libraries. Rs.25,65,073.00 was spent during the year 1998-99 for procuring library books, journals and other reading materials. Library also brought out Indian Fisheries Abstracts Volume 31(1-4), 1997 and Current Contents List for the period October-December, 1997; January-March, 1998 and April-June, 1998.

Project Monitoring & Documentation Service

The section monitors the progress of Research Projects of the Institute and organises Staff Research Council Meetings. It also assists the Director in policy formulation and technical guidelines on plan scheme preparations, apart from publishing reports, write ups, bulletins, project programmes, and newsletters. The section processes the research papers, submitted by the scientists for their publications in different journals or for presentation in symposia/workshops/summer school, etc. Participation of scientists in seminars, symposia, conferences, etc. was monitored by the section.

The section maintains an active DTP, photocopy, lamination, duplicating (cyclostyling), and binding unit to cater to the needs of the Institute.

Research Project Files

Annual progress reports of all the research projects and the contribution made by individual scientist are being maintained and monitored through the Primary Project Files and Scientists Files. Monitoring of research progress through RPF I, II and III, Activity Milestones and Monthly, Quarterly and Annual Reports were some of the major responsibilities of the section.

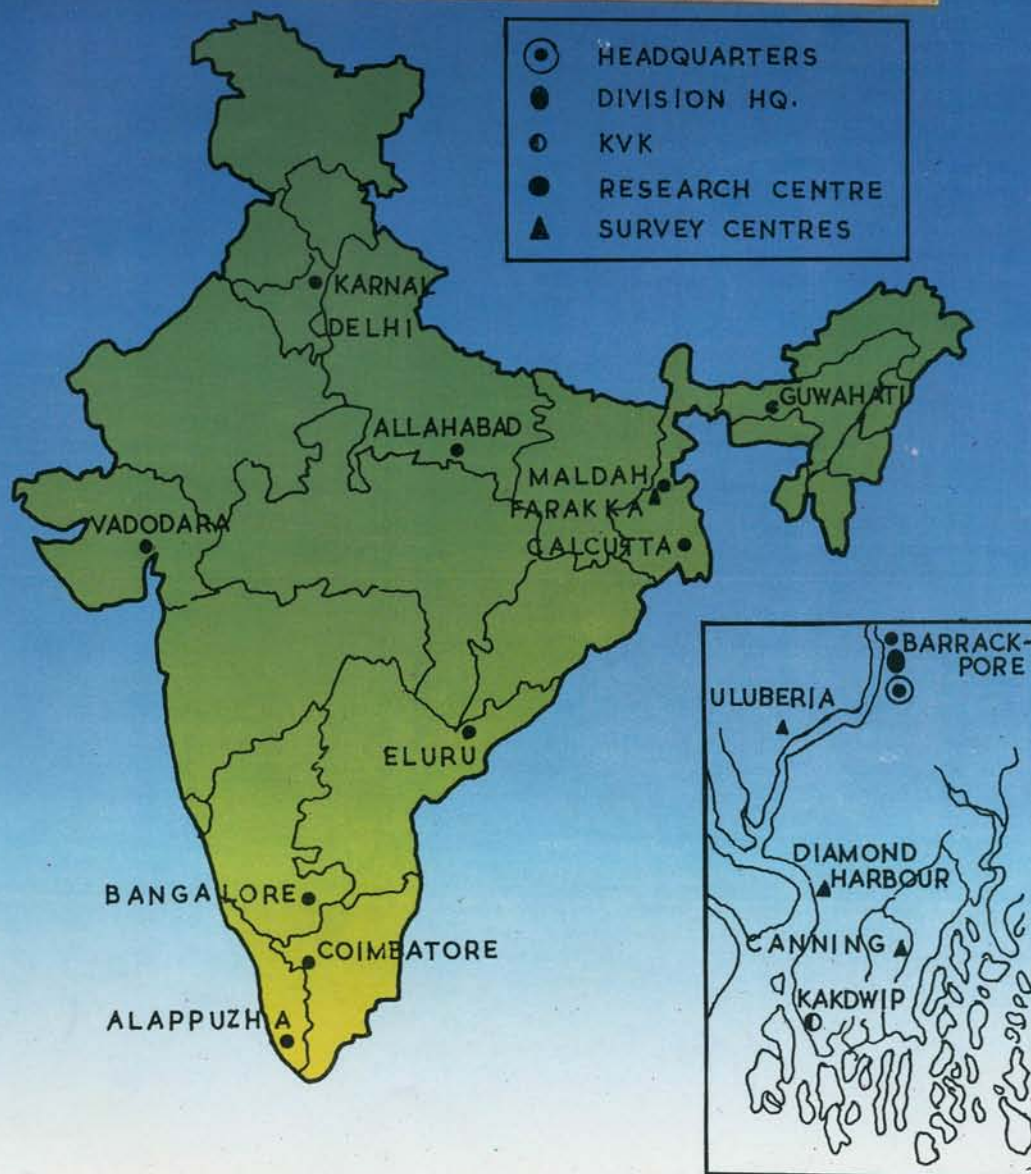
Technical Reports/queries

More than 25 Technical reports pertaining to progress of research activities of the Institute were compiled and sent to the Council, Ministry of Agriculture and other agencies. Technical queries regarding the activities of the Institute from various quarters of the country and abroad were attended to by the section.

Personal Information System (PISP)

During the reported period, biodata of 75 scientists of the Institute have been updated in the PIS based database which is being maintained at the Institute and ICAR.

DIVISIONS, RESEARCH CENTRES & SURVEY CENTRES of Central Inland Capture Fisheries Research Institute



Publications

The following departmental publications were brought out by CIFRI during the year.

Bulletin

- 1 No.77 Methods of collection of Inland Fisheries Statistics in India. Part – 1. Survey Methodology : Guide lines
- 2 No.78 Ecology and Fisheries of Markonahalli Reservoir (Karnataka)
- 3 No.79 The River Damodar and its Environment
- 4 No.80 Chilka Lake – Present and Past
- 5 No.81 Prawn Farming
- 6 No.82 *Bharat ke prakritik jal sansadhan – pryavaran awem matsyaki* (In Hindi)
- 7 No.83 Management of Inland Open Water Fisheries
- 8 No.84 Methods for Diagnosis for Treatment of Fish Disease
- 9 No.85 Ecology and Fisheries of Selected Reservoirs of Andhra Pradesh
- 10 No.86 Achievements of Krishi Vigyan Kendra, Kakdwip
- 11 No.87 Management of Fisheries in Open Water Systems and Extension Methods
- 12 No.88 Short Course Training on Aquatic Environment Impact Assessment (5-14 January 1999)
- 13 CIFRI Annual Report 1997-98
- 14

Book

- 1 The Ganga – Environment and Fishery

Folder

- 1 CIFRI (In English)
- 2 CIFRI (In Hindi)
- 3

Newsletter

- 1 The Inland Fisheries News (Vol.3, No.1, January'98 to June'98)
- 2 The Inland Fisheries News (Vol.3, No.2, July'98 to December'98)

Financial statement

For the year 1998-1999

		B.E.	R.E.	Actual expenditure
Plan	:	240.00	205.00	205.00
Non-Plan	:	526.00	627.50	627.50
TOTAL	:	766.00	832.50	832.50

Staff position

Statement showing the total number of employees in the CIFRI, Barrackpore pertaining to the employees under Scheduled Castes and Scheduled Tribes categories. (Period from 1.4.1998 to 31.3.1999)

Sl. No.	Class of Posts	Total No. of posts sanctioned	Total No. of employees in position	Total No. of Sch. Caste among them	S.C. in % of total employees	Total No. of Sch. Tribe among them	S.T. in % of total employees	Remarks
1.	SCIENTIFIC POSTS							
	Experimental Scientist	-	-	-	-	-	-	
	Scientist	76	59	3	5.08	-	-	
	Sr.Scientist/Scientist (Sel.Grade)/Scientist (Sr.Scale)	16	1	-	-	-	-	
	Principal Scientist	8	7	1	14.29	-	-	
	RMP Scientist	1	1	-	-	-	-	
	TOTAL	101	68	4				
2.	TECHNICAL POSTS							
	Category - I	61	56	10	17.86	3	5.36	This includes 2 (two) posts under C.S.S. and 15 (fifteen) posts under KVK
	Category - II	55	50	12	24.00	4	8.00	
	Category - III	15	9	1	11.11	-	-	
	TOTAL	131	115	23			7	

3.	ADMINISTRATIVE POSTS							
	Sr. A.Os/A.Os/Accounts Officer, etc.	2	1	1	100.00	-	-	This includes 1 (one) Assistant, 1 (one) Stenographer and 1 (one) L.D. C.posts under C.S.S., 1 (one) Asstt., 1 (one) L.D.C. & 1(one) Jr.Steno. under KVK and 1 (one) L.D.C. under N.F.
	A/A.Os/Superintendent(Accounts)/Supdt.	7	7	3	42.80	1	14.29	
	Assistant Director (O.L)	1	1	-	-	-	-	
	Assistants	25	22	5	22.70	1	4.55	
	Sr.Stenographer, Stenographer	5	4	1	25.00	-	-	
	Jr. Steno, Sr. Clerks/U.D.Cs	46	39	10	25.64	-	-	
	Junior Clerks/Hindi/Time Keeper/Sr.Gestetner Operator	16	15	3	20.00	1	6.67	
	TOTAL	102	89	23		3		
4.	SUPPORTING STAFF							
	Grade - I	86	70	31	44.29	1	1.43	This includes 1 (one) post of SSG under C.S.S. and 7 (seven) post of SSG under KVK
	Grade - II	62	62	19	30.65	4	6.45	
	Grade - III	37	35	11	31.43	3	8.57	
	Grade - IV	18	18	11	61.11	2	11.11	
	TOTAL	203	185	72		10		
5.	AUXILLIARY POSTS							
		10	4	2	50.00	-	-	

4 RESEARCH ACHIEVEMENTS

Project : RI/A/1
(In lieu of FC/A/26)

ECOLOGY AND PRODUCTION RELATIONSHIPS IN PENINSULAR RIVER SYSTEMS.

Personnel : C. Selvaraj, M. Ramakrishniah, D.N. Singh, D.S. Krishna Rao, P.K. Sukumaran, N.P. Srivastava, M. Karthikeyan, A.K. Das (Scientists)
S. Manoharan (Technical)

Duration : July 1997-March 1999

Location : Bangalore

Sub- Project I : Investigations on ecology, biodiversity and production functions in river Godavari.

River Godavari

River Godavari has been investigated to evaluate the status of the river in terms of its ecology, biodiversity and fishery and also to have an appraisal of socio-economic status of fishermen community. The river has its source in the Western Ghats near Nasik and flows through the States of Maharashtra and Andhra Pradesh before joining the Bay of Bengal.

Soil and water quality

Sediment : Sand dominated the sediment with significant clay content in deep pools around anicuts and estuarine zone. Organic carbon was relatively high at these regions. Nutrients (phosphate and nitrate) in general are in low concentration except in regions where sewage and municipal wastes are discharged.

Water : The pH was alkaline and total alkalinity ranged from 96 to 191 mg l⁻¹. Conductivity, hardness, calcium and magnesium recorded higher values in middle stretch followed by lower and upper stretches. Nutrients were generally low except at centres (around cities) receiving sewage and municipal wastes.

Primary production

Upper stretch showed higher production levels followed by lower and middle stretches (Fig.1).

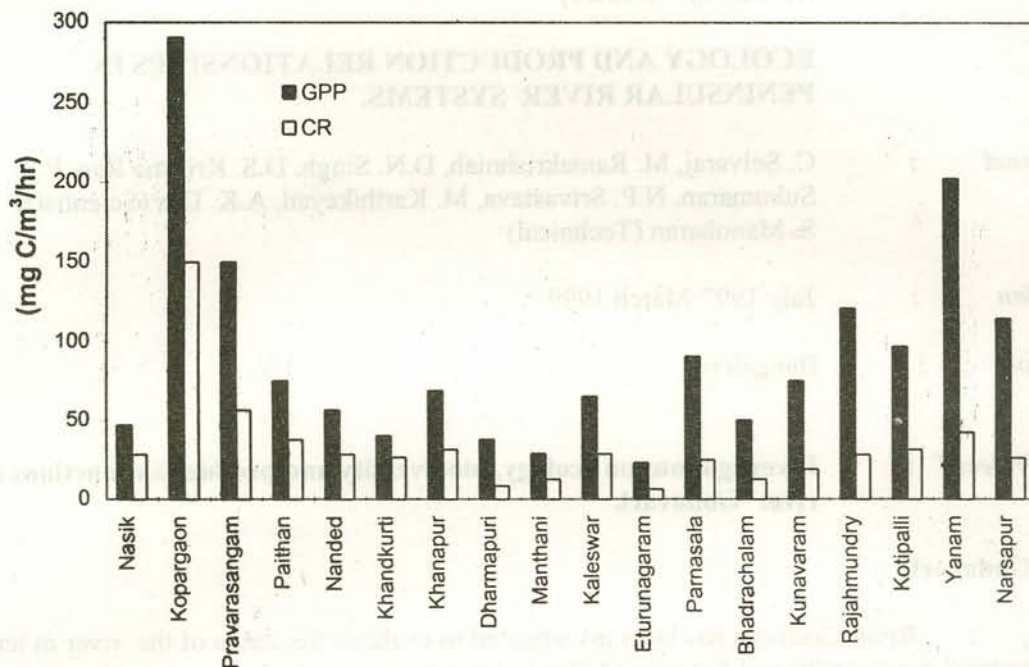


Fig. 1. Primary production and community respiration in river Godavari

Biotic communities

Plankton : Phytoplankton was overwhelming with predominant presence of Chlorophyceae throughout the river course.

Macrobenthos : Molluscs dominated the macrofauna except in the upper stretch where dipterans prevailed.

Periphyton : Was rich in the upper and middle stretch with dominating diatoms.

Fishery

The river is being exploited intensively, especially the lower and middle stretches. The indigenous carps *L. fimbriatus* and large catfishes *M. seenghala*, *S. childreni*, *P. pangasius* and *B. bagarius* are in an over-fished state. At present fishing is mainly targeted at prawn and hilsa, the former by intensive seining and the latter by drift gillnets. Juveniles of large catfishes and miscellaneous fishes occur in the seines as by-catch. Some fishermen communities wholly depend on the river for their sustenance exploiting the limited resource of the river. It is essential to wean them away from river exploitation by providing alternate source of fishing. The improvement of economic condition of fishing communities holds the key for the conservation of riverine fish stocks which are under severe stress.

Pollution scenario

At present there is no large scale discharge of pollutants in river Godavari. The municipal wastes and sewage at Nasik, Nanded, Rajahmundry and Narsapur and paper mill effluents at Bhadrachalam and Rajahmundry are the major pollutants. No adverse effect has been observed on the aquatic communities at these points. However, higher concentration of lead recorded in the sediments and fish flesh is alarming.

PROJECT : RI/B/1
(FC/B/10 & FC/B/12 merged)

INVESTIGATIONS ON ECOLOGY, BIODIVERSITY AND PRODUCTION POTENTIAL OF TRIBUTARIES AND THEIR IMPACT ON RIVER GANGA

Sub-project :

- (1) Investigations on ecology, biodiversity and production relationships of tributaries of river Ganga (Lower stretch of river Yamuna, Ghagra, Tons and Sone) – Allahabad.
- (2) Ecodynamics and fishery of upper stretch of river Yamuna and associated canals – Karnal.

Personnel : R.S. Panwar, A.K. Lal, Balbir Singh, R.N. Seth, Shree Prakash, R.K. Dwivedi, R.K. Tyagi, V. Pathak, B.K. Singh, P.N. Jaitly, P.K. Katiha, Sandeep Bhatia, D.N. Mishra, Usha Moza (Scientists)
R.C. Singh, B.D. Saroj, L.R. Mahavar, S.K. Srivastava, Ramji Tiwari, J.P. Mishra, Kalpana Srivastava, H.C. Banik, P. Rajani, Arjit Ghosh, C. Lakra, Sushil Kumar (Technicals)

Duration : Sub-Project 1 : June 1996-March 2001
Sub-Project 2 : June 1995-March 1999

Location : Allahabad/Karnal

Sub Project – 1

River Yamuna

Soil and Water quality

Sediment : Sediment from the different stretches showed dominance of sand (84.2 to 96.5%). Organic carbon, nitrogen and phosphorus were poor in the sediment phase. Pesticides residue in the different stretches of Yamuna reflected the presence of both DDT and DDD at Hamirpur.

