

# Annual Report

## 2007-2008



Central Inland Fisheries Research Institute

(Indian Council of Agricultural Research)

Barrackpore, Kolkata - 700120







# ANNUAL REPORT

## 2007– 2008

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**ANNUAL REPORT 2007-2008**

**CONTENTS**

	<b>Page No.</b>
<b>1 Preface</b>	<b>1</b>
<b>2 Executive Summary</b>	<b>3</b>
<b>3 Introduction</b>	<b>7</b>
<b>4 Research Achievements</b>	<b>14</b>
<b>5. List of on-going projects</b>	<b>41</b>
<b>6. Technology Assessed and Transferred</b>	<b>45</b>
<b>7. Education and Training</b>	<b>47</b>
<b>8. Awards and Recognitions</b>	<b>50</b>
<b>9. Linkages and Collaborations</b>	<b>51</b>
<b>10. Publications</b>	<b>52</b>
<b>11. Consultancies</b>	<b>56</b>
<b>12 Meetings</b>	<b>57</b>
<b>13. Participation in Conferences, Meetings, Workshops, Symposia</b>	<b>64</b>
<b>14. Events Organised</b>	<b>69</b>
<b>15. Distinguished Visitors</b>	<b>76</b>
<b>16. Personnel (Managerial position only)</b>	<b>79</b>
<b>17. Any other relevant information such as Special Infrastructure Development</b>	<b>80</b>
<b>18. Summary in Hindi</b>	<b>1</b>

## PREFACE

During the year, the CIFRI pursued its research agenda to generate more information in understanding the production functions of our inland waters, viz. rivers, estuaries, wetlands and reservoirs. The research was also directed towards standardizing and application on pilot scale the enhancement tools to improve the fish productivity in reservoirs and wetlands. At the same time modern tools of remote sensing were used to develop digitized maps of inland water bodies in a phased manner. In the context of changing scenario of inland environment and climate change, the institute was involved actively in monitoring of ecosystem health, and assess the impacts on fish stocks at molecular, physiological and community levels. The contamination of inland waters by various toxicants and their degradation was also looked into. All the programmes have generated valuable scientific information during the year that we share with our readers. Apart from works on Institute based projects, a number of sponsored projects and consultancies were under execution. We are also associated with execution of one NAIP programme as consortium partner under Component 4. While strengthening our linkage with different research institutes, we have been able to establish project linkages with DVC, CPCB, NFDB, Govt. of M.P., Jharkhand, U.P., Haryana and Gujarat in different reservoirs and environment related investigations.

This year, after rigorous discussions at different levels, the XI Plan SFC proposal was submitted to the authorities in ICAR, which has been approved and sanctioned. The Institute has taken steps to implement the approved plan activities in a phased manner. We have also printed and released the approved VISION 2025 document, which highlights the road map for CIFRI future.

The year 2007 has been very special to the CIFRI family, we have completed 60 years of dedicated

service in the field of inland fisheries. Between April to December 2007 many activities were organized, special Diamond Jubilee lectures were delivered by the eminent experts, viz., Dr. S. Ayyappan, DDG(Fy.) ICAR, Dr. M. V. Gupta, World Fish Laureate, Prof. S. K. Pal, Director Indian Statistical Institute, Dr. Ramakrishna, Director ZSI, Dr. C.D. Mayee, Chairman ASRB, Dr. N. K. Tyagi, Member ASRB, Dr. V.R.P. Sinha, Ex. Director, CIFE & FAO Consultant, Dr. M.L. Madan, V.C., Pt. DDU Veterinary University & Cattle Research Institute, Mathura. The concluding activity was organising a National Symposium in collaboration with Inland Fisheries Society of India, held between 15-16 Dec 2007 at Barrackpore. On this occasion existing and many retired fishery scientists involved with growing of CIFRI were honoured and entire CIFRI family re-dedicated themselves to work towards the grand success of CIFRI in years ahead.

All the achievements highlighted in this report are the outcome of the sincere efforts made by all members of staff of CIFRI during the year for which they deserve appreciation but I feel that there is significant scope to further improve our performance. I am confident that in future too CIFRI staff will undertake the activities of this institute with renewed dedication and commitment.

This brief report of CIFRI, I am hopeful, will be useful to various persons and organizations interested in inland open-water fishery and ecosystem management for achieving sustainable fishery and biodiversity conservation. I personally seek their indulgence and response to make it more presentable and informative in years to come.

I express my sincere thanks to Dr. Mangala Rai, the Secretary DARE & D.G. ICAR for his support and encouragement to the activities of CIFRI. I am grateful



to Dr. S. Ayyapan, DDG (Fy.) ICAR for his guidance and continued support in furthering the research activities of this Institute. Time to time support provided to this Institute by the Fishery Division of the Council, especially Dr. A.D. Dewan (ADG, M. Fy.), Dr. V.V. Sugunan (ADG, I. Fy.), Dr. V.R. Chitranshi and Shri Anil Agarwal (Pr. Scientist) and Shri A.S. Bagha, Under Secretary is thankfully acknowledged.

I am thankful to Dr. Manas Kumar Das, Principal Scientist and Dr. S.K. Manna, Scientist

Senior Scale, in compiling the basic draft of the document and to all other colleagues who have extended their help. Shri P.R. Rao (Asst. Director (OL)) and his staff members rendered their assistance in Hindi summary, which is duly acknowledged.

Barrackpore, Kolkata  
August, 2008

K.K. Vass  
Director

## EXECUTIVE SUMMARY

The Central Inland Fisheries Research Institute (CIFRI) from its inception in March 1947 has over the years grown and established itself as a premier institute in the field of inland fisheries in the country. The Institute is located at Barrackpore, Kolkata in the state of West Bengal. At present fifty three scientists, seventy seven technicians, sixty five administrative staff and hundred forty eight supporting personnel served the institute during the period. The CIFRI had a total budget allocation of Rs. 12.14 crores for the year 2007-2008, which was effectively utilised.

The Institute organized its research programmes keeping in view the guidelines of the high level Research Advisory Committee (RAC) and recommendations of last QRT, the road map indicated in our VISION 2025 document and the thrust areas identified for the XI Plan, including overall approach paper of XI Plan of the Planning Commission, Govt. of India. The Institute also has a Management Committee guiding its activities. A number of internal committees such as Institute Research Committee, Institute Joint Staff Council, Official Language Committee, Consultancy processing cell, etc are in place and contributed in Institute's management activities through periodic meetings and consultations.

The Institute during the year focussed its attention on overall performance, which involved institutional, sponsored, contract research and consultancies. At the same time serious attention was given to transfer of technology, internal and external human resource development, public awareness programmes, establishment of linkages and institution building activities.

The research programmes were designed with major thrust on ecosystem research involving resource assessment, ecology, biodiversity, fish stock evaluation including yields and environment monitoring and its management. During the year the Institute worked on seven research programmes, involving thirty one project activities, apart from six externally funded projects and one internationally funded. Salient achievements under various programme areas are highlighted as under:

### *Riverine Fisheries*

- The assessment of fishery resources in rivers is an important aspect for formulating conservation plans. In this context, in this year investigations were carried out at 11 centres of the river Yamuna covering Badwala (Dehradun) to Allahabad (confluence point with Ganga) stretch. The data generated revealed severe pollutional load with overall low oxygen levels in Delhi-Etawah stretch. The situation was worst at Etawah ( $1.2 \text{ mg l}^{-1}$ ), it improved gradually after each confluence point when better quality water was received from tributaries in the main river and the oxygen level increased to  $7.2 \text{ mg l}^{-1}$  at Allahabad. Due to changed ecology drop in fish catch and shift in species composition was very much evident.
- Fish landings at Sadiapur and Daraganj landing centers were estimated at 115.96 and 44.02 t respectively. At Sadiapur the fishery was dominated by smaller species that contributed about 34.6%, followed by exotic species, specifically common carp contributing about 34%. These species showed an increase of 79% over the preceding years catch which reflects a changing pattern of fish stock in the river system.



### Reservoir Fisheries

- The improvement of reservoir fish production is an important thrust area of the Institute. In this direction case studies in different states are being worked out for developing site specific protocols. Accordingly, Suvarnavathy reservoir in Karnataka was investigated in which the total catch was 39.5 t and Indian major carps contributed a high of 95% to the total catches followed by tilapia. The mean CPUE was 12.3 kg registering per unit fish yield of 80.6 kg/ha. Interim recommendations for enhancing productivity of Suvarnavathy reservoir have been formulated for implementation by the State Fisheries Department.

- Another issue of concern for reservoirs is developing a model for appropriate management. In this direction secondary data on reservoirs (which include morphometric details, fish catch statistics, yield potential, primary production, etc.) collected from different states (viz. Karnataka, Rajasthan, Maharashtra, Tamil Nadu, Uttar Pradesh, Haryana, Kerala, Himachal Pradesh, Andhra Pradesh, Orissa, Madhya Pradesh and Punjab) were compiled and analysed for development of software models. Preliminary analysis of data carried out to assess any relation of fish yield with area, mean depth and primary production and other critical parameters. The relationships worked out indicated a high coefficient of determination ( $R^2$ ) for the relationships *Mean Depth vs Yield* ( $R^2=0.889$ ) and *Area vs Catch* ( $R^2=0.715$ ).

### Estuarine Fisheries

- The country has significant resource of estuarine ecosystems. In this context, a backwater lake was re-assessed for its ecological status and fishery. Accordingly, physico-chemical profile, soil quality

and texture, primary production and biotic production were extensively studied in Pulicat lake. The fisheries of Pulicat largely depend on the catch of *P. indicus*, mullets (*M. cephalus* > *M. tade* > *M. canneiuis* > *M. macrolepis* > *Liza parsia*) and *Chanos chanos*. The dominant fishery of 1970s and 1980s, the *Chanos chanos* has, however, become almost rare. Similar has been the abundance of *P. monodon*, the tiger prawn which was predominant during 1970s & 1980s. The average catch per fisher per day has been estimated to be poor at 300 g to 500 g/day, mainly of *P. indicus*

- While working in the Godavari estuarine system a total of 68 species of fishes, belonging to 37 families and 12 Orders have been recorded.

### Wetland Fisheries

- The contribution of wetlands to open water inland production is significant and the Institute is involved in improving their fish yield. In this context, wetland programme is executed in different kinds of ecosystems. Accordingly, during this period fish catch and yield as well as environmental parameters from seven wetlands, situated at 24 Parganas North district, Nadia district and at Hooghly district of West Bengal were studied. The yield of natural fish stocks from these wetlands varied from 139 to 609kg/ha. The catch composition showed that *Puntius* spp. as a group forms a major contributor to the total catch of these wetlands (6-20%), followed by *Channa* spp. (7-18%) and prawns (5-12%).

- A total of 76 species among 55 genera and 30 families were recorded from *beels* of West Bengal. Exotic fish species viz. *Barbonymus gonionotus* (*Puntius gonionotus*) *Pangasianodon hypophthalmus* (*Pangasius sutchi*), *Clarias gariepinus*,

*Oreochromis niloticus niloticus*, *Pterygoplichthys disjunctivus* and *Piaractus brachypomus* were recorded. In Mahane wetland in Uttar Pradesh IMC and exotic fishes totalling 23 fish species were recorded.

- Microcosm experiment with the macrophyte *Eichhornia crassipes* in Assam *beel* indicated its negative influence on water temperature, water pH, dissolved oxygen and specific conductivity and positive impact on free CO<sub>2</sub> and total alkalinity as compared to other types of macrophytes. Sediment enzyme profiles showed decreased phosphorus solubilization by alkaline phosphatase activity whereas acid phosphatase activity increased due to floating macrophytes and decreased due to submerged one.

- The Periphytic algae of Puthimari *beel* showed bio-accumulation of large amount of Mn and may possibly be used as a bio-indicator species.

### **Fish Health & Environment**

- The open water inland fishery in the changing scenario of environmental degradation is getting significantly impacted. This issue becomes very important for the Institute and accordingly investigations were carried out in river Damoder.

- DDTs were estimated in all the water samples analyzed from river Damoder, which even exceeded the permissible limits of EPA for aquatic life.

- IBI study in a highly industrialised stretch of river Damoder recorded 55 fish species belonging to 22 families. Significantly for the first time 5 exotic species viz. *Cyprinus carpio*, *Ctenopharyngodon idella*, *A. nobilis*, *Tilapia mossambica* and *T. nilotica* have been recorded in the catches.

- Nineteen bacteria were isolated from river Damoder for their phenol degrading capability.

- Detectable gene expression of only one isoform of metallothionein gene was observed in *Labeo rohita* exposed to 3 different concentrations 1 mg l<sup>-1</sup>, 5 mg l<sup>-1</sup> and 10 mg l<sup>-1</sup> of cadmium.

### **Fishery Resource Assessment**

- The reliable estimation of inland water resources is very essential to plan fishery development and conservation. The Institute has been involved in using remote sensing tool in this estimation across the country. Some states have been covered while in others the work is going on. Accordingly, in this year, using TNT Microimage software topographical sheets of study area were geo-referenced and watershed area of Murugama (Sahara Jore) water body of Jhalda Block in Purulia district was delineated and computed water shed area. The data collected at different centers from various water bodies have been compiled and stored in the database for future use.

- Data were collected from 50 *beels* of Nagaon district of Assam for development of GIS on wetlands of Assam. Only 11 *beels* out of 49 *beels* have more than 50% macrophyte coverage, whereas 23 *beels* have less than 25% macrophyte. Also, most of the *beels* (39 out of 49) retained seasonal connection with the parent river to maintain their natural ecology.

### **Other projects**

Apart from the institutional projects, the work was also executed for seven sponsored projects viz., Strengthening of database and information networking for fisheries sector, The ecology and



Management of aquatic weeds in Ganga and Brahmaputra basin with particular reference to fisheries enhancement, Popularization of organic farming approach in fisheries for sustainable development, Database on taxonomy and distribution of freshwater fishes of India, Impact, adaptation and vulnerability of Indian agriculture to climate change – Effect of climatic change on inland fisheries, CPPN 34: Improved fisheries productivity and management in tropical reservoirs, Arsenic in food chain: cause, effect and mitigation.

### **Other activities**

The meeting of the various committees of the

Institute viz., Institute Research Committee, Research Advisory Committee, Institute Management Committee, Official Language Committee, Institute Joint Staff Council were held as per schedule. The respective committees discussed various agenda items and provided guidelines for the proper management and smooth functioning of the Institute and execution of research activities.

The CIFRI family is representative of the diverse cultures of the country and each member participated in celebration of various national days, events with genuine spirit of harmony and brotherhood.

## INTRODUCTION

### Brief History

Based on the recommendations of sub-committee of the Central Government on Agriculture, Forestry and Fisheries the Central Inland Fisheries Research Station was formally established on 17 March 1947 in Calcutta under the Ministry of Food and Agriculture, Government of India. From this modest beginning, the station expanded its activities and was elevated in 1959 to the status of an Institute (CIFRI) and moved to its own building at Barrackpore (West Bengal). Over the years, the organization has grown and established itself as a premier research institution in the field of the inland fisheries and aquatic ecology in the country. Since 1967, the Institute is under the administrative control of Indian Council of Agricultural Research (ICAR), DARE, and Govt. of India.

Initially the main objective of this Institute was to conduct investigations for a proper appraisal of all inland fishery resources of the country and to evolve suitable methods for their optimum fish production. While fulfilling the above objective, the Institute directed its research efforts towards understanding the ecology and production functions of different types of inland water bodies in the country. But investigation were also conducted to understand pond ecosystem, its bearing on fish production which eventually lead to development of farming practices to obtain high fish yield from a unit of water area.

The Institute during late sixties and seventies focussed its attention on aquaculture research and development in consonance with the plan priorities of Government of India. Having achieved significant

progress in fishery research & farming practices in the country, the planners between 1971-1973 approved All-India Coordinated Research Projects, one each on “Composite Fish Culture”, “Riverine Fish Seed Prospecting”, “Air-breathing Fish Culture” and “Ecology and Fisheries Management of Reservoirs” and “Brackish Water Fish Farming”. The success of combined project of “Composite Fish Culture & Fish Seed Production” initiated in 1974 was the turning point in the history of fish culture in India and provided a solid foundation for the development of freshwater aquaculture in the country. This resulted in the establishment of the Freshwater Aquaculture Research & Training Centre at Dhauli (Orissa) in 1977, which later became, Central Institute of Freshwater Aquaculture (CIFA) in 1987. Simultaneously, Central Institute of Brackish-water Aquaculture (CIBA) and National Research Centre on Coldwater Fisheries (NRCCWF) were carved out from this Institute to carry out research on brackish-water aquaculture and coldwater fisheries respectively. Thus, CIFRI gave birth to three major fisheries research Institutions in the country.

As a consequence of creating specialised institutes and keeping in view the emerging issues like sustainability in open water fisheries and aquatic resource management, the CIFRI mandate, was modified.

### Our Mandate

The research and developmental programmes in inland fishery sector demands reorientation of research priorities for achieving sustainable production besides



conserving the precious biodiversity. It is in this backdrop the focus of the Institute has to shift from:

- ❖ Production Optimization to Sustainable Productivity
- ❖ Fish as the only benefit, to Ecosystem Health and Benefits.

With this shift in focus, the mandate of the institute is as under:

- ❖ To undertake basic, strategic and applied research in inland open-water fisheries viz. rivers, reservoirs, lakes, estuaries and associated waters
- ❖ To develop ecosystem-based technology and strategies for productivity enhancement in mandated waters
- ❖ To monitor environmental changes, their impacts on fisheries and developing mitigation action plans in collaboration with other organizations
- ❖ To create awareness, provide training and consultancy in inland open-water fishery management.