Heavy metals : Heavy metals Cu, Cr, Cd, Pb and Zn were comparatively higher in the sediment in Yamuna but the same was not reflected in the water phase except Zn which was also higher ($105.7 \mu\text{g l}^{-1}$) in the Yamuna water.

Primary productivity

The average rate of net carbon production ($\text{mgCm}^{-2}\text{d}^{-1}$) and net energy fixation ($\text{Cal.m}^{-2} \text{d}^{-1}$) by producers were 222.3 & 2183 at Madauka, 238.5 & 2342 at Arail, 325.5 and 3197 at the confluence point, 217.9 & 2140 at Mavaiya and 299.0 & 2936 at Manaiya. Thus, showing an increasing trend from Madauka upto the confluence point as Ganga water was more productive.

Biotic communities

Plankton : In the stretch Madauka to Mavaiya the maximum phytoplankton density (1449 ul^{-1}) was recorded in autumn in Ganga (above confluence) and minimum (64 ul^{-1}) in monsoon at confluence.

Periphyton : Higher abundance of periphyton was recorded in Ganga at Jhusi (2207 ucm^{-2}) as compared to Yamuna at Madauka (366 u cm^{-2}).

Macrobenthic organisms : Variation in the bottom biota diversity and its population revealed Madauka to be rich in nutrient and congenial for macrobenthic organisms.

The faecal coliform count in Yamuna indicated source of pollution at Madauka and Sangam.

River Ghagra

Soil and water quality

Sediment : The sediment showed comparatively lower percentage of sand (77.8% to 78.2%) between Belthera and Bajitola than the main Ganga (90%). Organic carbon and available nutrients were poor in the sediment phase.

Water : A gradual increase in the values of alkalinity (143.2 to 157.2 mg l^{-1}), conductance (228.0 to $270.7 \text{ } \mu\text{mhos cm}^{-1}$), dissolved solids (113.7 to 135.4 mg l^{-1}) and chloride (12.1 to 16.0 mg l^{-1}) were observed from Belthera in Ghagra upto the confluence with Ganga as Ganga waters have comparatively much higher values of the above parameters.

Heavy metals : The concentration of heavy metals Cu, Cr, Cd, Pb and Zn were comparatively higher in Ghagra between Belthera and Bajitola and declined at the confluence point. In the water phase Cr, Pb and Zn were higher at the confluence point while copper was slightly higher in Ganga ($23.3 \text{ } \mu\text{g l}^{-1}$).

Primary productivity

There was a general increasing trend in production rate from 243.1 & 2387 at Belthera to 274.4 & $2694 \text{ (mg Cm}^{-2} \text{ d}^{-1} \text{ and Cal m}^{-2} \text{ d}^{-1}\text{)}$, respectively at the confluence.

Biotic communities

Plankton : Total plankton population in Ganga at Doriganj ranged between 16 ul^{-1} during Oct and 3648 ul^{-1} in January.

Periphyton : At Belthera periphyton population was 2288 ucm^{-2} and declined to (1309 ucm^{-2}) at confluence. It was minimum 773 ucm^{-2} below confluence point.

Macrobenthic organisms : Their maximum population was 176 nm^{-2} above out fall region during summer and 137 nm^{-2} below out fall region in autumn.

River Tons

Soil and water quality

Sediment : Considerable inter stretch variation was observed in the sediment with content being comparatively lower in Maihar and Sirsa (60.0 to 77.0%) and maximum at the confluence (97.5%). Specific conductance was maximum ($192.0 \mu\text{mhos cm}^{-1}$) in Ganga while free calcium carbonate was higher (10.2%) at Teothar.

Heavy metals : The concentrations of heavy metals Cu, Cd, Pb and Zn in the sediment phase were maximum at Maihar and minimum at the confluence point.

Primary productivity

The production rates were minimum at Teothar 240.6 and 2362 and maximum at Etma 328.8 and 3229 $\text{mgCm}^{-2}\text{d}^{-1}$ and $\text{Cal m}^{-2}\text{d}^{-1}$, respectively.

Biotic communities

Plankton : The maximum density (1603 ul^{-1}) of phytoplankton was recorded in winter in the Ganga and minimum (3 ul^{-1}) in post monsoon at Maihar in Tons.

Periphyton : The highest population was recorded at Maihar (6571 ucm^{-2})

Macrobenthic organisms : Both in abundance and diversity, the stretch around above outfall region represented maximum population (1232 nm^{-2}) during autumn and gradually declined towards outfall region (132 nm^{-2}) and at BOF it was nil..

Microbial forms : At Maihar the highest faecal coliform count (20,000 CFU 100 ml^{-1}) was recorded in January which may be due to religious festivals taking place during this period.

River Sone

Soil and water quality

Sediment : The physical composition of sediment showed dominance of sand throughout the stretch (86 to 97.5 %).

Water : Water was always alkaline (pH 8.1 to 8.2) and rich in dissolved oxygen (8.1 to 9.8 mg l^{-1}) and organic matter but poor in nutrients (nitrate and phosphate).

Primary productivity

From Dehri-en-Sone upto the confluence point the rate of net carbon production ($\text{mgCm}^{-2} \text{d}^{-1}$) and net energy fixed ($\text{Cal m}^{-2} \text{d}^{-1}$) were 368.0 & 3614 at Dehri, 275.2 & 2702 at Koilwar and 350.4 & 3441 at Digha below confluence respectively.

Biotic communities

Plankton : The phytoplankton population in river Ganga was richer than Sone and Koil. Contribution of phytoplankton in river Koil was maximum which can probably be attributed to the impact of forest litter.

Periphyton : Sone showed low periphyton productivity (496 ucm^{-2}).

Macrobenthic organisms : Average benthic population was maximum at Pansatola (on river Koil) 165 nm^{-2} followed by Dehri-en-Sone (154 nm^{-2}).

Community diversity and population indicated that the entire stretch was richer in particulate organic matter being carried away from upper stretch which has discerning impact of litters.

Physiological investigations

Carbohydrate metabolism was investigated in blood, liver and muscle tissues of advance fingerlings of *Cirrhinus mrigala* exposed to 0.01 and 0.05 ppm of Hg, 0.25 ppm of Cu and 5.5 ppm of Cr salts for 120 hr.

Socio-economic profile of fishermen community of river Yamuna and Bhagra were studied.

Fish catch statistics of river Ganga at Allahabad and Lalgola

Yamuna: At Sadiapur fish market the fish landings were estimated at 42.40 t (MC-4.58, CF-10.49, Hilsa-0.27, Others - 27.06) which was an all time low. As compared to previous year the decline was observed in all the species.

Tons: The fish fauna was akin to river Ganga, excepting presence of *Tor* sp. Fishing intensity seems to be of a low order.

Sone: As per the information gathered, at all of the centers the catches were dominated by other groups of smaller sized species such as *E. vacha*, *C. garua*, *R. rita*, *Chela* spp. followed by catfishes.

Ganga (Lalgola): At Lalgola, fish landings were estimated at 123.98 t (MC-13.37 t, CF- 20.38 t, Hilsa- 24.11, Others- 66.12 t).

Sub Project - 2

River Yamuna

Soil and water quality

The bed texture of river is alkaline, having 69.48% of sand, 20.19% of silt and 10.24% of clay. Nutrient dynamics of soil showed a good amount of available nitrogen $26.87 \text{ mg } 100\text{g}^{-1}$ and phosphorus $2.28 \text{ mg } 100\text{g}^{-1}$ conducive for higher productivity at all trophic levels.

Biotic component assessment

The standing crop of plankton was 265 u l^{-1} , of periphyton 316 u cm^{-2} , with average benthic density 179 u m^{-2} , and macrophytes biomass 6.82 g m^{-2} (dry wt.). Associated fauna was constituted mainly by insects nymphs in the upper segment and by prawns in the lower segment.

Fresh water indicator sp. were *Tor putitora* (fish), *Ephemerella* sp. and *Nymphula* sp. (insects) and *Chara* sp. (macrophytes).

Fish catch composition

Fish catch from Yamuna amounted to 21.08 t during 1998-99. It was dominated by miscellaneous fishery (68.40%), followed by cat fishes (13.14%), major carps (7.44%), Mahseer (5.31%) and common carp (5.69%). Mahseer fishery represented by *T. putitora* was confined to upper stretch, where it formed 12.43% of the population. Common carp although present in the entire stretch formed substantial fishery (9.50%) in the Yamunanagar sector only. Zone-wise, Panipat segment was more productive, although major carps formed a meagre fishery (5.82%). Spawn availability of major carps was only 2% in Karnal zone.

Western Yamuna Canal

Fish catch composition

Total estimated fish catch from Western Yamuna Canal was 13.41t. It was dominated by miscellaneous fishery (45.79%), followed by Mahseer (19.46%), common carp (18.49%), cat fishes (9.02%) and major carps (6.79%). *C. catla* (0.15%) at Yamunanagar and *H. molitrix* (0.30%) at Karnal were encountered within the canal. Mahseer fishery was mainly confined to Yamunanagar and above, where it contributed 35.81% of the total population.

The unprecedented rise in Mahseer fishery this year within Yamunanagar zone both in the river (76.7%) and in canal (84.35%) compared to last year may be because of disturbances going on in the river bed in and around Hathnikund area as a result of construction of Hatnikund barrage. This has forced the fishes to migrate in search of food and shelter as indicated by its stray presence in Panipat (2.28%).

Biotic component assessment

The standing crop of plankton (284 u l^{-1}), periphyton (340 u cm^{-2}), benthos (509 u m^{-2}), surface insects (10 u m^{-2}) and of macrophyte biomass (11.42 g m^{-2}), indicate productive nature of the canal, but still the canal sustain a lower biomass of fish, totalling 13.4 t only compared to 21.08 t of river. This is because of repeated fish kills in canal the due to the factory effluents. Macrophyte associated fauna as well other biotic components show eutrophic forms in comparatively clean waters (AOF, Yamunanagar and SYL), while the polluted zone shows saprophilic forms, *Lymnae* sp., *Berosus*, *Baetis* nymphs, *Enalllogoma* sp., *Corixa* sp., *Limnometra* sp., *Vallisneria* (eutrophic forms), *Physa* sp., *Gomphus* numphs, *Chironomids*, *Tubificids*, *Potomogeton* sp.

Eastern Yamuna Canal

Eastern Yamuna Canal does not have any organised fishery thus no information is available on its fish catch. Evaluation of biotic and abiotic factors reveal that the abiotic factors were conducive to better trophic activity. But the soil has more percentage of sand 74.01%. The concrete side walls of the canal and almost negligible entry of effluents, especially organic, result in poor growth of planktons (200 u l^{-1}), periphyton (256 u cm^{-2}), macrobenthos (93 u m^{-2}) and surface insects (4 u m^{-2}).

PROJECT : ES/B/1

INVESTIGATION ON THE FISHERIES OF HOOGHLY ESTUARINE SYSTEM AND ITS WETLANDS.

- Sub-projects :** (1) Investigations on the fisheries of Hooghly estuarine system
(2) Ecological changes in the estuarine wetland impoundments and its effort on production potential

Personnel : Ajoy Kumar Ghosh, D.K. De, D. Nath, P.M. Mitra, U. Bhowmik, P.K. Pandit, H.C. Karmakar, R.N. Misra, Ansuman Hajra, Dharendra Kumar, P.K. Kathia (Scientists)
N.C. Mandal, H.K. Sen, N.N. Mazumder, A.R. Paul, Sukumar Saha, S.K. Chatterjee, T. Chatterjee, B.B. Das, P. Biswas, A. Mitra, D. Sanfui, B.N. Das, A. Sengupta, A. Roy Choudhury, P. Singh, L.K. Parbat, A.K. Barui, D. Saha, S. Mandal, C.P. Singh (Technicals)

Duration : May 1998-March 2003

Location : Barrackpore and Calcutta

Sub project - I

Water and soil quality

Water : The physico-chemical parameters recorded viz. dissolved oxygen ($5.2-6.8 \text{ mg l}^{-1}$), water reaction (pH 7.6-8.2), total alkalinity ($86-166 \text{ mg l}^{-1}$), free Carbon dioxide ($2.0-6.2 \text{ mg l}^{-1}$) were very conducive to the general habitat of estuarine fauna and flora including fish. Salinity was maximum in Matlah (mean 26.97 ppt), followed by Saptamukhi (16.4 ppt), Thakuran (16.03 ppt) and Bidya (13.4 ppt), while slightly lower salinity was recorded in Haldi (3.64 ppt) and Ichamati (2.24 ppt). Maximum net primary production was observed in Hooghly, followed by Thakuran, Saptamukhi and Haldi, while Bidya, Ichamati and Matlah showed lower productivity.

Soil : The soil reaction was slightly alkaline (pH 8.2-8.69). Organic carbon contents were slightly higher at Saptamukhi, Thakuran, Ichamati and Matlah compared to Bidya and Haldi. The estuarine system had silty clay loam soil texture and the C : N ratio ranged between 9.7 and 11.25.

Biotic communities

Plankton : Plankton production in the main Hooghly channel and its major distributaries viz., Saptamukhi, Thakuran, Matlah, Bidya, Ichamati and Haldi estuaries showed almost bimodal distribution with one peak during winter and the other during summer months. The bulk of plankton is constituted by phytoplankton of which 90-95% by number is contributed by bacillariophyceae.

Macro-zoobenthos : The annual production by macro-zoobenthos in the Hooghly main channel alongwith major distributaries varied from 36 to 720 $\text{u m}^{-2}\text{yr}^{-1}$.

Estimation of catch and effort

Total fish yield from the Hooghly estuarine system and Digha centre was estimated as 65,026.9 t during the period February, 1998 to January 1999. The hilsa fishery of the estuarine system and Digha centre during 1998-99 recorded an estimated catch of 9,109.8 t and 2,590.5 t respectively totalling 11,700.3 t and contributing 18% of the total catch.

Sociological investigations of the prawn and fish seed collections in lower estuarine system (Sunderbans) were carried out and at the same time mass awareness programmes were conducted to restrict indiscriminate destruction of post larvae of fin fish and shell fish.

Fish migration study

Biochemical changes in hilsa during different stages of its migration were studied. Diseased fish and prawn infected with parasites were collected to study their role in host migration.

Sub Project : 2

Soil and water quality of wetlands (Bheris)

Water : Ecological investigations were conducted on physico-chemical and biological parameters in a low-saline (Haroa) (0.39-4.53 ppt), medium saline (Minakhan) (0.75-8.12 ppt) and high saline (Golabari) (4.37-33.17 ppt) wetlands. Primary production was found to be much higher in the low saline zone ($41.68 \text{ mg C m}^{-3} \text{ hr}^{-1}$ – $1125.36 \text{ mg C m}^{-3} \text{ hr}^{-1}$) compared to medium saline (37.5 to $337.6 \text{ mg C m}^{-3} \text{ hr}^{-1}$) and high saline zone (37.51 to $75.02 \text{ mg C m}^{-3} \text{ hr}^{-1}$).

Soil : The bottom soil of all the bheries studied had alkaline pH. Organic carbon was found to be higher in the low saline zone followed by medium and high saline zones.

Biotic communities

Plankton : An over all dominance of zooplankters was observed in almost all the impounded wetlands studied.

Macrobenthos : Macrobenthic fauna in Haroa region comprised oligochaetes, polychaetes, amphipods, insect larvae and molluscs. Minakhan region also had the representation of annelids, taenaiids, amphipods, insect larvae and gastropods. Macrobenthic fauna in Golabari region mainly consisted of taenaiids and amphipods.

Assessment of production potential

Fin and shell fish production from the selected wetlands in low, medium and high saline bheris ranged from 1151.77-4111.19 kg ha⁻¹ yr⁻¹; 395.43-520.23 kg ha⁻¹ yr⁻¹ and 392.20-500.00 kg ha⁻¹ yr⁻¹ respectively. Total average production in low saline bheris was more than 5.5 times higher than that of medium and high saline bheris.

PROJECT : ES/B/2

**ECO-STATUS OF SELECTED WEST COAST ESTUARIES
OF INDIA**

Personnel : S.N. Singh, V. Kolekar, R.K. Dwivedi, D. Kumar,
N.P. Srivastava, V. Pathak, D. Nath, K. Chandra, S. Samanta
(Scientists)
R.C. Mandi, Ramji Tiwari, R.K. Sah, Subrato Das (Technicals)

Duration : April 1998-March 2003

Location : Vadodara

Ecology of the Mandovi - Cumbarjua - Zuari estuarine system

For delineating the hydro-biological attributes, six sites based on salinity gradient have been selected and these are Panaji, Old Gao and Candola in Mandovi estuarine system, Banastari in Cumbarjua canal and Cortalim and Shiroda representing the Zuari estuarine system.

Soil and water quality

Water : In general the pH varied from 6.95 to 7.8. The Mandovi estuarine system was more transparent ranging from 71.0 to 110.50 cm. The transparency of Candola extent is affected by the Iron/Manganese ore suspension received from an Ore Processing Plant at Amona.

In Mandovi estuarine system the dissolved oxygen content of the Mandovi-Cumbarjua-Zuari estuarine system as a whole fluctuated between 5.15 to 6.67 mg l⁻¹. Total alkalinity exhibited a zonal variation since the lower estuarine extent recorded higher content of this species as compared to the upper expanses and this varied from 43.0 to 97.0 mg l⁻¹. Salinity reflected similar horizontal variation and varied from 6.21 to 35.21 ppt.

Assessment of nutrient's status of the system reflected poor to medium productive status. Phosphate varied from 0.075 to 0.091 mg l⁻¹ while nitrate fluctuated between 0.16 to 0.34 mg l⁻¹ for the Mandovi-Cumbarjua-Zuari estuarine system. Silicate level ranged from 0.52 to 1.64 mg l⁻¹.

Sediment : The soil was slightly alkaline and the pH varied from 7.05 to 7.75. The organic carbon content fluctuated from 0.99 to 3.62%. The average availability of phosphate

was higher at lower estuarine extents and this varied from 2.30 to 4.60% for the system as a whole. Free calcium carbonate ranged from 0.75 to 1.50%.

Biotic communities

Plankton : The average planktonic biomass of Mandovi-Cumbarjua-Zuari estuarine system as a single entity fluctuated from 77 (Panaji) to 271 nos. l^{-1} (Shiroda). Phytoplankton was the mainstay of this planktonic abundance and drifted from 61.99 (Cortalim) to 88.56% (Shiroda). Bacillariophyceae dominated followed by Chlorophyceae and Copepoda. Protozoa contributed the bulk of the zooplankton.

Macro-benthos : The Mandovi-Cumbarjua-Zuari estuarine system recorded average macro-benthic biomass of 182 (Old Goa) to 2009 nos. m^{-2} (Candola). Polychaeta was the most prevailing form. However, Mollusca was the major form at Panaji and Banastari sites.

Organic Production

Zuari estuarine system recorded higher gross (109.38 to 115.63 $mg\ C\ m^{-3}\ hr^{-1}$) and net production (89.58 to 103.13 $mg\ C\ m^{-3}\ hr^{-1}$)

PROJECT : RS/A/1
(FC/A/7, FC/A/24 & FC/A/25 Merged)

ECOLOGY AND FISHERIES OF FRESHWATER RESERVOIRS

- Sub-projects :**
- (1) Ecology and fisheries of Manchanbele reservoir (Karnataka).
 - (2) Assessment of production potentiality of reservoirs in Tamil Nadu.
 - (3) Ecological investigations in selected reservoirs in Madhya Pradesh
 - (4) Ecological investigations in selected reservoirs in Haryana, Punjab, Himachal Pradesh and Rajasthan.
 - (5) Impact of stocking of carps on the productivity of Yerrakalva reservoir (Andhra Pradesh).

Personnel : C. Selvaraj, M. Ramakrishniah, D.N. Singh, D.S. Krishna Rao, P.K. Sukumaran, M. Karthikeyan, A.K. Das, V.K. Murugesan, Rani Palanisamy, N.P. Srivastava, B.L. Pandey, D.K. Kaushal, V.K. Sharma (Scientists)
M. F. Rahman, S. Manoharan, Kuldeep Singh, P.S.C. Bose (Technical)

Duration : Sub-project 1 July 1996-March 2001
Sub-project 2 April 1996-March 1999
Sub-project 3 October 1993-March 1999
Sub-project 4 April 1996-March 1999
Sub-project 5 July 1998-March 1999

Location : Bangalore, Coimbatore, Hoshangabad, Karnal, Eluru.

Sub project - 1

Soil and water quality

Studies initiated earlier were continued this year. The reservoir received inflows more than 3 times of last year. The water level fluctuated between 724.78 and 735.85 m and the area between 125 and 327 ha. Sediment was mildly acidic (pH 6.4), fairly high in organic carbon (1.77%), medium in available nitrogen ($54.7 \text{ mg } 100 \text{ g}^{-1}$). pH of water showed wide variation from near neutral (7.2) to moderately alkaline (8.2). Specific conductivity, alkalinity and hardness showed similar trend with peaks in summer and troughs in monsoon. The nutrients, phosphate and nitrate, were generally low (Table 1).

The reservoir exhibited thermal stratification around 5 m depth during April to November, the period coinciding with hot-dry and hot-humid season. The breakdown of stratification after November was due to convective cooling. Sharp oxycline with anoxic hypolimnion was evident on many occasions.

Table 1. Sediment and water quality (range & average) of Manchanbele reservoir (1998-99)

Sediment					Water						
pH	Org. C (%)	Avail-N (mg/100g)	Avail-P (mg/100g)	Free CaCO_3 (%)	Transpar. (m)	pH	Sp. Cond. ($\mu\text{mohs/cm}$)	TA (mg/l)	$\text{NO}_3\text{-N}$ ($\mu\text{g/l}$)	$\text{PO}_4\text{-P}$ ($\mu\text{g/l}$)	$\text{SiO}_2\text{-Si}$ (mg/l)
5.8-7.1 6.4	1.08-2.25 1.8	42.5-64.5 54.6	0.3-0.8 0.52	0.36-2.30 1.4	1.0-3.5 1.8	7.2-8.6 8.0	300-490 384	96-180 127	10-45 29	10-70 24	3.0-9.5 6.0

Fish and Fishery

Gangetic carps (*C. catla*, *L. rohita* and *C. mrigala*) and common carp (*C. carpio*) were stocked in all the reservoirs, except in the upland Sandynulla, where the mirror carp has established itself. However, the rate of stocking and the species combination depended mostly on the availability of the seed rather than the yield potential of the reservoir. The fish landings were mainly constituted by *O. bimaculatus* and indigenous species. The studies, indicated that the fish yield obtained from majority of the reservoirs is much less than their production potential, warranting application of scientific management measures.

Sub Project - 3

Water and soil quality

Three reservoirs, one large (Barna) and two small (Dahod and Sampna), were surveyed in Madhya Pradesh. pH of the water was alkaline (8.7-8.9). The ionic concentration was moderate (Sp.cond. : 128.4 to 170.6 μ mhos cm^{-1}). Nutrients, particularly phosphate ($< 10 \mu\text{g l}^{-1}$), were low. The mean hourly rate of gross primary production (GP) was low with Dahod recording the maximum (106.7 mg) and Barna the minimum (67.7 mg $\text{C m}^{-3} \text{h}^{-1}$).

Biotic communities

Plankton was abundant in Sampna (3638 μl^{-1}) and least in Barna (403 μl^{-1}). The density of macrobenthos ranged from 659 (Barna) to 1173 no. m^{-2} (Dahod) and was represented by gastropods, bivalves and dipterans.

Fish and Fishery

The fish yield of Barna ranged between 21.3-31.8 kg ha^{-1} during 1992-1998 due to enhanced stocking and fishing effort. The fishery was dominated by major carps (62-93%) with the dominance of catla (34-77%). The fish production potential has been estimated at 60 kg ha^{-1} , whereas the maximum realised was 30 kg ha^{-1} . In Dahod, the fishery is dominated by indigenous *N. notopterus* and *X. cancila*. The major carps formed only 9-16% with dominance of rohu. The fish landings of Sampna, show indigenous fishes forming 50-89%. Tilapia and big head have been observed in the commercial landings. Though major carps are being regularly stocked, the same has not been reflected in the commercial catches to the desired level.

Sub Project - 4

Water and soil quality

Six reservoirs in Rajasthan viz. Sainthal, Kalakho, Baretha, Morel, Galwa and Panchara with water spread ranging from 520 to 1800 ha were surveyed. The sediments were neutral (pH 6.9-7.1), poor in organic carbon (0.29-0.46%), available phosphorus (2.3 to 4.1 mg 100 g⁻¹) and available nitrogen (38.4 to 47.6 mg 100 g⁻¹). The water pH varied from mildly acidic (6.6 in Kalakho) to moderately alkaline (7.9 in Sainthal). Alkalinity (123 to 151 mg l⁻¹) and specific conductivity (199 to 451 μ mhos cm⁻¹) were in the productive range. The nutrients (phosphate and nitrate) were in low to moderate concentration. The gross primary production was minimum in Galwa (164.7 mg C m⁻³ h⁻¹) and maximum in Sainthal (1024 mg C m⁻³ h⁻¹).

Biotic communities

The numerical abundance of plankton varied from 564 (Kalakho) to 2450 u l⁻¹ (Baretha). The macro-benthos fluctuated between 417 (Galwa) and 2194 no m⁻² (Sainthal). The benthic fauna was represented by larvae of *Chaoborus*, and *Chironomus*, dipteran nymphs and molluscs. The density of macrovegetation (wet weight) was highest in Galwa (687 g m⁻²) and lowest in Panchana (300 g m⁻²).

Fish and Fishery

The estimated fish yield was highest in Baretha (81.4 kg ha⁻¹) and least in Galwa (6.3 kg ha⁻¹) with major carps contributing significantly (60%) in some reservoirs and minor carps (43.8%) in others. All reservoirs had medium to high production potential.

Sub Project - 5

This reservoir located near Eluru in West Godavari district of Andhra Pradesh, has a water spread of 1737 ha at FRL. Annual fish catch has been estimated at 102 t contributed by major carps (*C. catla* and *L. rohita* 40%), indigenous carps (*L. calbasu* and *P. sarana* 20 %) catfishes (*W. attu* 15%), prawns (*M. malcolmsonii* 6.6%) and others (18.4%). The fish yield during the year has increased by 80% from 51 kg (1994-95) to 90 kg ha⁻¹. The impact of stocking about 4 lakhs of *C. catla* and 2.7 lakhs of *L. rohita* in 1994 is clearly seen in the enhancement of the yield comprising mainly of major carps.

Catla catla occurred in the size range 15 to 78 cm (50-9200 g), *L. rohita* 18.5 - 60 cm (125-2800 g), *L. calbasu* 16.6- 49 cm (80-1550 g) and *M. malcolmsonii* 16-33 cm (50-275 g). There are indications of breeding and recruitment of catla and rohu as revealed by the occurrence of juveniles (60 to 65 mm) in the dragnet collections during August 1998.

PROJECT : FW/A/1
(FC/A/4 & FC/A/22 merged)

**FISH PRODUCTION DYNAMICS OF FLOODPLAIN
WETLANDS OF ASSAM AND WEST BENGAL**

Personnel : V. V. Sugunan, P. K. Saha, M. Choudhury, Md. Aftabuddin, B. K. Bhattacharjya (On study leave), G. K. Vinci, K. Mitra, M. K. Bandopadhyaya and M A. Hassan (Scientists)
Alok Sarkar, B.K. Biswas (on study leave), M.P. Singh, D.K. Biswas, S. Saha (Technicals)

Duration : 1998-99

Location : Guwahati, Barrackpore

Assam

Survey of floodplain lakes

Six districts of Assam viz., Dhemaji, Tinsukia, Golaghat, Jorhat, Sibsagar, and Dibrugarh were covered for the ecological assessment of floodplain lakes. A total of 23 beels were surveyed

Soil and water quality

Soils in all the *beels* except Moridesoi (Golaghat) and Motapung (Tinsukia) were acidic in nature. Organic carbon levels were moderate to high (0.55 to 2.28 %) in all the districts which indicated high biological productivity of the *beels* even though their sediments were generally acidic. Water was generally clear with transparency ranging from 17 to 98 cm and in many cases, the bottom was visible. Chemical makeup of water in terms of pH, total alkalinity, specific conductivity and total hardness and dissolved nutrients were studied.

Primary productivity

The rate of carbon production by phytoplankton varied widely among *beels*/districts. Gross and net production ranged from 562 to 2,250 and from 0 to 1,717 mg C m⁻³ day⁻¹ respectively. Very low rates of net primary productivity (0 to 281 mg C m⁻³ day⁻¹) were recorded in weed-choked *beels*.

Biotic communities

Plankton : Open *beels*, which generally harboured less macrophytes, were favourably disposed for energy transformation through phytoplankton. The plankton ranged from 0-84 nos l^{-1} .

Benthos : Benthic communities varied widely in the *beels* ranging between 0 to 960 org. m^{-2} .

Macrophytes : Closed *beels* were mostly choked with floating (*E. crassipes*), submerged (*Najas*, *Vallisneria*, *Hydrilla*) and marginal (*Typha*) vegetation. The infestation percentage in the various *beels* ranged from 20-90%.

Fish and fishery

Fish yield of the *beels* under study were in the range of 30-600 kg ha^{-1} year⁻¹. Most of the *beels* are being managed on capture fishery norms by exploiting the natural fish stock. In the absence of any species management, these *beels* were dominated by small fishes

Fish and fisheries of the *beels* surveyed in Assam

District	Area (ha)	Depth (m)	Dominant fish	Fishing methods
Golaghat	10-50	1.0-5.0	<i>Puntius</i> spp., <i>Danio</i> spp., <i>Colisa</i> spp., <i>Botia</i> sp., <i>M. pancalus</i> , <i>M. vittatus</i> , Small prawns, <i>L. gonius</i> , <i>Wallago attu</i>	Drag net, Gill nets, Surrounding net, cast net
Jorhat	30-89	0.9-4.5	<i>Puntius</i> spp., <i>Danio</i> spp., <i>Colisa</i> spp., <i>Botia</i> sp., <i>M. pancalus</i> , <i>Chanda</i> spp., <i>L. gonius</i> , <i>Wallago attu</i> , <i>A. mola</i>	Gill net, Cast net, Surrounding net, Jeng fishing
Sibsagar	4-180	0.8-3.0	<i>Puntius</i> spp., <i>Danio</i> spp., <i>Colisa</i> spp., <i>Botia</i> sp., <i>M. pancalus</i> , <i>M. vittatus</i> , Small prawns, <i>L. gonius</i> , <i>Wallago attu</i>	Drag net, Surrounding net, Jeng fishing
Tinsukia	30-70	1.5-7.0	<i>Puntius</i> spp., <i>Danio</i> spp., <i>Colisa</i> spp., <i>Botia</i> sp., <i>M. pancalus</i> , <i>Chanda</i> spp., <i>L. gonius</i> , <i>L. calbasu</i> , <i>Wallago attu</i> , <i>A. mola</i> , small prawns	Gill net, surrounding net, Drag net, Traps
Dibrugarh	20-45	1.0-6.0	<i>Puntius</i> spp., <i>Danio</i> spp., <i>Colisa</i> spp., <i>Botia</i> sp., <i>M. pancalus</i> , <i>M. vittatus</i> , Small prawns, <i>Channa punctatus</i> , <i>H. fossilis</i> , <i>A. testudineus</i> , <i>L. gonius</i> , <i>Catla catla</i> , <i>Wallago attu</i>	Long line, Gill net, Jeng fishing
Dhemaji	10-65	1.0-3.0	<i>Puntius</i> spp., <i>Danio</i> spp., <i>Colisa</i> spp., <i>Botia</i> sp., <i>M. pancalus</i> , <i>M. vittatus</i> , Small prawns, <i>L. gonius</i> , <i>Wallago attu</i>	Drag net, Gill nets, Surrounding net, cast net

IMC - *Catla catla*, *Cirrhinus mrigala*, *Labeo rohita*

Fishing gears used in the *beels* were drag nets, surrounding nets, traps, *katal/jeng* fishing, long lines and gill nets. Indigenous fish species belonging to the *beels* such as *Labeo calbasu*, *L. gonius* and *L. bata* can be potential candidates species for developing a culture-based fishery in Assam. Small prawns formed a substantial fishery in beels of Tinsukia and Golaghat districts.