## Organisational Structure

Presently, the institute is pursuing its research activities through different divisions which are in turn supported by different research support services / sections. The **Riverine Division**, with its headquarters at Allahabad, in U.P. strives to monitor and develop effective management action plan for riverine fisheries and resources of the country with adequate emphasis on the conservation of fish stocks and

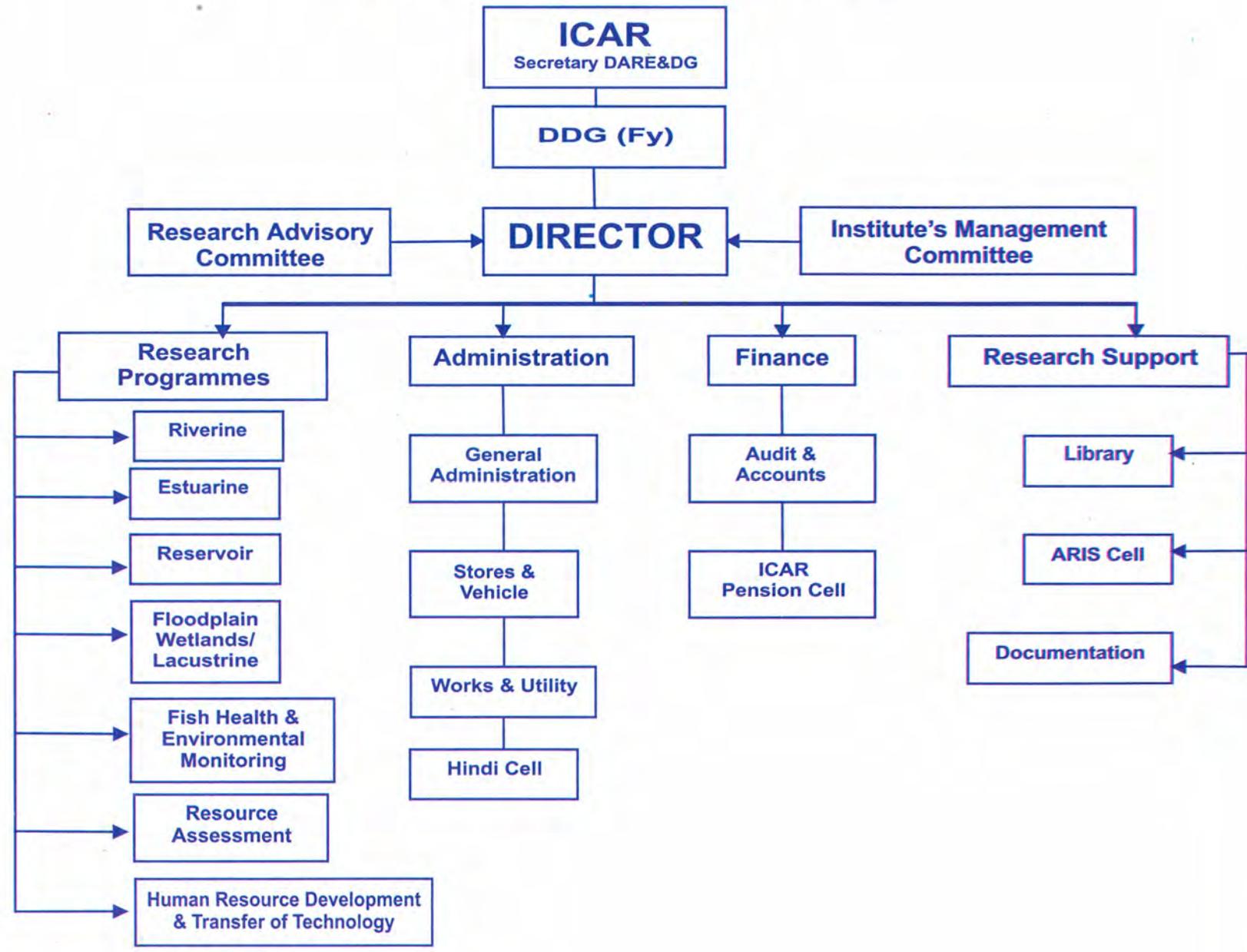
riverine environment. The **Reservoir Division** is based at Bangalore, in Karnataka. The investigations carried out in the Division are aimed at developing management norms for optimising fish yield from large, medium and small reservoirs of the country. The Barrackpore (Kolkata)-based **Estuarine Division** is involved in working on estuarine fishery & ecology, coastal wetlands and Sunderban mangrove ecology. The **Fish Health and Environmental Monitoring Division**, is working on fish health and environmental issues related to open-water fishery resources viz., rivers, wetlands, reservoirs and estuaries. It is also looking at biochemical, microbiological and biotechnological approaches for environment monitoring and management. Development of mitigation action plan for ecosystem restoration is also the responsibility of this Division. The **Floodplain Wetlands Division** carries out research on the wetland ecosystem production processes and fish production enhancement providing special attention to biodiversity conservation and development of environment-friendly technologies. The **Resource Assessment Division** is located at Barrackpore (Kolkata) 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 sustainable exploitation of inland fish stocks and develop resource management database on GIS format. The **Human Resource Development and Transfer of Technology Division** is located at Barrackpore (Kolkata). The institute has aimed at manpower training and education of fisheries personnel under Human Resource Development. The Transfer of Technology wing undertakes on regular basis the dissemination of various technologies of inland fisheries to the fish farmers, fishermen, entrepreneurs, extension functionaries through

training, demonstration, advisory service, fish farmers' day, camp discussion, film show, exhibition, etc.

The Director in Research Management Position heads the Institute. The responsibility of overall management of the Institute lies with Management Committee under the chairmanship of the Director. The Institute Research Committee and the Research

Advisory Committee make the specific recommendations pertaining to research and extension activities of the institute. The Institute's research activities are organised under various research projects, which are executed from the headquarters at Barrackpore (Kolkata), and Regional Centres at Allahabad, Bangalore, Vadodara and Guwahati. The structural outline of the institute is depicted in the Organogram.

# ORGANOGRAM OF CIFRI



## Research Support Services

### Library

CIFRI Library provides services to the scientists of the Headquarters and Centres as well as to the research scholars, teachers and other officials from different organizations. The library added 540 books out of which 217 books are in Hindi, 12 miscellaneous publications and 598 loose issues of journals to its collection and subscribed 16 foreign, 37 Indian and 102 e-Journals (foreign) during the year. The current total holdings are 11909 books, 4312 reprints, 1252 maps and 4342 miscellaneous publications. Complete digitization of books and other materials is under process.

The library maintained free mailing of the Institute's publication to various research organizations, universities, entrepreneurs and farmers to keep abreast with latest developments. The publication of Indian Fisheries Abstracts was continued. The library has exchange programmes with other National and International organizations. A budget of Rs. 30,66,737 was provided and spent during the year 2007-08 for procuring library books, journals and other reading materials.

### Project Monitoring and Documentation Section

The Section maintains project records through the Primary Project Files and Scientists' Files through RPF I, II and III. Preparation of Quarterly (QPR), Annual Reports and CIFRI News are some of the major responsibilities of the section. Technical briefs highlighting the progress of research under various projects are compiled and provided to the Council,

Ministry of Agriculture and other agencies from time to time. Technical queries regarding the activities of the Institute from various quarters within and outside the country were attended to by the section. The section monitored the progress of Research Projects of the Institute. The section processed the research papers submitted by the scientists for their publications in different journals and for presentation in symposia/workshops/summer school, *etc.* Participation of scientists in seminars, symposia, conferences, *etc.* was also monitored by the section. It is entrusted with the responsibility of publication of bulletin, annual report, newsletter, brochure *etc.* During the year this section published annual report, two newsletters and four bulletins.