Ornamental fish species

Regular surveys were conducted in the *beels* and rivers to spot fish species of potential ornamental value.

Pen Culture in beels

An experiment on pen culture was conducted in Samaguri *beel*, Nagaon district as tabulated below.

Growth performance of fish

Rearing period Period (Days)	Average length (mm)	Average weight (g)
0	140	50
45	200 (60mm)	95 (45g)
100	215 (75mm)	120 (70g)

The standing crop in the pen is estimated at 36 kg which is equivalent to 7.2 kg 10m². The fish is expected to grow further till the final harvesting scheduled for June, 1999.

Estimation of fish production in the river Brahmaputra

A total of 311.08 t of fishes were estimated to have been landed at Uzanbazar fish assembly centre of the river Brahmaputra. The catch comprised minor carps (26.09%), major carps (21.53%), cat fishes (6.81%), featherbacks(3.30%), *T. ilisha* (1.22%) and others (41.05%). *L. calbasu* (6.65%) and *L. rohita* (6.24%) dominated the major carps. *C. reba* (11.37%) and *L. bata* (11.28%) accounted for most of the minor carps. Among the cat fishes *W. attu* (5.31%) completely dominated the catch. Other species include *L. dero*, *G. chapra*, *C. garua*, *A. coila*, *A. morar* etc. The concentration of catch was predominant during the period July- October mainly due to large-scale capture of fingerlings.

The prices of *L. rohita* range from Rs. 60.00 to Rs.120.00, *L. calbasu* from Rs. 50.00 to Rs. 80.00, *C. catla* from Rs.60.00 to Rs. 100.00, *A. seenghala* from Rs.80.00 to Rs.120.00, minor carps around Rs.100.00 and *W. attu* from Rs.50.00 to Rs.100.00

West Bengal

Pen culture of prawn

Pen culture experiment of the giant freshwater prawn, *Macrobrachium rosenbergii* was carried out to standardize the stocking density. The optimum stocking density could be fixed as 40,000 nos ha⁻¹ for the pen culture of giant freshwater prawns.

Socio-economic status of the fishers

A total of ten beels, five each from North (Nehati, Moranadi, Patari, Bhaluka, Bandardaha) and South (Bhomra, Bansdaha, Kole, Akaipur, Kola) Bengal were surveyed to find out the socio-economic condition of the fishers of these beels. About 25 fishers from each beel were randomly selected to get the relevant information in a prepared standardized proforma.

As a whole, economic condition of the fishers was very poor. Only 40% of the total population held agricultural land and the land holding ranged between 0.01-0.99 ha only. Majority (87%) of the fishers adopted fishery as their primary occupation followed by agriculture (5%) and the rest adopted various other miscellaneous occupations. About 72% of fishers practice animal husbandry for their meeting their own consumption as well as for marketing. The annual earning of 56% of the fishers ranged between Rs. 11,000-20,000/-. However, they remain engaged almost throughout the year. The family size of the fishers as a whole in Bengal consists of 3-4 members.

In North and South Bengal, fishers possess mainly fishing nets. In North Bengal 10% of them possess boats and in South Bengal the ratio of net holders to boat holders is 23.6:13.4. Fish culture practice was adopted by 9% of the total population and they rear mostly seed for stocking and earn a net profit of Rs. 10,000 per year.

Fishery cooperatives were active in all the selected beels. The marketing of the produce was only through these societies.

Ornamental fish species

Eight species of fishes were identified from beels of West Bengal as having ornamental value.

PROJECT : FW/A/2
(In lieu of FC/A/27)

**SEASONAL STUDIES ON FISHERIES RESOURCES IN
RELATION TO ENVIRONMENTAL QUALITY AND
PRODUCTION POTENTIAL IN SELECTED
BACKWATERS.**

Personnel : V. K. Unnithan (Scientist)
S. Bijoy Nandan, C. K. Vava (Technicals)

Duration : April 1997-March 1999 (Extended by one year)

Location : Alappuzha, Kerala

Ten backwaters, viz., Kadinamkulam, Anchuthengu, Ashtamudi, Kayamkulam, Azhikode, Chettuva, Ponnani, Mahe, Valapattanam and Neleswaram were assessed for fishery during 1998-99. A systematic database was created for the first time for the fishery of these ecosystems.

Fish landings and catch composition

Ninety four species of fish and shellfishes (excluding the molluscs) were identified contributing to the fishery of these backwaters. Of these species, 83 were fishes, 8 were prawns, and 3 were crabs. Of the species listed, 64 have been recorded from the marine waters by different workers, thereby establishing a close relationship of the backwater fishery with that of the marine system.

The total landings from different backwaters varied from 96.8 t in Mahe to 2898.7 t in the Astamudi backwater. The average yield ha⁻¹ varied from 246 kg from the Valapattanam backwater to 2747.3 Kg from the Azhikode backwater. An analysis of the income distribution of the fishermen showed that they receive only 48-78% of the market price at the landing site through auction.

Craft, Gear and CPUE

Over 30 types of gears were observed from the backwaters during the present survey. Their density (no. km⁻²) in different systems ranged from 52 in Ashtamudi to 174 nos in Mahe. The stake nets, Chinese dip nets and the siene nets were small meshed gears (c. 6mm) bringing ashore large quantities of young ones and juveniles. The average CPUE was highest at Azhikode (13.5 Kg unit⁻¹ day⁻¹) and the lowest in the Anchuthengu backwater (3.7 Kg unit⁻¹ day⁻¹). The density of fishermen per km² varied from 58 in Ashtamudi to 203 in Mahe. (Av. 74nos. km²).

Since the backwater fishery is largely dependent on the migratory stock, the intense exploitation may adversely affect the marine stock in the adjoining sea. This also warrants an immediate attention to the fishery regulation in the backwater ecosystems.

Percentage contribution by various species/groups to the total landings from the ten backwaters during 1998-99

Species/ Groups	Contribution (%) to total landings	Species/ Groups	Contribution (%) to total landings
<i>Acanthurus</i> spp.	0.27	<i>Gerres</i> spp.	1078
<i>Platycephalus</i> sp.	1.06	<i>Leiognathus</i> spp.	0.63
<i>Eetroplus</i> spp.	5.8	<i>Megalops</i> sp.	0.47
<i>Tachysurus</i> spp.	2.97	<i>Ambassis</i> sp.	2.92
<i>O. Mossambicus</i>	0.31	<i>Stolephorus</i> sp.	1.43
<i>Sillago sihama</i>	0.55	<i>Caranx</i> spp.	0.90
<i>Lutjanus</i> spp.	1.07	Mulletts	4.23
Flat fishes	0.65	Half beaks	0.12
Others	9.78	<i>Metapenaeus dobsonii</i>	38.8
<i>M. Monoceros</i>	7.63	<i>Penaeus indicus</i>	9.3
<i>P. monodon</i>	0.9	Other penaeids	0.5
Non-penaeids	0.5	Crabs	7.4

PROJECT : EM/B/1

**ASSESSMENT OF ENVIRONMENTAL IMPACT ON
BIOTIC COMMUNITY IN RIVERS AND ASSOCIATED
ECOSYSTEMS**

Sub-Project : (1) Environmental assessment of selected river systems

(2) Bio-integrity assessment and evaluation

Personnel : M.K. Mukhaopadhyaya, M.A. Khan, B.C. Jha, K. Chandra,
K. Mitra, , U. Moza, Balbir Singh, Srikanta Samanta,
S. Manna (Scientists)
S.P. Ghosh, S. Bhowmik, Keya Saha, S. Bandopadhyaya,
K.K. Das (Technicals)

Duration : April 1998-March 2003

Location : Barrackpore, Allahabad, Karnal

Water and sediment quality assessment

The investigations under the project on water and sediment quality assessment revealed that BOD and metal contents at Kanpur stretches were above normal limits, whereas the same were within permissible limits in West Bengal at Tribeni and Rishra sites.

Sediment was alkaline at all the centres in river Ganga from Shekhpur to Rishra (pH 7.7-8.2) with low organic carbon content (0.14-0.42%).

Bioaccumulation of metals were investigated in water, soil sediments, fish and macrobenthos at Rishra and Triveni.

The microbiological studies undertaken at Samudragarh and Baranagar for heterotrophic bacteria count, phosphate solubilising bacteria count, total coliform and fecal coliform count revealed that Samudragarh area was more productive and hygienic.

Tissue Fish (<i>R. rita</i>)				
<u>Metals</u> (ug l ⁻¹)				
Cu	8.43			
Cr.	30.18			
Cd.	3.98		0.007-0.008	
Pb.	40.18		0.172-0.184	
Zn.	58.73		0.01-0.048	
<u>Soil</u> . (ug g ⁻¹)				
Cu		13.14	9.13	21.97
Cr		29.49		
Pb.	31.38		9.87	18.57
Zn.	65.56		115.0	
	180.17			
Hg	Insignificant			
Cd.			Insignificant	
<u>Pesticides</u> (ppb)				
PP'DDT			7.78	
	413.0			
-BHC			28.3	85.9
PP'DDE				
Tissue Fish (<i>R. rita</i>)				

Impact on biotic communities

Plankton and Benthos : Dominance of *Rotifers* and *Microcystis* sp. and *Oscillatoria* sp. was indicative of organic contamination in the gangetic stretch in and around Kanpur. Higher organic contamination of the river sediments were confirmed by the dominance of Chironomids and Gastropods in the entire stretch.

Fishery

River Ganga recorded an estimated 15.5 t fish production in 1998-99 which was more than 56% less as compared to the fish production recorded in the year 1965-66. Time scale shift in fish community structure was evident from fluctuation in percent distribution of important groups of fishes in the stretch. Group-wise the major carp fisheries suffered maximum exhibiting 96-48% decline, while the cat fishes and other fishes declined 56.87% and 45-38% respectively. The changed community structure was indicative of the decline in contribution by primary level consumer species which has ultimately damaged the fish production. Fish community integrity on the basis of IBI was rated and the value indicated deviations from the normal in respect of percentage of tolerant (86.0-20) and insectivorous (12.8-20) species. However, the top carnivorous species percentage (4.3-1.5) moderately deviated from the normal value (5.0).

Histopathology

Histopathological studies of gills from dead fry of experimental fishes indicated mild to acute hyperplasia in secondary gill lamella and occasional degeneration of secondary filaments.

Macrophytes screening for heavy metals

Preliminary experiments with two aquatic plant, *Salvinia* sp. and *Pistia strites* revealed that these plants are capable of removing heavy metals zinc, and copper in low concentration from ambient medium.

Optimum water quality standardisation

Standardisation of water quality parameters viz. dissolved oxygen and pH for fishes was taken up under laboratory conditions. Experiments revealed variability in absolute lethal concentration, oxygen consumption stress range and breathing rates with different of exposed fishes. The major carp fingerlings when compared with those of common carp were found more sensitive to acidic pH and could tolerate lowest pH up to 3.75.

Gut content analysis revealed no significant alteration in feeding habits of carps. GSI was comparatively higher in cat fishes (1.65-3.29) compared to the major carps *C. catla*, *C. mrigala* (2.19-2.31) and *L. rohita* (2.19).

EIA of river Mahi

Saprobicity indices based on the texture of planktonic community and macrobenthic organisms indicated that the water quality of river Mahi was comparable up to Vassad and thereafter improvement occurred. The river Sabarmati stretch was found to be a grossly stressed aquatic system. The saprobicity of the water quality based on biotic index of macro-benthic community was estimated to be in the range of 7.6-9.7. This is indicative of poor water quality.

PROJECT : EM/B/2

STUDIES ON THE AETIOLOGY, PATHOPHYSIOLOGY AND IMMUNOLOGY OF FISH AND PRAWN DISEASES

Personnel : Manas Kr. Das, S.K. Manna, S. Bhatia, S. Samanta (Scientists)
S.P. Ghosh, S. Bhowmick (Technicals)

Duration : April 1998-March 2003

Location : Barrackpore

During the period under report the details of the investigation sites and pathogens isolated are presented

Site	Kulia (K1)	Kalyani (SF2)	Habibpur (H3)	Karibari (KB4)
Water quality				
PH	8.0-8.2	8.0-8.2	7.6-7.8	8.2-8.3
Alkalinity (mg/l ⁻¹)	118-165	182-198	168-172	127-132
Hardness (mg/l ⁻¹)	132-172	320-340	174-178	1650-1680
UIA (mg/l ⁻¹)	0.2-0.2	2.0-4.0	0.1	0.2-0.5
DO (mg/l ⁻¹)	7-9	6.0-6.5	8.5-9.0	7.0-9.0
Bacterial load (no. ml ⁻¹)	1500	5700	4200	3600
Fishes affected	<i>L. rohita</i> <i>C. catla</i>	<i>L. rohita</i> <i>C. mrigala</i>	<i>L. rohita</i> <i>C. mrigala</i>	<i>L. parsia</i> <i>P. monodon</i>
Pathogens isolated	<i>Aeromonas hydrophila</i> <i>M. bangalensis</i> <i>Trichodina</i> sp.	<i>Tripatiella copiosa</i>	<i>Tripatiella bulbosa</i> <i>Argulus</i> sp.	<i>Mugilicola bulbosa</i> <i>Epistylis</i> sp.

Isolation and identification of pathogens

Host : *Catla catla* fishes were afflicted with reddish eyes, periorbital oedema, reddened mouth.

Aetiological agent : The causative agent isolated was *Aeromonas hydrophila*.

Pathogenicity : Intraperitoneal injection and dip treatment of the isolated *A. hydrophila* at specific dilution showed mortality from 8th day and total mortality by day 10. Histopathological studies of liver indicated parenchymal cells of irregular shape and with vacuoler and dilated sinusoids. *A. hydrophila* could be reisolated from the liver and kidney.

Antigen preparation : From the bacterial isolate of *A. hydrophila* three kinds of antigens were prepared : (i) Heat inactivated, (ii) Sonicated and (iii) Formalin inactivated.

Experiments on stress diagnosis in fish

Cortisol

A series of four experiments of one month duration was conducted in the laboratory and field to determine the resting levels of the stress hormone cortisol. The test fish *L. rohita* (122 mm-176 m; 24-36 gms) were acclimated and reared for one month with water quality ranges (pH 7.8-8.2; Alkalinity 165-322, Hardness 172-262, UIA-Nil-0.2, D.O. 9.5-11.0). The level of cortisol measured from 40 fishes of four experimental set up by the ELISA method ranged from (42-128 ng ml⁻¹) (78.2).

Interrenal activity

Assessment of the activity of internal cells of anterior kidney of *L. rohita* was done. 20 clinically healthy *L. rohita* (122 m-210 m; 24-60 gm) were raised under optimum water quality conditions in laboratory and field (pH 7.8-8.2, alkalinity 165-322, hardness 172-262, UIA, Nil-0.2, D.O. 9.5-11.0). The anterior kidneys were histologically examined to determine the normal interrenal cell area and their nuclear diameters. The measurement of 300 interrenal cells of *L. rohita* were statistically analysed.