### ARIS facility

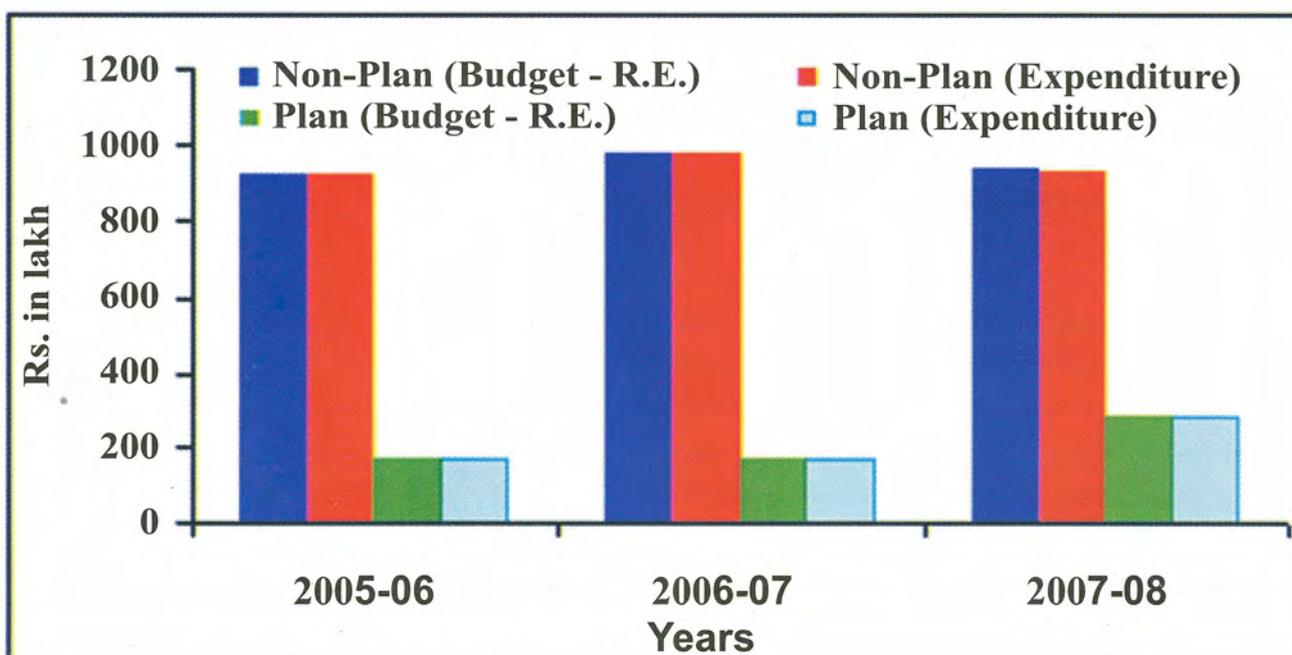
The computer related facilities are provided to the scientists and other staff members of the institute by this Cell. Total LAN system is in place. The 24-hour 512 kbps internet and E.mail facility has been provided to scientists. Centralized antivirus and firewall programmes are installed for protection of computers and data against malicious activities. The Institute website ([www.cifri.ernet.in](http://www.cifri.ernet.in)) is also updated regularly by the Cell.



**Budget Statement for the year 2007 - 2008**

(Rs. in lakhs)

Head of Account	Budget (R.E.)		Expenditure	
	Plan	Non - plan	Plan	Non - plan
Pay & allowances including OTA	-	820.40	-	820.40
T.A	21.00	6.40	21.00	5.77
Other charges including equipment, library books, I.T and H.R.D	257.00	90.65	257.00	90.65
Works	-	18.55	-	18.54
Others	-	-	-	-
<b>Grand total</b>	<b>278.00</b>	<b>936.00</b>	<b>278.00</b>	<b>935.36</b>



**Staff Position as on March 31, 2008**

Serial No.	Category	Sanctioned	In position
1.	Director (RMP)	01	01
2.	Scientific	98	53*
3.	Technical	90	77
4.	Administrative	80	65
5.	Supporting	168	148
	Total	437	344

\* Including four (4) Technical Personnel of KVK adjusted against scientific post, as per the Council's directive.



## RESEARCH ACHIEVEMENTS

Research achievements during the year 2007-2008 under major programme areas at CIFRI are given hereunder:

## INSTITUTIONAL PROJECTS

### RIVERINE FISHERIES

#### *Ecology and fisheries of the Yamuna river system*

The Yamuna river system was investigated at 11 centres, viz., Badwala, Kalanaur (Yamunanagar), Sunauli (Panipat), Delhi, Mathura, Agra, Etawah, Hamirpur, Lalauli, Mau and Allahabad.

**Sediment and water characteristics :** Sediment was alkaline in nature (pH 7.45-7.9). Sand percentage was high in Badwala-Agra stretch of river (81-98%), reaching minimum at Lalauli (65%) but again increased to 73.8% at Allahabad. Soil characteristics clearly indicated the pollutional impact in Delhi-Etawah stretch of the river. Water was rich in oxygen at Badwala (10.2 mg l<sup>-1</sup>), the upstream study site, dropping to moderate ranges after Hathnikund barrage. But due to severe pollutional load the concentration was low in Delhi-Etawah stretch, the situation was worst at Etawah (1.2 mg l<sup>-1</sup>). However, it improved after joining number of tributaries and registered the level of 7.2 mg l<sup>-1</sup> at Allahabad. Free CO<sub>2</sub> was high in Delhi-Etawah stretch with maximum at Etawah (34.2 mg l<sup>-1</sup>). Conductance was moderate at Badwala (235  $\mu$ S cm<sup>-1</sup> at 25°C) but was high in Delhi-Etawah stretch with a maximum of 1345  $\mu$ S cm<sup>-1</sup> at Etawah. Chloride was also very high in Delhi-Etawah stretch (198-230 mg l<sup>-1</sup>). The nutrient status was poor at all the centres.

**Productivity :** Carbon production and net energy assimilated by producers were minimum at Badwala

(90 mgCm<sup>-2</sup>d<sup>-1</sup> & 886 Cal m<sup>-2</sup>d<sup>-1</sup>) and maximum at Agra (481 mgCm<sup>-2</sup>d<sup>-1</sup> & 4721 Cal m<sup>-2</sup>d<sup>-1</sup>). The production rate showed sudden drop at Etawah supporting water quality deterioration.

### Biotic communities

**Plankton :** Numerical abundance of plankton varied from 20 to 4680 UI<sup>-1</sup> during monsoon with maximum at Agra. Diversity wise Bacillariophyceae (9 forms) dominated followed by Chlorophyceae (6 forms) and Myxophyceae (4 forms). In winter the abundance ranged from 340 to 6080 UI<sup>-1</sup> with maximum at Lalauli. The diversity was dominated by Chlorophyceae (13 forms) followed by Bacillariophyceae and Myxophyceae (9 forms each).

During monsoon the periphytic population density ranged from 60 to 7060 Ucm<sup>-2</sup>, with maximum at Badwala. In winter the density increased to 3160-22310 Ucm<sup>-2</sup> at Hamirpur. Bacillariophyceae dominated at all the sampling sites.

**Benthos :** Benthic population was very poor during monsoon. In winters it ranged from 30-7800 Nos.m<sup>-2</sup> with maximum at Mathura. In monsoon samples the biota was mainly represented by molluscs, while annelids dominated in winter.

### Fishery

Fish landings at Sadiapur and Daraganj stood at 115.96 and 44.02 t. Fishery showed an improvement at Sadiapur (33.5%) as compared to the preceding year. The main increase was in major carps and exotic species (78.9%). Fish landings at Sadiapur and Daraganj landing centers were

estimated at 115.96 and 44.02 t. At Sadiapur the fishery was dominated by minor species and contributed about 34.6%. Next dominant group was exotic species; specifically common carp and contributed around 34%. These species showed an increase of 79% over the preceeding year catches. This year major carp fishery improved significantly (27.84 t) and was almost three times of the preceeding year. Large catfishes showed a marginal decrease of 7.9%. Landings at Daraganj were at the level of the preceding year but with marginal decline in other groups compensated by exotic species and large catfishes. At other centres the study indicated

predominance of mahseer (*Tor putitora*) in upper stretch. The river stretch between Yamunanagar and Panipat was inhabited by small sized weed fishes. Tilapia (*Oreochromis niloticus*) was observed in the entire stretch of river (Wazirabad-Allahabad) and dominated the catches in Mathura-Etawah stretch of the river Yamuna, followed by common carp. Catfishes, major carps, murrels and weed fishes contributed marginally to catches. Maximum fishing activities were noticed in the mid and down stream segment of the river. The river is virtually sieved in these segments with the help of different types of cast, gill and drag nets.

**Table 1: Fish landings at Sadiapur and Daraganj during 2007**

Species	Sadiapur		Daraganj	
	T	%	t	%
<i>C. mrigala</i>	9.78	8.4	2.41	5.5
<i>C. catla</i>	6.62	5.7	0.90	2.0
<i>L. rohita</i>	9.04	7.8	0.42	0.9
<i>L. calbasu</i>	2.39	2.1	0.70	1.6
<b>Major carps total</b>	27.84	24.0	4.42	10.0
<i>A. aor</i>	2.88	2.5	2.18	4.9
<i>A. seenghala</i>	4.37	3.8	3.62	6.0
<i>W. attu</i>	1.10	0.9	0.23	0.5
<b>Catfishes total</b>	8.35	7.2	5.03	11.4
<i>T. ilisha</i>	0.05	0.0	0.02	0.0
Others	40.14	34.6	28.39	64.5
Common carp	35.75	30.8	4.38	9.9
Tilapia	3.83	3.3	1.78	4.0
<b>Total</b>	<b>115.96</b>		<b>44.02</b>	



### **Environmental flow requirements of rivers**

A small stretch of Betwa river proposed for linking programme was investigated, from below Parichha dam (near Jhansi) up to Hamirpur. Analysis of data revealed that discharge rate was high during 1983-87, the annual average being 30,51,411 m<sup>3</sup>sec<sup>-1</sup> which came down to 19,37,128 cusec during 1993-96. The annual discharge during 2001-07 further reduced to 3,71,312 cusec. It was only 83,618 cusec during 2007. The fish production, which was reported to be quite high in the stretch during 1983-87 has totally collapsed due to severe reduction in flow rate. The water quality parameters reflected good productive character of river. The abundance of plankton (230 UI<sup>-1</sup>), periphyton (1710 Ucm<sup>-2</sup>) and net carbon production (348 mg cm<sup>-2</sup> day<sup>-1</sup>) were all favourable.

### **ESTUARINE FISHERIES**

#### **Ecology, biodiversity and fisheries of Pulicat Lake**

**Physico-chemical profile :** The water depth ranged from 0.7 m to 3.0 m. Mean water temperature ranged between 20.5 and 25.5°C. Relatively higher water temperature was recorded during summer (28-30°C). Transparency varied from 15 to 50 cm. The lake indicated reasonably high content of dissolved oxygen (5.7-7.6 mg l<sup>-1</sup>), which can support good biotic production including the fisheries. Salinity concentration of Pulicat ranged from 7.79 to 28.91 ppt. Higher salinity was recorded near the Barmouth area (TN) and also at Sriharikota (AP), being nearer to sea. The salinity gradient of the lake thus indicates highly suitable regime for the proliferation of brackish-water biota including the fish and prawns.

**Plankton :** A total of 43 species of phytoplankton and

11 species of zooplankton have been documented so far. The important forms were *Minidiscus* sp., *Planktoniella muriformis*, *Thallossiosira pungtigera*, *Melosira nummoloidea*, *Pleurosigma normanii*, *Pseudo-nitzschia delicatissima*, *Navicula viridis* (bacillariophyceae); *Procentrum minimum*, *Gymnodium uncateneum*, *Alexandrium affine* (dinophyceae); *Oscillatoria* sp. *Gloeocapsa* sp. (blue-greens); *Phacus*, *Trachelomonas* (Euglenophyceae). Among zooplankton *Arcella*, *Vorticella*, *Polyarthra*, *Karetella*, *Cyclops* and *Nauplei* were dominant

**Fisheries :** The fisheries of Pulicat largely depend on the catch of *P. indicus*, mullets (*M. cephalus* > *M. tade* > *M. canneaius* > *M. macrolaepis* > *Liza Persia*) and *Chanos chanos*. The dominant fishery of 1970s & 1980s, the *Chanos chanos* has, however, become almost rare. Similar has been the situation with *P. monodon*, the tiger prawn which was predominant during 1970s & 1980s has declined now. Other non-penaeid prawns, contributing to the fishery were *Metapenaeus dobsonii*, *M. monoceros* and *M. brevicornis*. The Crab fishery (*Scyella serrata*) though very conspicuous, but its abundance has declined considerably. *Plotosus canius*, *Sardinella* sp. and *Hilsa keele*, which were sizeable in abundance during 1980s could not be recorded during the present campaigns. The use of destructive gears was rampant. Extensive survey of the lake indicated the trend of over-fishing, as huge catch of small size mullets were recorded. The average catch per fisher per day has been estimated to be poor at 300 g to 500 g per day, mainly of *P. indicus*. The peak fishing season in Pulicat Lake has been from July to October.

#### **Ecology and fisheries of east coast estuarine systems (Godavari)**

**Water discharge :** The monsoon months (July-Sept) account for about 95% of the mean annual discharge of

water estimated at  $\sim 90 \times 10^9 \text{ m}^3$ . The winter and post winter months recorded an estimated flow rate of  $40 \text{ m}^3 \text{ s}^{-1}$  (Nov.) –  $15 \text{ (Jan) m}^3 \text{ s}^{-1}$  respectively, or even less.

**Salinity:** At Antaravedi, at the sea mouth of Vashist branch, the salinity increased from 0.54 ppt to 20.79 ppt in November which further increased to 24.4 ppt in January. In the mangrove forest area of the Gauthami (Guthinadeevi) the salinity increased from 0.39 to 6.89 to 19.16 ppt in the respective months. The Siddhantham sampling site in Vashist branch was found to be completely dried up in January, 2008.

**Fish diversity :** A total of 68 species of fishes, belonging to 37 families and 12 Orders have so far been recorded. Seven prawn and four crab species have also been recorded.

**Hilsa fisheries :** Both during September and November *Tenualosa ilisha* was one of the most dominant species in the fishery. Hilsa migrates up to Dwaliswaram during the monsoon months through both the branches. However, during post-monsoon and winter months the hilsa fisheries was found to be restricted up to Narsapuram in Vashist branch (c. 12 km upstream from sea face) and up to Kapilaeswarapuram in the Gauthami branch (about 40 km from sea face). During monsoon the hilsa fishes encountered were mostly above 600 g (382 mm/650 g to 525mm/1250 g). In the post-monsoon campaign the size range was between 340 mm/480 g and 495 mm/1150 g. During winter campaign in January the size range was of the order 305 mm/250 g to 445 mm/780 g.

**Plankton :** The plankton concentration was highest at Antaravedi both in September and November ( 100

$\text{UI}^{-1}$  and  $380 \text{ UI}^{-1}$  respectively). Lowest ( $60 \text{ UI}^{-1}$ ) plankton concentration was obtained at Alamurru during November. In the mangrove zone of the Gautami estuary (Guthinadeevi) the plankton concentration was to the tune of  $200 \text{ UI}^{-1}$ .

**Macro-zoo-benthos :** Highest ( $222 \text{ nos. m}^{-2}$  and  $266.64 \text{ nos. m}^{-2}$ ) macro-zoo-benthos concentration was observed at Antarvedi both during September and November, and lowest ( $89 \text{ nos. m}^{-2}$ ) at Bobbaralanka (below Dwaliswaram barrage) and Railanka in Vashist branch of the estuary during September and at Guthinadeevi in Gowthami during November.

### ***Migratory pattern, behaviour and fish pass design***

**Characterization of seasonal migration of Hilsa:** A freshwater induction into the estuary in monsoon was identified as the potential cue in triggering intensive migratory tendency in Hilsa into the estuarine system, as evident from the catch rate and frequency distribution. The juvenile and small size fish are seen at shallower depth and bigger adults were invariably more abundant in higher depths.

The rate of freshwater discharge, controlled excessively at upper stretches by barriers, plays a very prominent role in shape of hilsa resource in the downstream and the estuary. There are apparent indicators on the specific preference, effectiveness and influence of hydraulic habitat characteristics, water quality, physical and biological processes etc. as a cue for guiding hilsa migration.

**Hydrological and hydraulic data relevant to designing of fish pass:** Relatively high turbidity, lower base flow, shallow water depth (2 -3.5 m), heavy

siltation of the estuary mouth and a weak salinity gradient caused lower response of hilsa migration into Devi estuary even in monsoon. Decreased flow /discharge resulting in reduced river plume might be limiting the adult hilsa reaching the estuary for reproduction.

## RESERVOIR FISHERIES

### Improving the fish productivity of Indian reservoirs

#### Multi-location trials in small reservoirs

**Suvarnavathy (Karnataka) :** The principal morphometric features are- Latitude: 10°, 49', Longitude: 70°, 1', Area at FRL: 490.57 ha, Maximum depth: 22.86 m, and Mean depth: 7.25 m. The reservoir became full in December 2007 due to anellist inflow.

**Physico-chemical parameters :** The ranges of various parameters were: surface water temperature 25.6 to 28.6 °C, transparency 0.4 to 1.6 m, pH 7.1-7.6, alkalinity 57-66 ppm and ionic concentration 104.9 to 157.0  $\mu\text{Scm}^{-1}$ . The reservoir exhibited thermal stratification with clinograde distribution of oxygen in August 2007 and January 2008. Daily integrated column gross primary production varied from 670.6 to 1912.5  $\text{mgC m}^{-2}\text{d}^{-1}$ .

**Fishery :** The average fish seed stocking rate for the years 2004 to 2007 was high, 979 Nos. $\text{ha}^{-1}\text{year}^{-1}$ . A total catch of 39.5 t was recorded during March 2007 to February 2008. This resulted in Indian major carps contributing as high as 95% to the total catches with the rest mainly by tilapia. The mean CPUE was a high of 12.3 kg. The fish yield was a high of 80.6  $\text{kg ha}^{-1}$ . Major carps do not develop natural recruitment population and the fishery is sustained mainly by stocking. Contribution of minor catfish like *O.*

*bimaculatus* and *M. cavasius* and tilapia is negligible in contrast to what is observed in many Cauvery river basin reservoirs of Karnataka.