Inter-renal cell	Mean μm	Range
Cell area	36.88	8.68-78.5
Nuclear diameter	2.15	1.25-3.75

Leucocrit evaluation

The leucocrit % and differential count were done to determine their normal level for 20 *L. rohita*. The leucocrit percentage ranged from (0.5-0.9) and the differential count of leucocytes were lymphocytes (1.3-5.6%) monocytes (0.07-0.4%), and neutrophil (0.04-0.4%). The normal values are significant for comparison because stress in fishes result in lymphocytopenia, monocytopenia and neutrophilia.

Twenty-five permanent slides of various fish pathogens isolated were prepared. Twenty slides for histological studies were prepared and thirty slides of blood film were prepared for further studies.

PROJECT : HL/A/1
(In lieu of BF/A/22))

IMPACT OF FARAKKA BARRAGE ON RECRUITMENT OF HILSA

Personnel : H.P. Singh, A. Mukherjee, A. Ghosh, A. Hajra (Scientists)
K.S. Banerjee, K.P. Singh (Technicals)

Duration : April 1995-March 1999

Location : Malda

Farakka region

Total fish landing : The total fish landing from the Farakka region above and below the Farakka barrage has been estimated to the tune of 140.79 t, exhibiting an increase of 1.29% from that of the corresponding period of 1997-98. Taltala contributed 44.90% to the total fish landing of the region followed by Feeder canal (29.94%) and Beniagram (25.16%).

Miscellaneous varieties of fishes formed the bulk (45.19%) of the total fish landing of the region followed by hilsa (17.64%), catfishes (17.16%), Indian Major carps (12.37%) and prawns (3.83%). Featherbacks (2.72%) and murels (1.09%) contributed the least.

Hilsa fish catch : The total catch of hilsa, *Tenualosa ilisha* from the Ganga river system at the Farakka region during the period under report has been estimated to be 24.83 t forming 17.64% of the total fish landing from the region. Beniagram Fish Landing Centre contributed 56.06% to the total catch of hilsa from the region followed by Feeder canal (35.52%) and Taltala (8.42%).

When compared with the hilsa catch of the corresponding period of 1997-98, the total hilsa catch depicts a decrease of only 1.09%.

Manikchawk Fish Landing Centre

Total fish catch : The total fish landing from the centre during the period under report has been estimated to be 30.82 t, depicting a decrease of about 18.76% when compared with that of the corresponding period of 1997-98.

Hilsa fish catch : The total estimated catch of hilsa during the period has been estimated to be 164.75 kg, which is about 64.4% less than that of the corresponding period of 1997-98.

Rajnagar Fish Landing Centre

Total fish catch : The total fish landing from the centre during the period under report has been estimated to be 24.64 t, indicating a decrease of about 29.34% when compared with the catch of the corresponding period of 1997-98.

Hilsa fish catch : The total catch of hilsa during the period has been estimated to be only 66.00 kg, which is sixteen times less when compared with that of the previous year.

Rajmahal Fish Landing Centre

Total fish catch : The total fish landing from the centre during the period has been estimated to be 63.08 t.

Water and soil quality

During the period under report, water and soil samples were collected in summer and winter season from different centres to assess their qualities above and below the Farakka barrage.

Water : The water quality reflects that it is completely free from pollution. Data when compared with the preceding year indicate a similar trend except in case of free CO₂ and carbonate alkalinity.

Soil : Trend of observation was similar to that of last year.

Heavy Metal : As depicted below.

Concentration of heavy metals in soil sediments at different centres during 1998-99

Metals ($\mu\text{g g}^{-1}$)	Manikchakghat	Taltalaghat	Feeder canal	Nimtita
Copper	3.56	34.84	45.00	28.2
Chromium	12.54	34.00	38.12	44.2
Cadmium	1.30	1.60	1.68	1.7
Lead	24.2	32.3	37.0	35.4
Zinc	57.4	93.6	128.4	88.4

Biotic communities

Plankton : Plankton population was found to be 170 u l^{-1} at Manikchakghat, 215 u l^{-1} at Taltalaghat and 115 u l^{-1} at Beniagram during summer season.

Macrobenthos : The concentration of macrozoobenthos during monsoon was found to be highest at Manikchakghat (97.24 u m^{-2}) followed by Taltalaghat (55.50 u m^{-2}).

Biochemical studies

Studies on body composition and biochemical changes of Hilsa from Rajmahal to Nimtita show that the mean body weights were almost same (1.916 and 1.933 kg) with mean moisture contents of 63.0 and 63.5% respectively. The mean value of protein was 19.56 to 19.6%, mean lipid (fat) was 12.96 to 13.3%.

PROJECT : RA/A/1
(In lieu of AN/A/16)

**INLAND FISHERIES RESOURCE EVALUATION THROUGH
REMOTE SENSING TECHNIQUES**

Personnel : R.A. Gupta, D. Kumar, D. Nath, S.K. Mandal, Debabrata Das
(Scientists)
S.K. Majumder, K. Jacqueline, A. Sengupta (Technicals)

Duration : April 1995-March, 2000

Location : Barrackpore

Collection of topographical maps and satellite imagery

Topographical maps and satellite imagery of the selected areas were obtained and waterbodies were identified for assessment of area and other parameters.

Field collections were made from the selected water bodies in the districts of Nadia and 24-Parganas (North) of West Bengal during post monsoon period with respect to water quality parameters such as transparency, dissolved oxygen, pH, specific conductivity, total dissolved solid, total alkalinity, free CO₂, salinity, NO₃, total nitrogen, PO₄, silicate, hardness, Ca, Mg, primary productivity (gross and net), and respiration. Soil characteristics, percentage of sand, siltation percentage, clay percentage and C/N ration etc., have also been studied. Observation on biological parameters have also been taken.

GIS

Attempt has been made to create GIS on the basis of field data collected from the above mentioned districts. The map of West Bengal has been scanned and used as a reference raster. The data structure of GIS include various important parameters like name of the centre, date of sampling, location, water temperature, transparency, dissolved oxygen, pH, specific conductivity, total dissolved solid, total alkalinity, free CO₂, chlorinity, salinity, NO₃, total nitrogen, PO₄, silicate, hardness, Ca, Mg, primary productivity (gross and net), respiration along with soil characteristics namely pH, specific conductivity, total nitrogen, available nitrogen, available P₂O₅, organic carbon, free CaCO₃, percentage of sand, siltation percentage, clay percentage and C/N ratio in order to further test suitable models on these data sets. The information on management practices such as ownership, managing agency, culture practices, area of water bodies has also been added to the database for developing efficient GIS.

5 TECHNOLOGY ASSESSED AND TRANSFERRED

Extension activities

Advisory services : A total of 519 clientele consisting of fish farmers/fishermen, entrepreneurs, extension officers, NGOs, students etc. were rendered necessary advice/suggestions on various aspects of inland fisheries.

Talks delivered and mass awareness campaign : Fortyfour talks on different aspects of inland fisheries and fisheries extension were delivered and 3 campaigns were organised in the Sunderbans for mass awareness towards conservation of fish and fish/prawn seed. Two Doordarshan programmes and one Radio programme on fish conservation were arranged.

Krishi Vigyan Kendra

During the period under report the Kendra has organised and conducted employment generation training programmes in the field of paddy-cum-fish culture, veriniculture, betelvine production, hybrid tomato cultivation, mushroom production and dairy, poultry and pig production to farmers, farm youth and farm women of the adopted blocks viz. Kakdwip, Namkhana, Sagar, Pathar Pratima, Kulpi and Mandirbazar of South 24 Parganas district of West Bengal.

Name of crop	Variety grown	Area		Beneficiary		Adopted Blocks
		Target	Achievement	Target	Achievement	
Mustard	Binoy	20 ha	20 ha	100	120	Kakdwip, Namkhana, Kulpi
Sesamum	Roma	10 ha	10 ha	80	85	Kakdwip, Namkhana, Kulpi
Moong	B- 105	10 ha	10 ha	90	95	Kakdwip, Namkhana, Kulpi



Mass awareness campaign in a fishermen village in Sunderbans

CIFRI officials interviewing women fish seed collectors



Technology assessment on major crops, animal husbandry and fisheries during the period 1998-99

Sl. No.	Name of technology	No. of farmers observed	Adoption percentage	Remarks for shortfall
1	Induced breeding of Indian Major Carp	50	60	Lack of facility
2	Composite fish culture	200	80	Lack of facility
3	Paddy-cum-fish culture	50	50	Land situation
4	Hybrid tomato cultivation	100	60	Cost factor
5	Betelvine production technique	200	60	Cost factor
6	Freshwater prawn farming	20	60	Risk factor
7	Pig-cum-fish farming	20	50	Cost factor
8	Duck-cum-fish farming	30	60	Risk factor
9	Mushroom cultivation	30	40	Risk factor

The following programmes on on-farm trials were undertaken :

A. Crops : Betelvine Season : Perennial Farming situation : Irrigated

Treatment	No. of farmers	Area (ha)	Yield (No. of leaves)	Increase in yield over control in percentage
Vermicompost	101	02	1.9 million ha ⁻¹ yr ⁻¹ .	21.79
Integrated N management	10	02	1.95 million ha ⁻¹ yr ⁻¹ .	25.00
Mustard oil cake	10	02	1.56 million ha ⁻¹ yr ⁻¹ .	Control

B. Crop : Mushroom ; Productivity depends on quality of straw

Treatment	No. of farmers	Area (ha)	Yield (No. of leaves)	Increase in yield over control in percentage
High quality straw	9	180 sq.ft	800 gms sq.ft ⁻¹ in flushes	66.66
Low quality straw	9	180 sq.ft	480 gms sq.ft ⁻¹ in flushes	Control

C. Crop : Giant freshwater prawn in low saline waterbody
Season : Seasonal; Farming situation : Fish based production system

Treatment	No. of farmers	Area (ha)	Yield (No. of leaves)	Increase in yield over control in percentage
Pen	16	0.3	493 kg ha ⁻¹ 140 days ⁻¹	38.48
Pond	16	0.3	493 kg ha ⁻¹ 140 days ⁻¹	Control

D. Crop : Productivity of RIR Poultry birds
Season : Whole year; Farming situation : Livestock based production system

Treatment	No. of farmers	Unit	Yield	Increase in yield over control in percentage
Semi-intensive rearing with supplementary feeding	10	1 unit of 10 birds	190 eggs bird ⁻¹ yr ⁻¹	35.71
Free range	10	-do-	140 eggs bird ⁻¹ yr ⁻¹	Control

6 EDUCATION AND TRAINING

Training organised by the Institute

Title	Period	Participants
On-job training course on Inland Fisheries	15-24 March 1998	Students of Industrial fisheries course of Sitananda College, Nandigram, Midnapur (Total 24 participated)
Training on Management of fisheries of reservoirs	1-30 May 1998	NACA Trainee from Sri Lanka
Workshop-cum-training on prawn farming	8-9 July 1998	Extension Functionaries of the State Fisheries Department, Govt. of West Bengal (Total 20 participated)
National training course on Management of fisheries in open water systems and extension methods	10-17 November, 1998	Senior officers of various State Governments (Total 22 participated)

Training received

Dr. S. Bhatia, Scientist, CIFRI, underwent short term training course on Polymerase Chain Reaction and Nucleic Acid Probes in Animal Disease diagnosis at I.V.R.I., Bareilly.

7 AWARDS AND RECOGNITIONS

Dr. Maniranjana Sinha, Director, CIFRI was awarded the **Fellowship of Nature Conservators (F.N.C.)** by the executive council of Nature Conservators (An International Social and Scientific Organisation), Muzaffarnagar.

Dr.M. Sinha, Director, CIFRI was awarded **FZS (Fellow of Zoological Society)** by Zoological Society of Calcutta, India.

Dr.M. Sinha, Director, CIFRI was awarded the **Hon. Fellowship Award 1999** on the occasion of Inaugural Session of Indian Agricultural Scientists & Farmers Congress, by the Bioed Research & Communication Centre (Research Wing of Bioed Research Society), Allahabad, for the outstanding contribution made in the field of Agriculture.

Dr. M. Sinha, Director, CIFRI visited Bhutan from March 10 to 31, 1999 as one of the members of a mission constituted by DARE for undertaking a feasibility study of Sub-Tropical Integrated Area Development Project (STAIDP) in Bhutan. Dr. Sinha was the fishery expert of the mission.

Dr. V.K. Unnithan, Sr. Scientist was nominated as Member of the Fisheries Resource Management Society, Dept. of Fisheries, Government of Kerala.

Shri M. Roy, received 'Best athlete of ICAR' award in the ICAR Central Sports Meet at Goa.

8 LINKAGES AND COLLABORATION IN INDIA AND ABROAD INCLUDING EXTERNALLY FUNDED PROJECTS

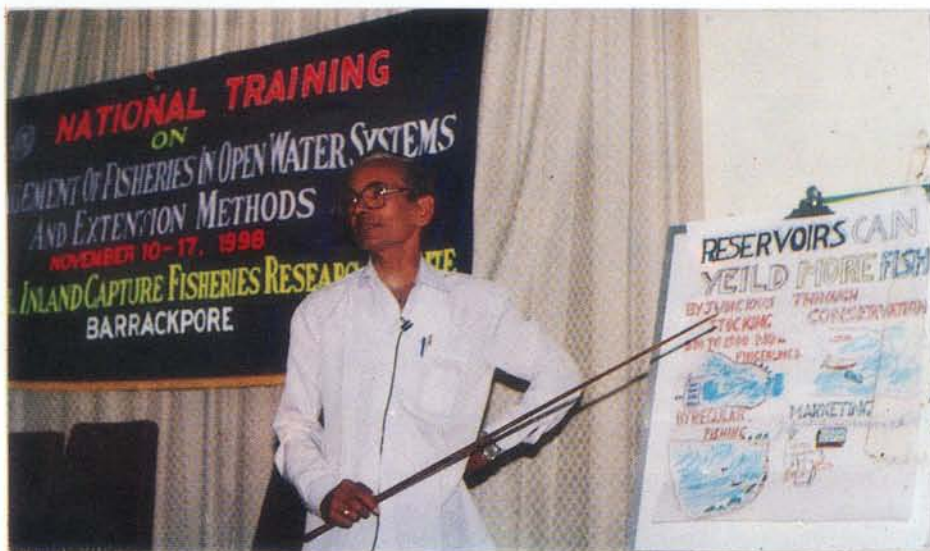
ICAR Cess Fund Projects

- i) *Dynamics of Tilapia population in Peninsular reservoirs and their possible impact on the native fish genetic resources* is under operation.
- ii) *Standardisation of the stress sensitive biological parameters in fish and their possible use as indicators of water quality* is under operation.



Participants presenting their experience in the workshop

A trainee presenting his flip chart in the training





Dr. M. Sinha, Director explaining a point to the trainees

The trainees engrossed in field studies



iii) **Ecological status and fishery potential of riverine fisheries resource of 6 NE states (Andhra Pradesh, Assam, Manipur, Meghalaya, Nagaland and Tripura)** is under operation.

- The CIFRI Center at Alappuzha collaborates with the State Government in the implementation of the *Janakeeya Matsyakrishi*, a mass fishery programme with the public participation in Kerala.
- Linkages have been made with National Remote Sensing Agency, Hyderabad to procure satellite maps. The help of the Institute of Wetland Management and Ecological Design, Calcutta has been taken for using their wetland maps.
- The Vadodara centre has linkages with the Gujarat Ecology Commission, the nodal agency to preserve environment of Gujarat State. The Commissionerate of Fisheries, Govt. of Gujarat is also linked up with this centre for research back up.
- The studies on raciation of hilsa above and below Farakka Barrage have been taken up in collaboration with the NBFGR, Lucknow.

9 AICRP/COORDINATION UNIT/NATIONAL CENTRES

Nil.