**Kanjiraphuza reservoir ( Kerala ):** Has a water spread area of 515 ha . The various physico-chemical parameters investigated during monsoon and post-monsoon seasons indicated its oligotrophic tendency and with no pollution, the water is pristine.

**Biotic communities :** The plankton density varied from 1158-6006 Nos. $\text{l}^{-1}$ . Chlorophyceae followed by Desmidaceae dominated the phytoplankton population. Among zooplankton, rotifers outnumbered other groups in all the months. The gross primary production ranged from 12.50  $\text{mgC m}^{-3}\text{hr}^{-1}$  to 75.0  $\text{mgC m}^{-3}\text{hr}^{-1}$ .

**Fishery :** The fish yield through the years has dropped to 21.5  $\text{kg ha}^{-1}\text{yr}^{-1}$ . Poor yield may be attributed to poor management practices including incorrect stocking size and density, species composition and faulty harvesting practices.

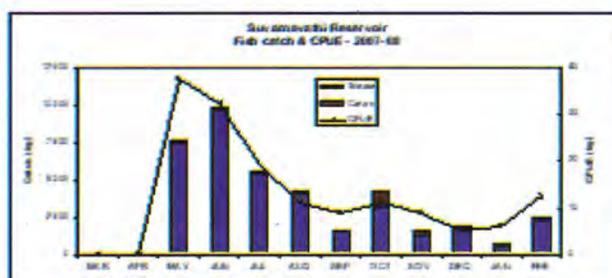


Fig. 1. Fish catch and CPUE in Suvarnavathy reservoir

**Arjun Sagar (Uttar Pradesh) :** The reservoir has an area of 1890ha at F.S.L and 700 ha at D.S.L.

**Water quality parameters:** Alkaline pH, moderately high alkalinity, conductance, dissolved solids, hardness, dissolved organic matter and rich organic reflected good productive characters of the reservoirs.

**Biotic communities :** The average plankton and benthos population were 535 U<sup>l</sup> and 215 U<sup>m</sup><sup>2</sup>, respectively. The rate of net carbon production was on average 372.2 mgC m<sup>-2</sup>d<sup>-1</sup>, with a fish production potential of 126.6 kg ha<sup>-1</sup>yr<sup>-1</sup>. The present level of fish production was estimated at 18.3 kg ha<sup>-1</sup>yr<sup>-1</sup> and thus only 14.5 % of the potential is presently being harvested.

**Kelavarapalli Reservoir ( Tamil Nadu):** This small reservoir has a total water spread area extending to 430 ha at FRL. During July 2007 to February 2008, 43.6 tonnes of fishes were landed at Kelavarapalli Reservoir with a CPUE of 8.3 Kg. The maximum catch was recorded in the month of January but the maximum CPUE was observed in August. *Oreochromis niloticus* dominated the catch at Kelavarapalli reservoir forming 72.3 % of the total

fish catch followed by *Catla catla*, *Cirrhinus mrigala*, *O. mossambicus* and *Labeo rohita*. African catfish *Clarias gariepinus* also formed a minor fishery here. The fish yield of this reservoir is estimated at 152 kg ha<sup>-1</sup>yr<sup>-1</sup>.

**Fishery:** Experimental gillnet fishing was conducted at different sites at Kelavarapalli Reservoir in December 07, January and February 08. The gear for the experimental gillnet fishing were made of nylon monofilaments with knot-to-knot mesh sizes of 80, 90 and 100 mm. These nets had an average of 4.5 m hanging depth. Sets of these gillnets of all the mentioned mesh sizes were assembled, in order of mesh size, to panels of 168 metres total length (70 & 80 mesh size) and 20 metres length for (80mm mesh size), 113 metres length (90mm) and 35metres (110mm). One habitat was sampled at a time, and all panels were placed in that habitat. The panels were placed and were soaked for 2-7 hours in different experiments. CPUE was calculated and expressed as gh<sup>-1</sup>. *O. niloticus* dominated the catch in experimental gill net fishing in all the experiments followed by *Clarias gariepinus*. The CPUE ranged from 3.4 to 4.43 kg hr<sup>-1</sup>.

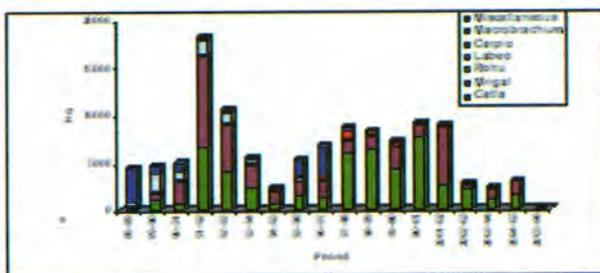


Fig. 2. Fluctuation in fish catch in Kanjirapuzha reservoir

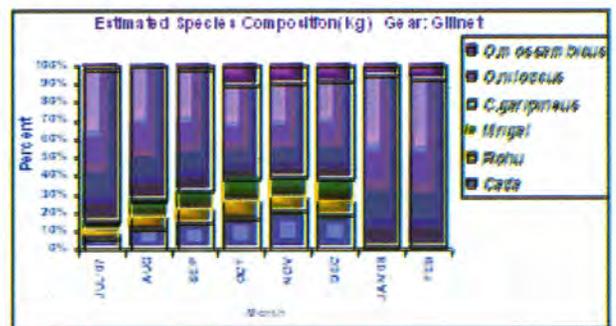


Fig.3 Estimated species composition at Kelavarapalli Reservoir

### ***Development of software models for fish yield estimation in reservoirs***

For development of software models, secondary data on reservoirs (which include morphometric details, fish catch statistics, yield potential, primary production, etc.) was collected from different states (viz. Karnataka, Rajasthan, Maharashtra, Tamil Nadu, Uttar Pradesh, Haryana, Kerala, Himachal Pradesh, Andhra Pradesh, Orissa, Madhya Pradesh and Punjab) compiled and analysed. Preliminary statistical analysis of data was carried out to get the estimated relation of yield with area, mean depth and primary production as well as the estimated relationship between other parameters.

The estimated relationships indicated a high coefficient of determination ( $R^2$ ) for the relationships Mean Depth vs Yield ( $R^2=0.889$ ) and Area vs Catch ( $R^2=0.715$ ) was observed. All the above relationships have been estimated by pooling data from all the states. Further analysis of data is required separately for each state as well as for different groups of reservoirs (i.e. small, medium and large) to estimate more precise estimates of these relationships and to draw valid inferences.



Fish catch from Suvarnavathy reservoir



Marketing of fish at Suvarnavathy reservoir



*Clarias gariepinus* at Kelavarappalli Reservoir

## WETLAND FISHERIES

### Monitoring of fisheries enhancement in beels

Two floodplain wetlands (*beels*) of West Bengal, namely, Jhagrasish and Gomokpota under East Calcutta Wetlands and three wetlands, namely, Poka bundh, Shyam bundh and Kalindi bundh in Dist. Bankura were selected. In these beels the fish species commonly used for aquaculture-based fisheries enhancement are *Catla catla*, *Cirrhinus mrigala*, *Labeo rohita*, *L. bata*, *Cyprinus carpio*, *Ctenopharyngodon idella* and *Hypophthalmichthys molitrix*. Both stocking and harvesting are a continuous process in all the wetlands studied. Annual cumulative stocking density found to be very high (35,318 – 62,596 ha<sup>-1</sup>). Seed size at stocking ranged from 12-20 cm. Low harvest size (Major carp- 98g, Silver carp-514 g) is evident in Gomokpota and Jhagrasish and low retrieval has been recorded in Poka bundh at higher harvest size (Catla-761g, Rohu-583g, Mrigal-307g, Silver carp -531g)

**Primary production:** The gross primary production estimates were 132, 155, 939, 392 and 330 mgC m<sup>-3</sup>h<sup>-1</sup> in Shyam Bundh, Kalindi, Poka Bundh, Gomokpota and Jhagrasish beels respectively. The high productivity in Poka Bundh is a result of city sewage input.

**Plankton:** Highest plankton volume (2.3ml/100 l) and density (499U l<sup>-1</sup>) were recorded in Poka bundh, while minimum density was observed in Shyam bundh.

**Benthos:** Presence of Oligochaetes represented by *Tubifex tubifex* and *Lumbriculus* was noted in all the wetlands studied. Kalindi bundh recorded low density (8 nos.m<sup>-2</sup>) of benthic community.

**Macrophyte:** In terms of coverage, more than 50% of the water area in Shyam and Kalindi bundh was recorded to be covered with macrophytes dominated by *Pennisetum*

*purpureum*. In Kalindi bundh this species forms a huge floating mass occupying the entire water spread, like *phumdih* in Loktak Lake, and is a unique feature of this wetland.