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11 LIST OF APPROVED ON-GOING PROJECTS (TITLE ONLY)

<u>Project No.</u>	<u>Name of Project</u>
RI/A/1	ECOLOGY AND PRODUCTION RELATIONSHIPS IN PENINSULAR RIVER SYSTEMS
RI/B/1	INVESTIGATIONS ON ECOLOGY, BIODIVERSITY AND PRODUCTION POTENTIAL OF TRIBUTARIES AND THEIR IMPACT ON RIVER GANGA
ES/B/1	INVESTIGATIONS ON THE FISHERIES OF HOOGLHY ESTUARINE SYSTEM AND ITS WETLANDS
ES/B/2	ECO-STATUS OF SELECTED WEST COAST ESTUARIES OF INDIA
RS/A/1	ECOLOGY AND FISHERIES OF FRESHWATER RESERVOIRS
FW/A/1	FISH PRODUCTION DYNAMICS OF FLOODPLAIN WETLANDS OF ASSAM AND WEST BENGAL
FW/A/2	SEASONAL STUDIES ON FISHERIES RESOURCES IN RELATION TO ENVIRONMENTAL QUALITY AND PRODUCTION POTENTIAL IN SELECTED BACKWATERS
EM/B/1	ASSESSMENT OF ENVIRONMENTAL IMPACT ON BIOTIC COMMUNITY IN RIVERS AND ASSOCIATED ECOSYSTEMS
EM/B/2	STUDIES ON THE AETIOLOGY, PATHOPHYSIOLOGY AND IMMUNOLOGY OF FISH AND PRAWN DISEASES
HL/A/1	IMPACT OF FARAKKA BARRAGE ON RECRUITMENT OF HILSA
RA/A/1	INLAND FISHERIES RESOURCE EVALUATION THROUGH REMOTE SENSING TECHNIQUES

12 CONSULTANCY, PATENTS, COMMERCIALISATION OF TECHNOLOGY

A Consultancy Project entitled *Ecological and Conservational perspectives of river Narmada with a special reference to SSP* of the Deptt. of Fisheries, Govt. of Maharashtra is under operation.

A Consultancy Project entitled *Likely impact on Aquatic Ecology in the context of barrage construction across the river Ganga at Kanpur* of the Deptt. of Irrigation, Govt. of Uttar Pradesh is under operation.

A Consultancy Project entitled *Compilation and Analysis of data on fisheries and water quality attributes in the river Ganga during 1985-95 for the cost and benefit of Ganga Action Plan* of the Ministry of Environment & Forests has been completed.

A World Bank funded Consultancy Project entitled *Environmental Monitoring of Oxbow Lakes fisheries impact in the State of Bihar and Uttar Pradesh* of the Ministry of Agriculture, Govt. of India is under operation.

Another World Bank funded Consultancy Project entitled *Developing Monitoring Mechanism for the World Bank assisted Shrimp & Fish Culture project (Inland Fisheries Component)* of the Ministry of Agriculture, Government of India is under operation.

13 RAC, MANAGEMENT COMMITTEE, SRC, QRT, ETC. MEETINGS

Fourth Research Advisory Committee Meeting

The fourth Research Advisory Committee meeting of the Institute was held at Central Inland Capture Fisheries Research Institute, Barrackpore on 27 April 1998 under the Chairmanship of Prof. H.P.C. Shetty and in the presence of other member viz., Dr. J.R.B. Alfred, Dr. P. Das, Dr.(Mrs.) R. Dalwani, Dr. P.C. George, Shri S. Halder, Shri Anil Agarwal and Dr. M. Sinha.

After the introductory remarks of the committee members and discussion on the Action Taken Report of the last meeting, the Heads of Divisions presented the progress and achievements under various projects. After a thorough discussion on various research projects, recommendations for future research programmes were formulated. In his concluding remarks

Director, CIFRI, thanked everybody for the deliberations made and assured the members that the suggestions given will be incorporated in future work programmes of the Institute. The draft proceedings of the meeting has been sent to the Chairman, RAC, for approval.

Management Committee Meeting

- The 21st Management Committee Meeting was held at CIFRI, Barrackpore on 28th April 1998. The meeting was attended by Dr. M. Sinha, Director, Dr. D. Saha, Dean, Faculty of Fisheries, University of Animal Sciences & Fisheries, West Bengal, Mr. Anil Agarwal, Senior Scientist, ICAR, Shri Sushanta Halder, NGO, and other members of the Institute. The proceedings of the 20th meeting was confirmed and discussions were made on the agenda items.

- The 22nd meeting of the Management Committee was held at CIFRI, Barrackpore on 22nd December 1998. Dr. M. Sinha, Chairman, Dr. R.A. Selvakumar, ADG (MFy), ICAR, Dr. D. Saha, Dean, Faculty of Fisheries, University of Animal Sciences & Fisheries, West Bengal, Shri Sushanta Halder, NGO, Shri A.P. Trivedi, F & AO, CRIJAF, Nilganj and other members of the Institute attended the meeting and confirmed the proceeding of the 21st meeting. Discussions were made on the agenda items.

Staff Research Council Meeting

Annual Staff Research Council Meeting of the Institute was held at CIFRI Auditorium, Barrackpore on 29 and 30 April 1998 to discuss the annual progress reports of projects and future plan of action under each project. Dr. M. Sinha, Director, CIFRI, chaired the proceedings. Progress achieved under all the 18 projects of the Institute was presented at the meeting by the respective project leaders.

The meeting commenced with the welcome address by Dr. M. Sinha, Director. Before starting the project wise presentation, Director exhorted the project leaders to present their salient findings as per the stipulated technical programme for the year, the shortfall if any, the future course of action and the conclusion/recommendations derived from completed projects. The project leaders of the 18 projects under the seven divisions presented the progress of work for evaluation by the council members. After elaborate deliberation future project work was decided. Director informed that the Research Project Programme for 1998-99 has to be formulated as per the Project Based Budgeting norms.

At the end Director thanked all the members for their scientific presentation and fruitful interaction and suggestions in the deliberation of the SRC.



Research Advisory Committee Meeting in progress

Scientist presenting research achievements in the SRC



Meeting of the Joint Staff Council, CIFRI

The meeting of the Institute Joint Staff Council of CIFRI was held on 1st June 1998 and at Barrackpore. The meeting was attended by Dr. M. Sinha (Chairman) and other members both from Office and Staff sides. The IJSC confirmed the proceedings of its meeting held on 3rd December 1997. Another meeting of the IJSC was held on 28th November 1998. The meeting was attended by the Chairman and other members of IJSC. The meeting confirmed the proceedings of the previous meeting. Discussions were held as per agenda items.

14 PARTICIPATION OF SCIENTISTS IN CONFERENCES, MEETINGS, WORKSHOPS, SYMPOSIA, ETC. IN INDIA AND ABROAD

The scientists of the Institute participated in various conferences/symposia/seminars/workshops and meetings held during April 1998 to March 1999, wherein they presented their research findings and exchanged views with the other delegates. List of scientists who participated/presented papers in such gatherings are given below :

Conference/Symposium/ Seminar/Workshop, etc.	Paper presented	Authors/Participants
INDO-BRAZILIAN Workshop on Agricultural Biotechnology held at NDRI, Karnal, 27-29 April 1998		Usha Moza
Workshop on Development of National Technical Guidelines on Health Certification and Quarantine for the responsible movement of Live Aquatic Animals in the country, organised by the Ministry of Agriculture, Govt. of India, held at Central Institute of Freshwater Aquaculture, Bhubaneswar from 28-29 May, 1998	Present status of fish/prawn disease management in India	M.K. Das

Inaugural function of the Faculty of Fishery Sciences and the National Workshop of West Bengal University of Animal and Fishery Sciences at Mohanpur campus on 17 July 1998	Inland fisheries resources of India and their utilization	M. Sinha
National Symposium and Workshop on fin fish and shell fish farming : Environment impact, disease and control. Organised by the Department of Zoology, University of Calcutta and Zoological Society, Calcutta, July 17-18, 1998.	-	D.K. De
National Seminar on Management of Coastal Ecosystems in India under the auspices of the Indian Council of Agricultural Research at Port Blair, Andaman Islands from 8-10 August 1998	Fisheries in coastal areas of West Bengal and the required conservation	M. Sinha
First ARIS Incharges' Workshop from 17-18 August 1998 held at NBPGR(ICAR), New Delhi.	-	D.Das
Meeting of the ICAR Regional Committee II at Administrative Staff College, Khanapara from 3 - 4 September 1998	-	V. V. Sugunan & M. Choudhury,
Experience sharing workshop for the Fisheries Sector Development in Gujarat State organised by the Commissionerate of Fisheries, Govt. of Gujarat, Gandhinagar during 22nd to 23rd , September, 1998 at Indian Institute of Management, Ahmedabad.	-	S.N.Singh

Experience Sharing Workshop for the fisheries sector development in Gujarat State held at the Indian Institute of Management, Ahmedabad on 22-23 September 1998	Inland capture fisheries resources and utilization	M. Sinha
Workshop on Role of funding agencies (banks) in fish culture development of fishermen conducted by the Deptt. of Fisheries, U.P. at Allahabad on 17 th October 1998	Riverine fisheries and marketing practices – by R.K. Tyagi	A.K. Laal and R.K. Tyagi
Eighth Kerala Swadeshi Science Congress , held at Alappuzha during 5-7 th November 1998, organised by the Swadeshi Science Movement.		V. K. Unnithan and S. Bijoy Nandan
International Conference on Ecological Engineering organised by Kalyani University held at Science City, Calcutta on 23-27 November 1998	Environmental perturbations and Inland Fisheries	M. Sinha
State Level Workshop on Reservoir Fishery Development in Orissa under World Bank Assisted Programme on 29-30 November 1998		V.V. Sugunan
Expert Committee Meeting of Bhoj Wetland sub-project on Biological control through Aquaculture at Bhopal on 12 January 1999.		Dr. M.Ramakrishniah
National Seminar on Development and Transfer of Fisheries Technology organised by the Fisheries College & Research Institute, Tamilnadu Veterinary and Animal Sciences University, Tuticorin from 3-5 February 1999	Keynote address on Development and transfer of technologies for management of fisheries in inland open water systems	M. Sinha

National Seminar on 'Development and Transfer of Fisheries Technology', Fisheries College, Tuticorin, Tamil Nadu in February 1999	A suitable marking technique for assessing the growth of fish in open water	V.K.Murugesan, C. Selvaraj, S. Manoharan and V.K.Unnithan
Second ARIS Incharges' Workshop and Seminar on LINUX" from 5-7 March 1999 held at NBPGR(ICAR),New Delhi.		D.Das
Workshop of "Fishery Technocrats Forum", held at Chennai on 13 March 1999	Delivered a lecture on Small reservoirs development.	C. Selvaraj
National Seminar on Management of Fisheries in small waterbodies organised at Chennai during 13 March 1999, organised by The Fisheries Technocrats Forum, Chennai .	Management options for the fisheries of the wetlands in the south-west coast of India	V. K. Unnithan
National Seminar on Ocean, Fish and Fisheries held at the Christ College Irinjalakuda during 24- 25 th March 1999, organised by the Dept. of Zoology, Christ college, Irinjalakkuda.	Impact of fish stock manipulation on the energy conversion and yield in Chulliar reservoir in Palakkad district, Kerala	Aji C. Panicker and V.K. Unnithan

15 WORKSHOPS, SEMINARS, SUMMER INSTITUTES, FARMERS' DAY, ETC.

Short Course on *Methods for Diagnosis and Treatment of Fish Disease* at CIFRI, Barrackpore from 15-24 July 1998

A short Course on Methods for Diagnosis and Treatment of Fish Disease was organised by CIFRI at Barrackpore from 15-24 July 1998. There had been a very encouraging response of participants to the course and thirty participants selected were scientists, lecturers, associate professors, research scholars and development officers representing SAU, ICAR Institutes, NABARD, ZSI, State Fisheries Departments and general Universities. The participants had exposure to the various fish diseases prevalent in India, their symptoms, aetiology, identification and treatment methods through a series of lectures. Identification and treatment methods for various groups of pathogens were taught through various demonstration and practical classes including a field trip. Ten hectic days of study and sharing of knowledge enriched the participants as well as the resource persons. During the course the participants made full use of the rich collection of books and other facilities in the CIFRI library and greatly enriched their literature collection on various aspects of fisheries. A very attractive compilation of the lecture notes of the Short Course was given to the participants along with other course materials and certificates.

16 DISTINGUISHED VISITORS

A number of distinguished personalities visited the Institute's Headquarters and its Centres during 1998-99. Some of them are :

Shri Tape Batt, Hon'ble Minister (Fisheries), Arunachal Pradesh
Shri T.K. Ramakrishnan, Hon'ble Minister for Fisheries, Govt. of Kerala
Dr. J. Richard Arthur, Sporwood, B.C. Canada
Prof. Ducar Mara, University of Leeds, U.K.
Mr. Alok Pandey, Professor, Computing Technology Deptt., Community
College of Southern Nevada, Las Vegas, Nevada, U.S.A.
Shri Joythilal, IAS, Director of Fisheries Trivendrum, Kerala
Dr. P. Nath, Dept. of Fisheries, Govt. of Arunachal Pradesh
Mr. N. Chaturvedi, I.A.S., Secretary of Fisheries, Govt. of West Bengal
Shri N. Vasudevan, Managing Director, Kerala State Cooperative Fisheries
Federation, Trivandrum, Kerala
Dr. B.S. Saharan, Director of Fisheries, Govt. of Harayana, Chandigarh
Mr. T. N. Sivadasan Asari, Addl. Director, Dept. of Fisheries, Govt. of Kerala

Mr. D. Thankappan, Dy. Director, Dept. of Fisheries, Govt. of Kerala
 Mr. T. D. Velayudhan, Dy. Director, Dept. of Fisheries, Govt. of Kerala
 Dr. S.A.H. Abidi, Director, CIFE, Bombay
 Dr. P. Narayan, Director of Fisheries, Uttar Pradesh.
 Dr. J. George, Director, D.B.T., New Delhi
 Dr. S. N. Pandey, Ex. Director, Central Research Institute on Jute & Allied
 Fibre, Nilgunj, Barrackpore (W.B.).
 Dr. Ravindran, Director, CIFT, Kochi
 Dr. K. Gopakumar, Dy Director General (FY), Indian Council of Agricultural
 Research, New Delhi
 Dr. R.A. Selvakumar, ADG (MFy), ICAR, New Delhi
 Lt. Col.(Dr.) R.K. Mehta, Command Hospital (EC), Alipore, Calcutta
 Dr. Meena Kumari, Sr. Scientist, CIFT, Kochi
 Dr.T.K. Sivadas, Sr. Scientist, CIFT, Kochi
 Dr. H.R. Singh, Head, Zoology Department, University of Allahabad.
 Prof. Krishna Swarup, F.N.A., F.N.F.Sc., Emeritus Scientist, National Academy of
 Science.
 Prof. U. H. Mane of Dr. Babasahenb Ambedkar Marathwada University, Aurangabad
 (Maharashtra).
 Dr. S. K. Pradhan, Pr. Scientist & Officer-in-Charge, Sunhemp Research Station,
 Pratapgarh (U.P.).
 Dr. L.S. Bhushan, Principal Scientist & Officer-in-Charge, Soil Conservation Research
 Institute, Agra.
 Shri D.S. Bharati, Chief Executive Officer, FFDA, Karnal
 Shri Om Prakash, Chief Executive Officer, FFDA, Karnal

17 PERSONNEL (MANAGERIAL POSITION ONLY)

Dr. M. Sinha, Director, CIFRI, Barrackpore, West Bengal

Riverine Division, Allahabad, Uttar Pradesh

Dr. R.S. Panwar, Principal Scientist, Head of Division (Acting)

Reservoir Division, Bangalore, Karnataka

Shri C. Selvaraj, Principal Scientist, Head of Division (Acting)

Estuarine Division, Barrackpore, West Bengal

Dr. A.K. Ghosh, Principal Scientist, Head of Division (Acting)

Environmental Monitoring & Fish Health Protection Division, Barrackpore, West Bengal

Dr. Krishna Chandra, Principal Scientist, Head of Division (Acting)

Floodplain Wetlands Division, Guwahati, Assam

Dr. V.V. Sugunan, Principal Scientist, Head of Division (Acting)

Resource Assessment Division, Barrackpore, West Bengal

Shri R.A. Gupta, Principal Scientist, Head of Division (Acting)

Hilsa Division, Maldah, West Bengal

Shri H.P. Singh, Senior Scientist, Head of Division (Acting)

Senior Administrative Officer, CIFRI, Barrackpore

Shri A.C. Ghosh (upto 26 March 1999)

Finance & Accounts Officer, CIFRI, Barrackpore

Shri S.K.C. Bose

**18 ANY OTHER RELEVANT INFORMATION SUCH AS SPECIAL
INFRASTRUCTURAL DEVELOPMENT**

An extent of 2.4 ha land has been acquired from the Government of Karnataka for construction of office, laboratories and residential quarters.

Equipments and GIS software for analysis of remote sensing data and development of GIS, have been procured and installed during the year.



Dr. M. Sinha, Director, CIFRI distributing certificate to participants of the short course

Participants engrossed in practical classes

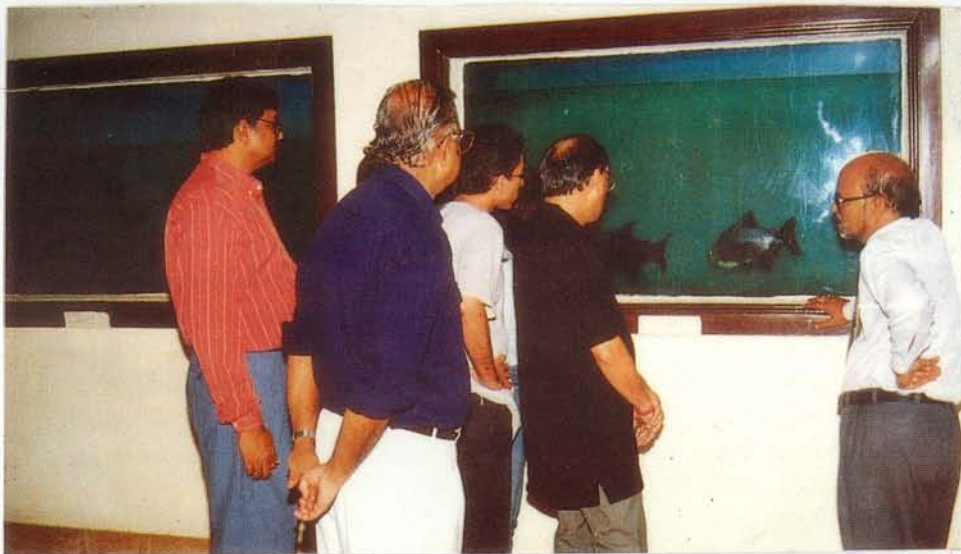




Dr. K. Gopa Kumar, DDG (Fisheries), ICAR visits
the Fish Pathology Laboratory

Hon'ble Minister of Fisheries, Govt. of Kerala
Shri T.K. Ramakrishnan taking interest in
CIFRI publications





Shri N. Chaturvedi, IAS, Secretary of Fisheries,
Govt. of West Bengal visits Aquarium

Dr. R.A. Selva Kuma, ADG, discussing with scientist
the research activities on fish disease



Estuarine Division, Barrackpore, West Bengal

Dr. A.K. Ghosh, Principal Scientist, Head of Division (Acting)

Environmental Monitoring & Fish Health Protection Division, Barrackpore, West Bengal

Dr. Krishna Chandra, Principal Scientist, Head of Division (Acting)

Floodplain Wetlands Division, Guwahati, Assam

Dr. V.V. Sugunan, Principal Scientist, Head of Division (Acting)

Resource Assessment Division, Barrackpore, West Bengal

Shri R.A. Gupta, Principal Scientist, Head of Division (Acting)

Hilsa Division, Maldah, West Bengal

Shri H.P. Singh, Senior Scientist, Head of Division (Acting)

Senior Administrative Officer, CIFRI, Barrackpore

Shri A.C. Ghosh (upto 26 March 1999)

Finance & Accounts Officer, CIFRI, Barrackpore

Shri S.K.C. Bose

**18 ANY OTHER RELEVANT INFORMATION SUCH AS SPECIAL
INFRASTRUCTURAL DEVELOPMENT**

An extent of 2.4 ha land has been acquired from the Government of Karnataka for construction of office, laboratories and residential quarters.

Equipments and GIS software for analysis of remote sensing data and development of GIS, have been procured and installed during the year.

वार्षिक प्रतिवेदन 1998-99

केन्द्रीय अंतर्स्थलीय प्रग्रहण मात्स्यकी अनुसंधान संस्थान
(भा.कृ.अनु.प.) वैरकपुर : पश्चिम बंगाल

1. आमुख

इस संस्थान का वर्ष 1998-99 का वार्षिक रिपोर्ट आपके समक्ष प्रस्तुत है । इस वार्षिक रिपोर्ट में संस्थान के विभिन्न अनुसंधान परियोजनाओं एवम् अन्य कार्यकलापों से प्राप्त परिणामों का व्यापक चित्रण प्रस्तुत किया गया है ।

रिपोर्ट की अवधि के दौरान संस्थान का मुख्य ध्येय निम्नलिखित विषयों पर था -

1. भारतीय जलाशयों वाढकृत मैदानी आर्द्र-क्षेत्र तथा नदियों जैसे गंगा, यमुना और गोदावरी
2. गंगा एवम् यमुना नदियों में प्रदूषण स्तर का अनुमापन तथा
3. मछलियों एवम् झींगों के स्वास्थ्य अनुमापन एवम् मत्स्य-रोग नियंत्रण हेतु विभिन्न प्राचलों का मानकीकरण ।

आर्थिक संसाधनों की प्राप्ति हेतु संस्थान ने निरंतर परामर्शक सेवाएँ उपलब्ध कराती रही है । अन्य बाहरी संगठनों द्वारा प्रवर्तित तदर्थ योजनाओं के माध्यम से भी वित्तीय संसाधन प्राप्त किए गए हैं ।

संस्थान ने अनेक राष्ट्रीय और अंतर्राष्ट्रीय संगठनों से सम्पर्क बनाकर अपने अनुसंधान कार्य को और भी सुदृढ़ बनाया है । संस्थान द्वारा विकसित तकनीकी प्रणालियों को सफलतापूर्वक हस्तांतरण किया गया ।

मणीरंजन सिन्हा
निदेशक

2. अधिकारिक सारांश /मुख्य उपलब्धियाँ

हरियाणा, पंजाब व हिमाचल प्रदेश के जलाशयों की उत्पादन क्षमता

संस्थान के वैज्ञानिकों ने हरियाणा, पंजाब एवम् हिमाचल प्रदेश के 7 छोटे जलाशयों में वैज्ञानिक सर्वेक्षण का कार्य किया ताकि पारिस्थितिक अभिलक्षण, जैव-विविधता एवम् मत्स्य उपज क्षमता के आधार पर जलाशयों को वर्गीकृत किया जा सके । पंजाब के जलाशयों की मत्स्य उपज वार्षिक कृत्रिम संग्रहण पर आधारित है, इन जलाशयों में प्राकृतिक मत्स्य सम्पदा उपलब्ध नहीं है । इस अध्ययन से राज्य के जलाशयों के विकास हेतु निम्नलिखित सुझाव दिए गए हैं 1) अधिकतम मत्स्य बीज संग्रहण (250 अंगुलिकाएँ प्रति हेक्टर) 2) वर्षोपरांत मछलियाँ पकड़ने के उचित पद्धतियों का अनुपालन 3) स्पिल वे एवम् चैनल मुख से मत्स्य पलायन का उचित रोकथाम । इनके उपरांत नंगल लेक में *स्नो ट्राउट* एवम् *महसीर* मछलियों के संरक्षण एवम् *सी. आडेल्ला* के अधिकतम संग्रहण से मेक्रोफाइट्स की वृद्धि के नियंत्रण करने की सिफारिश की गई है । हिमाचल प्रदेश के चमेरा जलाशय में वर्तमान शीतजल मछलियों के संग्रहण पद्धति को जारी रखने की सिफारिश की गई है ।

तमिलनाडु के जलाशयों की उत्पादन क्षमता

इस संस्थान के वैज्ञानिकों ने राज्य के 9 जलाशयों का सर्वेक्षण किया । अध्ययन से जलाशयों में निम्न से मध्यम स्तर की उत्पादकता एवम् मत्स्य प्रजातियों की विविधता में कमी देखी गई है । इन जलाशयों की मत्स्य उपज में काफी अन्तर पायी गई है जैसे अमरावती में 48 किलोग्राम प्रति हेक्टर एवम् वरट्टूपल्लम में 197 किलोग्राम प्रति हेक्टर । केवल *ओरियोक्रोमिस मोनोमविकस* प्रजाति ही सभी जलाशयों में पायी जाती है । उत्पादन क्षमता के आकलन एवम् वर्तमान उत्पादन दर के अन्तर के कारण, इन जलाशयों में प्राथमिक उत्पादकता एवम् क्षेत्रफल के आधार पर उचित संग्रहण एवम् अधिकतम समुपयोजन से, उत्पादन में वृद्धि करने की अनेक सम्भावनाएँ हैं ।

गोदावरी नदी का त्वरित सर्वेक्षण

भारत के प्रायद्वीपीय नदियों में जैसे गोदावरी, विभिन्न प्रकार की मत्स्य प्रजातियाँ पाई जाती हैं, जिनकी संरक्षण की आवश्यकता है। इस संस्थान के वैज्ञानिकों ने गोदावरी नदी का त्वरित सर्वेक्षण कार्यक्रम पूर्ण कर लिए हैं। अन्वेषणों से ज्ञात होता है कि गोदावरी नदी प्रायद्वीपीय भारत का सबसे कम उपयोग किए जानेवाली नदी है। वर्तमान में इसकी 1465 किलोमीटर की धारा में मत्स्य निवास स्थल के हास व जलीय गुणवत्ता की कमी की कोई विपेश समस्या नहीं है। प्लवक वर्ग के *क्लोरोफाइसे* पूरे नदीय क्षेत्र में पायी जाती है जो स्वच्छ नदीय पर्यावरण का द्योतक है। नदीय क्षेत्र का निछली एवम् मध्य क्षेत्र का अधिकतम शोषण होता है। भारतीय कार्प, एल. फिमब्रियाटस और बड़ी शिंगटी मछलियाँ जैसे एम. सिंगाला, एस. चिलड्रेनी, पी. पंगासियस तथा बी. बगारियस मछलियाँ नदीय क्षेत्र में अत्यधिक हैं। वर्तमान स्थिति में झींगा तथा हिल्सा मत्स्यन पर ही ध्यान केन्द्रित किया जा रहा है।

कुछ मछुओं के समुदाय नदीय उपज पर ही आधारित हैं जिससे नदी के सीमित संसाधनों का अत्यधिक शोषण हो रहा है। इन मछुआरों को अन्य मत्स्यन स्रोत उपलब्ध कराकर इस प्रकार अत्यधिक शोषण करने से रोकने की आवश्यकता है। अत्यधिक रूप से शोषित मत्स्य संसाधनों का संरक्षण मछुआरों की आर्थिक स्थिति में सुधार से ही संभव है।

केरल के पश्चजल निकायों में मत्स्य संसाधन

केरल राज्य के 10 पश्चजल निकायों काडिनमकुलम, अंचुतेंगु, आशतामुडी, कायमकुलम अजिकोड, पोन्नानी, मही, वलापट्टनम और नालेश्वरम की मत्स्य संसाधनों का मूल्यांकन किया गया। इन परितंत्रों से संबंधित आंकड़ों का डाटा वेस पहली बार तैयार किया गया है। इन जल निकायों में 94 प्रकार के मत्स्य प्रजातियों की पहचान की गई है। इनमें से 63 मत्स्य प्रजातियाँ पहले ही समुद्री जल में पहचाना गया है, जिससे इन जल निकायों का समुद्रीय तंत्र से सम्बद्धता ज्ञात होता है। इन जल निकायों का औसतन मत्स्य उपज 246 किलोग्राम से 2747 किलोग्राम प्रति हेक्टर पाया गया है। मछुआरों के आय के विश्लेषण से पता चलता है कि उन्हें अवतरण स्थान पर मछलियों के बाजार मूल्य का 48 से 78 प्रतिशत मूल्य ही प्राप्त होता है। अध्ययन के दौरान देखा गया है कि 30 प्रकार के मत्स्यन संभार एवम् इनकी सघनता 52 से

174 प्रतिवर्ग किलोमीटर की दर से उपयोग में लाया जाता है । इन जल निकायों का मत्स्यन कार्य, गहन मत्स्यन एवम् विवेकहीनता से प्रभावित है जिसके परिणामस्वरूप अत्यधिक मात्रा में अवांछनीय वजन के मछलियों का शिकार होता है ।

यमुना नदी एवम् इसके नहरों की मात्स्यकी में हास

वर्ष 1998-99 के दौरान यमुना नदी के ऊपरी क्षेत्र से (यमुनानगर से पानीपत तक) 21.08 टन मत्स्य उपज प्राप्त हुई है । इस मत्स्य उपज में 14.42 टन मछलियाँ विविध प्रकार की छोटी प्रजातियाँ तथा इसके बाद का स्थान क्रमशः शिंगटी 2.77 टन, मेजर कार्प 1.57 टन, कामन कार्प 1.2 टन और महसीर 1.12 टन का रहा । पिछले वर्ष प्राप्त उपज 21.78 टन से इस वर्ष का उपज 0.70 टन कम रहा है । नहरों से प्राप्त मत्स्य उपज 2.22 टन पिछले वर्ष के आकलन 15.63 टन से काफी घट गया है । इसके परिणामस्वरूप प्राकृतिक विवृत जल क्षेत्रों की कुल उपज वर्ष-दर-वर्ष घटते हुए 39.27 टन (95-96) से 34.39 टन (98-99) हो गई । सी. आईडिल्ला एवम् एच. मोलीट्रिक्स विदेशी प्रजातियाँ निरंतर कुछ क्षेत्र में तथा ए. नोबोलिस प्रजाति कभी-कभी पायी जाती हैं । मात्स्यकी हास के मुख्य कारण 1) जल अवरोध 2) मेजर कार्प बीजों बहुत ही कम संग्रहण 3) मत्स्यन पद्धतियाँ हैं ।

मछलियों के रक्त-प्राचलों का सामान्य स्तर का निर्धारण

मछलियों पर पड़नेवाले दबाव के अध्ययन हेतु शारीरिक रूप से स्वस्थ मछलियों के रक्त और ऊतक प्राचल जैसे हेमोग्लोबिन, हेमाटोक्रिट, लिकोक्रिट, क्लाटिंग टाइम, प्लाज्मा क्लोराइड, ग्लूकोज कोलेस्ट्रॉल, प्रोटीन, लिवर ग्लाइकोजेन, का सामान्य स्तर सांख्यिकीय रूप से निर्धारित किया गया । यह अध्ययन मछलियों के सामान्य स्वस्थ, पर्यावरणीय विपैले तत्वों द्वारा होनेवाले शरीरक्रियात्मक प्रभाव के मूल्यांकन और कुछ विशेष मत्स्य-रोगों के पहचान में सहायक है ।

मछलियों के लिए ऑक्सीजन की कमी का आकलन

माइकल ए. ली

मेजर कार्प डिम और पोना मछलियों के संदर्भ में प्रयोगशाला स्थितियों में ऑक्सीजन की घातक सांद्रता का आकलन किया गया। डिम (अंडज) के संदर्भ में घुले हुए ऑक्सीजन की अत्यंत घातक सीमा (एल.सी.₁₀₀) 28.5° - 30.5° सेन्टीग्रेड तापमान तथा 6.85-7.33 पी.एच. पर 0.4 मिलीग्राम प्रति लीटर से 0.7 मिलीग्राम प्रति लीटर के मध्य रहा। पोना के संदर्भ में यह सीमा, डिम की तुलना में अधिक रहा यानी 30° सेन्टीग्रेड तापमान और 6.75-7.39 पी.एच. पर (एल.सी.₁₀₀) की सीमा 0.18 मिलीग्राम प्रति लीटर से 0.35 मिलीग्राम प्रति लीटर के बीच रहा।