**Pen culture trial:** A total of three pens each of 0.1 ha of different shapes were designed and installed in Gomokpota east Calcutta wetland. Reducing the use of bamboo solely, HDPE nets having mesh size of 3 mm were used as pen wall. Bamboo poles and splits were used to hold the pen walls vertically in its position. The experiment was laid to test the pen material and different sizes. The shapes were circular, one rectangular pen with 50m length, and another rectangular pen with 100m length. The pens were stocked with major carp seeds at a uniform density (7500 ha<sup>-1</sup>). The experimental fishes in all the pens were fed with a mixture of mustard oil cake and rice bran *ad libitum* in a porous bag suspended from a pole. Variable growth performance was recorded during 60 days of experimental trial in different shapes of pen despite being fed with similar ration and occupying same area. Among the three major carps, *Labeo rohita* indicated better growth performance, while *C. catla* showed very poor performance in all the three shapes of pen. Highest growth (600%) was recorded with *L. rohita* in circular pen. *C. catla* indicated negative (-8.57%) growth. Growth performance of all the three carp species was found better in circular pen compared to other two shapes. Differential growth performance exhibited by different species in various shapes of pen was very distinct, except *L. rohita*

**Cage culture trial:** Two different sizes of cage having volumes of 18 and 144m<sup>3</sup> were designed and fabricated using HDPE net of 1mm mesh and another cage having volume of 24m<sup>3</sup> was designed and fabricated using the same net with bigger mesh size

of 25mm to raise table fish from advance fingerling. Fingerlings of only *C. catla* were stocked at different densities at different stocking density to study their growth performance. Fishes in each cage were fed with mixture of mustard oil cake and rice bran *ad libitum* in a suspended tray at sub-surface zone.

During 60 days trial, the data indicated that fish growth was density dependent with maximum growth (310%) at lowest density. However, the growth performance plateaued up to stocking density of 3 m<sup>-3</sup> followed by drop in growth as the density of stocking was increased.

### *Exotic fish invading wetlands*

While improving the fish yield from wetlands through stock enhancement is acceptable but keeping the balance between indigenous and exotic species in the stocking waters is important from biodiversity angle. In these water bodies exotics have to be kept under control. In this context breeding population of tropical South American Sailfin catfish belonging to family Loricariidae was recorded in Gomokpota fishery under East Calcutta Wetlands. A huge biomass, approximately 20 metric tones was harvested in a single month during February, 2007, from the said wetlands. The two species identified were *Pterygoplichthys disjunctivus* and *P. pardalis*. Gut contents analysis indicated, the species is detritivore, since more than 95% of the content was occupied by detritus.

Gravid females with mature ova and presence of young fishes indicated the existence of breeding population. The species is a prolonged breeder. Mature ova were noticed from July till October

indicating their breeding season. The fecundity of the fish ranged from 530 (fish; 29.2cm; 437g) to 2419 (fish: 29.8cm; 491g). The highest fecundity was recorded during August, but higher value was also recorded during October.



*P. disjunctivus*



*P. pardalis*

Other exotic fish species commonly encountered are *Barbonymus gonionotus* (*Puntius gonionotus*) *Pangasianodon hypophthalmus* (*Pangasius sutchi*), *Clarias gariepinus*, *Oreochromis niloticus niloticus*, *Pterygoplichthys disjunctivus* and *Piaractus brachypomus*.



*Barbonymus gonionotus*



*Piaractus brachypomus*



*Oreochromis niloticus niloticus*

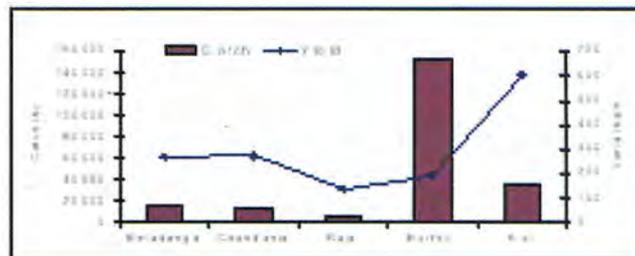


*Pterygoplichthys disjunctivus*

**Exotic fish species recorded from wetlands**

**Fish stock assessment in wetlands**

Fish catch and yield as well as environmental parameters from Chandania, Beledanga, Chamordaha, Borthy and Raja wetlands, situated at 24 Parganas North district; Khalsi and Bhomra at Nadia district and Kol at Hooghly district, were studied. The yield of natural fish stocks from these wetlands varied from 139 to 609kg/ha. The catch composition showed that *Puntius* spp. as a group forms a major contributor to the total catch of these wetlands (6-20%), followed by *Channa* spp. (7-18%) and prawns (5-12%).



**Fig. 4: Catch and yield of natural fish stock from wetlands of West Bengal**

Fish catch, yield and CPUE increased with increase in water level to a certain level and then showed decreasing trend. The yield of stocked fishes (Indian and Chinese major carps) was 448 to 1637kg ha<sup>-1</sup>.

**Biodiversity status of wetlands of West Bengal :** A total of 76 species among 55 genera and 30 families were recorded. The number of fish species recorded from Beladanga, Chandania, Bhomra, Khalsi, Raja, Chamordaha, Borthy and Kol wetland was 51, 55, 39, 31, 33, 25, 38, and 61, respectively.

**Fish yield enhancement in wetlands of Uttar Pradesh**

Mahane wetland located on Ganga river basin in Unnao district of Uttar Pradesh was selected for investigation. The total water spread area of the wetland was 39.98 ha. Water quality reflects that wetland is highly productive.

**Biotic communities :** Plankton in Mahane wetland varied from 380 to 880 UI<sup>-1</sup> (av. 506 UI<sup>-1</sup>). Phytoplankton (95.25 %) productivity was significantly higher with predominance of diatoms (48.55 %). Moderate periphytic density (830 Ucm<sup>-2</sup>) was recorded during post monsoon and which significantly increased in winter month (3651 Ucm<sup>-2</sup>). Numerical abundance of associated micro flora and fauna in the wetland varied from 710 to 2100 Ucm<sup>-2</sup> on average value basis. Infestation of macrophytes was poor, only shore areas had luxuriant growth of *Ipomea*



and *Eichhornia*. Macro-benthic abundance in the wetland was recorded 258 and 692 nos.m<sup>-2</sup> (average 475 nos.m<sup>-2</sup>) during monsoon and winter, respectively.

**Fishery :** The wetland harbours rich fish diversity, besides, stocked IMC and exotics, a total of 23 fish species were recorded during the period. Total fish production from the wetland during past 3 years has been reported from 9.0 to 12.0 t/year (225.0-300.0 kg ha<sup>-1</sup>yr<sup>-1</sup>). Fish catch composition of the jheel reportedly dominated by IMC, followed by exotics, catfishes, murrels and weed fishes. The jheel holds sizeable population of some highly prized murrels (*Ophiocephalus marulius* and *Ophiocephalus striatus*) and catfishes (*Wallago attu* and *Aorichthys seenghala*).

### **Management protocols for sustainable fisheries from wetlands in Assam**

#### **Standardizing fish stock enhancement protocols**

Dorakohora jan, a closed serpentine shallow beel (water-spread area 7.71 ha; average depth 1.2 m) located at Kamrup district of Assam, was investigated. The beel was heavily infested with free-floating macrophytes (mainly *Eichhornia crassipes*) followed by submerged (*Hydrilla* sp., *Valisneria* sp.) and marginal macrophytes (*Typha* sp.).

**Water quality :** Characterised by alkaline pH (7.4), moderate temperature (32°C), low dissolved oxygen (4 mg l<sup>-1</sup>) and moderate free CO<sub>2</sub> (6 mg l<sup>-1</sup>) concentrations, moderate total alkalinity (64 mg l<sup>-1</sup>), low hardness (32 mg l<sup>-1</sup>), moderate specific conductivity (95.6 μS cm<sup>-1</sup>) and total dissolved solids (46.3 ppm), low calcium (16.03 mg l<sup>-1</sup>) and magnesium (6.5 mg l<sup>-1</sup>).

**Fishery:** Fish fauna of the beel comprised 45% air-breathing fishes (*Anabas testudineus*, *Colisa fasciatus*, *Clarias batrachus*, *Heteropneustes fossilis*, *Channa striatus*, *C. punctatus*, *C. orientalis*, etc.

among which *C. fasciatus* was numerically the most dominant one. Non air-breathing fishes present in the beel included *Wallago attu*, *Puntius* spp., *Esomus danricus*, *Notopterus notopterus*, *Chanda nama*, *Lepidocephalus guntea*, etc. In addition, the Indian major carps (*C. catla*, *L. rohita*, *C. mrigala*) and exotic carps (*C. idella*, *H. molitrix* and *C. carpio*) were stocked in the cleared portion of the beel during June-July, 2007. A tentative statistical design of experiments (randomised block design) has been prepared for carrying out *in situ* experiments (in 12 pen enclosures of approx. 500 sq.m. size) on standardization of fish stock enhancement protocols.

#### **Role of macrophytes in wetland functions**

Microcosm experiment of 35 days duration was performed to study the effect of five different macrophytes viz. *Eichhornia crassipes*, *Salvinia molesta*, *Hydrilla verticillata*, *Vallisneria spiralis* and *Ceratophyllum demersum* using one container without macrophyte as control. The experiment revealed that *Eichhornia crassipes* influenced negatively on water temperature, water pH, dissolved oxygen and specific conductivity and positive impact on free CO<sub>2</sub> and total alkalinity as compared to other types of macrophytes. *Vallisneria* sp. showed strong negative influence on total alkalinity signifying its capacity to utilize HCO<sub>3</sub><sup>-</sup> ion for photosynthesis.

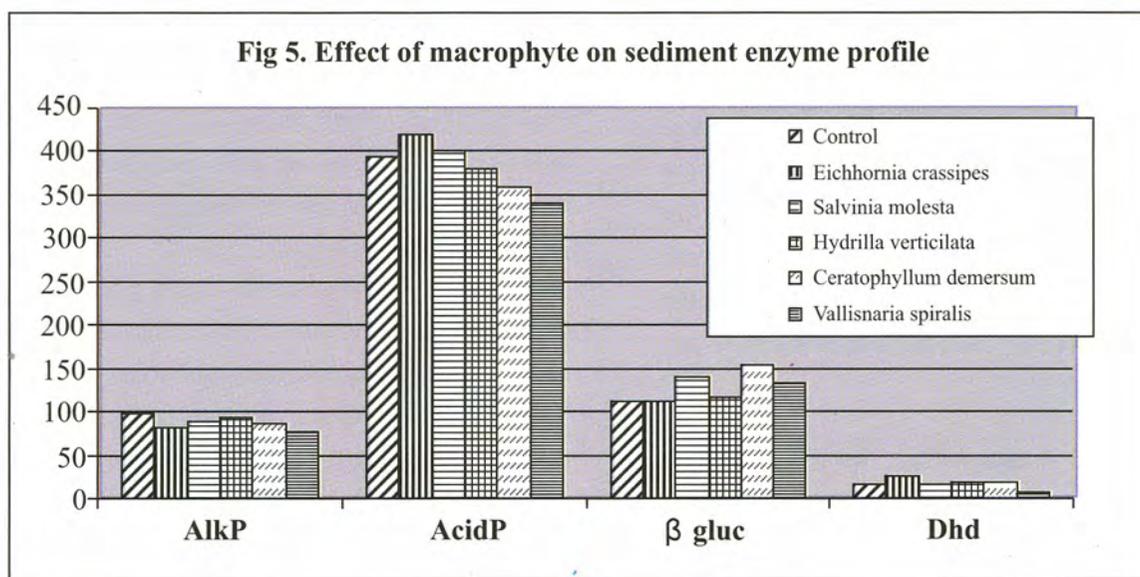
*Vallisneria* sp. and water hyacinth were the most efficient in utilizing available ions present in sediment as revealed by low sp. conductivity of sediment as compared to other types of macrophytes. Sediment enzyme profiles showed decreased phosphorus solubilization in terms of alkaline phosphatase activity whereas that in terms of acid phosphatase activity increased due to floating

macrophytes and decreased due to submerged one. Cellulose breakdown increased due to macrophytes except *Eichhornia crassipes*. Microbial dehydrogenase activity increased in four macrophytes with significant decrease in *Vallisneria spiralis*.

Water hyacinth offered negative impact on plankton as revealed by its lower plankton density with respect to other types of macrophytes. Macrophyte free environment provided a better environment for plankton as evidenced by its higher density in the container without macrophytes.

**Table 2: Physico-chemical properties of sediment**

Macrophytes	Organic matter (%)	Soil pH	Sp. Conductivity ( $\mu S\ cm^{-1}$ )
Without macrophytes (Control)	6.48	6.5	246
<i>Eichhornia crassipes</i>	6.48	6.3	217
<i>Salvinia molesta</i>	6.37	6.4	246
<i>Hydrilla verticilata</i>	6.31	6.6	223
<i>Ceratophyllum Demersum</i>	6.27	6.6	226
<i>Vallisneria spiralis</i>	6.07	6.1	216





Microcosm experiment for 8 weeks duration was conducted to understand the effect of macrophytes on time scale changes of physico-chemical, biochemical and biological properties of water and sediment involving one floating leaved macrophyte (*Eichhornia crassipes*) and one rooted submerged macrophyte (*Vallisneria spiralis*). *Vallisneria spiralis* created a condition with higher pH with respect to the control chamber with water hyacinth offered an opposite influence. Sp. conductivity of water hyacinth container increased sharply over time probably due to higher decomposition rate than consumption. Water hyacinth increased total alkalinity with time, whereas *Vallisneria* decreased the same. *Eichhornia crassipes* and *Vallisneria spiralis* showed increased phosphorus solubilization in terms of alkaline phosphatase during the experiment except at 4<sup>th</sup> week with higher activity in *Vallisneria spiralis* than *Eichhornia crassipes*. Acid phosphatase was decreased due to macrophyte addition with higher decrease in *Eichhornia crassipes* than *Vallisneria spiralis*. Cellulose breakdown in terms of  $\beta$ -glucosidase activity increased owing to macrophyte addition with more in *Vallisneria spiralis* than *Eichhornia crassipes* during experiment except at 4<sup>th</sup> week. Dehydrogenase was significantly decreased during 2<sup>nd</sup> week in the entire chamber after which it started increasing. Prominent decrease in activity was observed during 2<sup>nd</sup> week to 8<sup>th</sup> week with more decrease due to *Vallisneria spiralis* than *Eichhornia crassipes*. Higher plankton and periphyton growth (dominated by *Spirogyra* sp.) was observed in the control chamber with respect to both submerged and floating macrophytes.

#### **Accumulation of heavy metals in macrophytes:**

Manganese was estimated in various organisms collected from a closed beel, Puthimari and a

seasonally open beel, Morakolong. Periphytic algae of Puthimari beel bio-accumulated large amount of Mn (8577.88  $\mu\text{g g}^{-1}$  dry wt) as compared to all other species and thus may possibly be used as a bio-indicator species. In Morakolong beel, rooted submerged species *Vallisneria spiralis* observed to have very high amount of Mn content (9083.31  $\mu\text{g g}^{-1}$  dry wt) as compared all the species analysed from this beel.

### **FISH HEALTH AND ENVIRONMENT**

Rivers because of various anthropogenic factors are stressed. As a result fish and other biotic populations are subjected to stress affecting growth and productivity from such aquatic ecosystems. It is therefore essential to monitor these ecosystems in relation to the contaminant levels and the impact it is producing on fish population. With this aspect in view investigations were conducted in river Damoder

#### **Developing fish based indicator tools for environment monitoring**

During the period, investigation was conducted at six sites in river Damoder, viz., Jamalpur (Ds1), Randiha (DS2), Ashish nagar ( DS3 ), Namo-mejia (DS4), Burnpur (DS5), and Panchet ( DS6 ) covering 123 km stretch of river Damoder. DS1 was the reference site upstream and DS6 the reference site downstream. DS2 to DS5 were the stressed sites.

**Sources of environmental stress :** The industrial establishments along this stretch are a) Coal mines b) Coal washery, coal handling and coke oven plant c) Thermal power station d) Steel plant e) Fertilizer cement and chemical industry. There is extensive sand mining from river bed throughout the studied stretch.



**Extensive sand mining in river Damoder**

***Sediment and Water Quality of the river***

Water pH of river Damodar was found in the alkaline range 7.31 – 8.9 (average 8.1). Conductance in the normal range of 169 – 307  $\mu\text{S cm}^{-1}$  (average 234  $\mu\text{S cm}^{-1}$ ). The Raniganj to Durgapur area exhibited highest values of the conductance due to the impact of industrial effluents. Dissolved oxygen content was good. Plankton and submerged weeds increased DO to very high levels up to 13.3  $\text{mg l}^{-1}$  at Jamalpur. Like conductance, BOD of the Raniganj to Durgapur stretch was found to exceed the limit value of 4 ppm (detected up to 7.4  $\text{mg l}^{-1}$ ). Alkalinity and hardness values were in the normal range. Moderate content of phosphate was noticed in the river stretch, but many a time detected in traces (observed range 0 – 0.24  $\text{mg l}^{-1}$ ). In some cases

presence of free ammonia was also noticed, though not at a higher level (observed range 0 – 0.01  $\text{mg l}^{-1}$ ). The concentration of Cd, Cu, Pb & Zn in water was in traces. Except Zn the levels of Cu, Cd and Pb in the sediment at all the stations were in traces. The mean values of Zn ranged between 7.2 and 38.4  $\text{mg kg}^{-1}$  soil. ***Assessment of water / sediment microbial enzyme activity in river Damoder***

**Water and sediment ALP and  $\beta$ -Glu activity:** The results indicated very high ALP activity at Jamalpur. Both the enzyme activities were lowest at