3 संक्षिप्त इतिहास

भारत सरकार ने सन् 1943 के अपने एक ज्ञापन में देश के मात्स्यकीय संसाधनों के विकास के लिए एक केन्द्रीय विभाग की स्थापना पर विशेष बल दिया था । तत्पश्चात्, केन्द्रीय सरकार की कृषि, वानिकी तथा मात्स्यकी से संबंधित उप-समिति ने भी इस प्रस्ताव का पृष्ठांकन किया था । फलस्वरूप, भारत सरकार के खाद्य तथा कृषि मंत्रालय के अन्तर्गत केन्द्रीय अन्तर्स्थलीय मात्स्यकी अनुसंधान केन्द्र की स्थापना 17 मार्च 1947 को कलकत्ता में हुई । एक अन्तरिम योजना के रूप में प्रवर्तित यह केन्द्र अब देश की अन्तर्स्थलीय मात्स्यकी क्षेत्र में एक प्रमुख अनुसंधान संस्थान का रूप ले चुका है । वर्ष 1959 में इस केन्द्र को केन्द्रीय अन्तर्स्थलीय मत्स्य अनुसंधान संस्थान का पूर्ण दर्जा प्राप्त हुआ तथा पश्चिम बंगाल के बैरकपुर स्थित नवनिर्मित भवन में इसका स्थानांतरण हुआ । वर्ष 1967 में यह संस्थान भारतीय कृषि अनुसंधान परिषद् का विधिवत सदस्य बना ।

संस्थान का मुख्य उद्देश्य देश के अन्तर्स्थलीय मात्स्यकी संसाधनों का उचित मूल्यांकन एवं इनके संरक्षण तथा अधिकतम समुपयोजन के लिए उपयुक्त प्रणालियों को विकसित करना था । इन उद्देश्यों की पूर्ति के लिए संस्थान ने देश में उपलब्ध अन्तर्स्थलीय जल संसाधनों जैसे- नदी, झील, पोखर, टैंक, जलाशय तथा बाढ़कृत आर्द्र क्षेत्र आदि के पारिस्थितिकी तथा इनकी उत्पादन क्षमताओं का अध्ययन किया तथा इन अध्ययनों द्वारा विभिन्न प्रकार के जलीय परितंत्रों की जटिल पोषी संरचना एवं पर्यावरणीय प्रकार्यों को सुलझाया ।

1970 के दशक में संस्थान ने चार अतिविशिष्ट समन्वित राष्ट्रीय परियोजनाओं का कार्य आरम्भ किया ये परियोजनाएँ थीं 'मिश्रित मत्स्य पालन व मत्स्य बीज उत्पादन' 'वायु-श्वासी मत्स्य पालन' 'अलवणीय जलाशयों की पारिस्थितिकी एवं मात्स्यकी प्रबन्धन' तथा 'लवणीय जल मत्स्य पालन' ।

इस संस्थान को निम्नलिखित मत्स्य पालन तकनीकों के विकास करने एवं उन्हें लोकप्रिय बनाने का श्रेय प्राप्त है ।

नदीय संसाधनों से मत्स्य बीज संचयन
मत्स्य बीज परिवहन संबंधित तकनीक
कार्प मछलियों का प्रेरित प्रजनन एवं नर्सरी प्रबन्धन प्रणाली
चाईनीज कार्प मछलियों का बंध प्रजनन
मिश्रित मत्स्य पालन
जलीय खरपतवारों का नियंत्रण
वायु-श्वासी मछलियों का पालन
एकीकृत मत्स्य पालन
मल जल पर आश्रित मत्स्य पालन
छोटे जलाशयों में मत्स्यकीय प्रबन्धन
लवणीय जल में मत्स्य पालन
घोंघा का पालन

उपर्युक्त तकनीकों एवं शोध प्रणालियों के फलस्वरूप ही आज देश का अन्तर्स्थलीय मत्स्य उत्पादन 2 लाख 80 हजार टन (1950-51) से बढ़कर 5.25 लाख टन (1997-98) हो गया है ।

7वीं पंचवर्षीय योजना के आरम्भ में ही इस संस्थान ने तीन अन्य संस्थानों (केन्द्रीय अलवणीय जलीय कृषि संस्थान, केन्द्रीय खारा जलीय कृषि संस्थान और राष्ट्रीय शीत जल मात्स्यकी केन्द्र) को जन्म दिया तथा इस मूल संस्थान का पुनर्नामकरण 1.4.87 से केन्द्रीय अन्तर्स्थलीय प्रग्रहण मात्स्यकी अनुसंधान संस्थान हुआ । इस परिवर्तित व्यवस्था में के. अ. प्र. म. अनु. सं. का दायित्व उन विवृत जल संसाधनों में शोध कार्य करना है जिनमें मत्स्य प्रबन्धन कार्य पर्यावरणीय अनुमापन तथा उसके संरक्षण से संबद्ध है ।

अधिदेश

इस संस्थान के वर्तमान अधिदेश निम्नलिखित हैं :-

- 1 10 हेक्टर क्षेत्रफल से बड़े जलीय संसाधनों में मत्स्य संख्या गतिकी का अध्ययन
- 2 उक्त प्रकार के जलीय संसाधनों से अधिकतम मत्स्य उत्पादन प्राप्त करने हेतु प्रबन्ध प्रणालियों को विकसित करना ।
- 3 इन जलीय संसाधनों में अपकर्षण / प्रदूषण के कारण एवं उनके प्रभाव का अध्ययन कर इन जलीय संसाधनों के संरक्षण के लिए अनुसंधानात्मक कार्य करना ।
- 4 नदीय घाटी परियोजनाओं के कारण संबंधित बेसिन की मात्स्यिकी पर पड़ने वाले दुष्प्रभावों का अध्ययन एवं इनकी प्रबन्धन के लिए प्रणालियों को विकसित करना ।
- 5 अन्तर्स्थलीय मात्स्यिकी से संबंधित आंकड़ों के संदर्भ में राष्ट्रीय केन्द्र के रूप में कार्य करना ।
- 6 प्रशिक्षण कार्यक्रमों का आयोजन एवं विस्तार / परामर्शक सेवाएं उपलब्ध करना ।

संगठन

उपर्युक्त अधिदेश की पूर्ति एवं देश के मात्स्यिकीय विकास हेतु केन्द्रीय अन्तर्स्थलीय प्रग्रहण मात्स्यिकी अनुसंधान संस्थान के अनुसंधान कार्यों को प्रमुख मात्स्यिकीय स्रोतों के अनुरूप सात प्रभागों के अन्तर्गत संगठित किया गया है ।

नदीय प्रभाग का मुख्यालय इलाहाबाद में स्थित है और यह प्रभाग नदीय पर्यावरण के संरक्षण पर पर्याप्त ध्यान देते हुए देश के नदीय मात्स्यकीय संसाधनों के प्रभावशाली प्रवन्धन हेतु तकनीकी प्रणालियों को विकसित करने का प्रयास कर रहा है । इस प्रभाग के अनुसंधान प्रकल्प गंगा, ब्रह्मपुत्र, महानदी एवं नर्मदा नदियों तथा उनके मुख्य परितंत्रों से संबंधित है ।

बंगलोर स्थित **जलाशय प्रभाग** के केन्द्र तमिलनाडु, आन्ध्र प्रदेश एवं मध्य प्रदेश राज्यों में हैं । इस प्रभाग की कार्य दिशा छोटे, मध्यम तथा बड़े जलाशयों में मत्स्य उत्पादन की वृद्धि हेतु प्रवन्धन प्रणालियों को विकसित करने की ओर है ।

वैरकपुर स्थित **ज्वारनदमुखी प्रभाग** इस समय हुगली-मातलह तथा नर्मदा ज्वारनदमुखी परितंत्रों पर कार्य कर रहा है । अनेक औद्योगिक ईकाइयों से प्रवाहित बहिःस्त्राव, कृषि एवं नगरपालिकाओं के अपरदूद आदि ने गंगा नदीय तंत्र के हुगली ज्वारनदमुख को एक अति प्रदूषित क्षेत्र बना दिया है । यह प्रभाग इसका अध्ययन कर रहा है । सुन्दरवन के ज्वारनदमुख परितंत्रों एवं मंगलो का जैविक एवं अजैविक अध्ययन भी यह प्रभाग कर रहा है ।

वैरकपुर स्थित **पर्यावरणीय अनुमापन एवं मत्स्य स्वास्थ्य परिरक्षण प्रभाग** को यह अधिदेश दिया गया है कि नदीय, जलाशय एवं ज्वारनदमुखी परितंत्रों में मानवीकृत परिवर्तनों का अनुमापन करें एवं उपयुक्त सुधारात्मक उपायों को विकसित करें । प्राकृतिक स्रोतों से प्राप्त सूचनाओं के निर्धारण के लिए प्रयोगशाला स्थितियों में भी अन्वेषण कार्य किया जा रहा है । प्रभाग द्वारा किये गए अध्ययनों में मत्स्य निवास स्थान की विभिन्नता, जैव विविधता तथा ज्ञात सूचकों के माध्यम से दुष्प्रभाव का शिनाख्त करना, नियंत्रित स्थितियों में विषैले पदार्थों को परखना, जलीय पर्यावरण में कार्बनिक पदार्थों के परिमाण के लिए सूक्ष्म जैविकी का अध्ययन और मत्स्य रोगों की पहचान तथा इनके उपचार से संबंधित मौलिक सूचनाएँ भी सम्मिलित हैं । इस प्रभाग को जलीय परितंत्रों के सुधार के लिए एक कार्य योजना तैयार करने का दायित्व भी सौंपा गया है ।

बाढ़कृत मैदानी आर्द्र क्षेत्र प्रभाग का मुख्यालय वैरकपुर में स्थित है । इस प्रभाग के अन्तर्गत गंगा तथा ब्रह्मपुत्र बेसिन के आर्द्र क्षेत्रों की पारिस्थितिक गतिकी का अध्ययन किया जा रहा है ताकि इनके विकास के लिए उपयुक्त प्रणालियों को विकसित किया जा सके । गंगा तथा

ब्रह्मपुत्र बेसिन के आर्द्र क्षेत्र अपनी जैव-विविधता के कारण महत्वपूर्ण ही नहीं बल्कि विहार, पश्चिम बंगाल तथा असम राज्यों के मात्स्यकी का प्रमुख अंग हैं । यह प्रभाग इन पारिस्थितिक परितंत्रों की प्रक्रिया एवं इनकी मत्स्य उत्पादन क्षमता का अध्ययन करता है जिससे इनकी जैव-विविधता को नुकसान पहुँचाए बिना पर्यावरण के अनुकूल तकनीकी प्रणालियों को विकसित किया जा सके ।

मत्स्य स्रोत मूल्यांकन प्रभाग वैरकपुर में है और इस प्रभाग का लक्ष्य मत्स्य सम्पदा एवं मात्स्यकीय स्रोतों से संबंधित आंकड़ों को एकत्रित करना है । इस प्रभाग को विभिन्न जलीय स्रोतों में उपलब्ध मछलियों की संख्या निर्धारण कार्य का दायित्व सौंपा गया है ताकि इन अन्तर्स्थलीय मत्स्य स्रोतों का वैज्ञानिक समुपयोजन किया जा सके ।

हिल्सा प्रभाग पश्चिम बंगाल राज्य के मालदह में स्थित है । इस प्रभाग का मुख्य लक्ष्य हिल्सा मछलियों की जैविकी, स्वभाव तथा आचरण आदि पर अनुसंधान कार्य करना है जिससे गंगा नदीय क्षेत्र से कम हुई इन मछलियों की पुनर्स्थापना के उपाय किये जा सके ।

संस्थान का अनुसंधान कार्य कुल 19 अनुसंधान परियोजनाओं में विभाजित किया गया है । इन अनुसंधान परियोजनाओं का कार्य, मुख्यालय के अलावा 10 राज्यों में फैले संस्थान के 11 अनुसंधान एवं 6 सर्वेक्षण केन्द्र तथा एक कृषि विज्ञान केन्द्र से किया जा रहा है ।

पुस्तकालय सेवाएँ

इस संस्थान के पुस्तकालय ने संस्थान के मुख्यालय एवम् इसके अनुसंधान केन्द्रों के सभी वैज्ञानिकों के अलावा अन्य संगठनों के अनुसंधानकर्ताओं, शिक्षकों, विद्यार्थीगण एवम् अधिकारियों को अपनी सेवाएँ उपलब्ध कराया । इस वर्ष पुस्तकालय के पुस्तक भण्डार में 404 पुस्तकों, 152 विविध प्रकाशनों एवम् जर्नलों के 650 अंकों की वृद्धि हुई । इस समय पुस्तकालय में कुल 8036 पुस्तकें, 4247 पुनर्मुद्रित लेख, 945 मानचित्र, 3673 विविध प्रकाशन एवम् 52 शोध-ग्रन्थ उपलब्ध हैं ।

संस्थान के पुस्तकालय ने अपने विभागीय प्रकाशनों को विभिन्न संगठनों, विश्वविद्यालयों, उद्यमियों एवम् मत्स्य-पालकों को निःशुल्क भेजने का काम जारी रखा । अन्तर-पुस्तकालय ऋण के रूप में 20 प्रकाशनों को अन्य पुस्तकालयों को भेजा गया । इस वर्ष पुस्तकालय में पुस्तकों, जरनलों व अन्य पाठ्य सामग्री के खरीद हेतु 25,65,073 रुपये खर्च किए गए । इस वर्ष पुस्तकालय ने कुछ प्रकाशनों को भी प्रकाशित किया ।

परियोजना अनुमापन एवम् प्रलेखन सेवाएँ

संस्थान के परियोजनाओं में हुई प्रगति का अनुमापन तथा कर्मचारी अनुसंधान परिषद् के बैठकों का अयोजन इस अनुभाग द्वारा किया जाता है । यह अनुभाग निदेशक महोदय को नीति निर्धारण एवम् योजनाओं की तैयारी में सहायता करने के अलावा विभिन्न प्रकार के रिपोर्ट, बुलेटिन, परियोजना कार्यक्रम तथा न्यूजलेटर का प्रकाशन का कार्य करती है । इस अनुभाग द्वारा विभिन्न संगोष्ठियों में वैज्ञानिकों की सहभागिता कार्य का अनुमापन भी होती है ।

इस अनुभाग में लघु-प्रकाशन प्रणाली, फोटोकॉपी, लेमिनेशन, साइक्लोस्टाइलिंग और जिल्दसाज की सुविधाएँ उपलब्ध हैं ।

अनुसंधान परियोजना फाइल

इस अनुभाग द्वारा सभी अनुसंधान परियोजनाओं में हुई वार्षिक प्रगति तथा वैज्ञानिकों द्वारा वैयक्तिक रूप से दिए गए योगदान, का अनुमापन प्राथमिक परियोजना फाइल के माध्यम से किया जाता है । अनुसंधान परियोजनाओं की प्रगति का आर.पी.एफ. I, II, और III के माध्यम से अनुमापन, एकटीविटी माइलस्टोन, मासिक, त्रैमासिक और वार्षिक रिपोर्ट आदि इस अनुभाग के मुख्य दायित्वों में से है ।

तकनीकी रिपोर्ट एवम् प्रश्नोत्तर

लगभग 25 तकनीकी रिपोर्टों को संकलन कर परिषद्, कृषि मंत्रालय व अन्य अभिकरणों को भेजा गया । देश-विदेश से आये अनेक तकनीकी प्रश्नों का समाधान भी इस अनुभाग द्वारा प्रस्तुत किया गया ।

पर्सनल इनफरमेशन सिस्टम (पी.आई.एस.पी.)

रिपोर्ट की अवधि के दौरान 75 वैज्ञानिकों के बयोडाटा को आधुनिक बनाया गया, जिसे संस्थान तथा भारतीय कृषि अनुसंधान परिषद् में संग्रहण किया जाता है।

प्रकाशन कार्य

इस वर्ष के दौरान संस्थान द्वारा 12 बुलेटिन, 1 पुस्तक, 97-98 का वार्षिक रिपोर्ट, 2 फोल्डर और न्यूजलेटर के 2 अंक प्रकाशित किए गए हैं।
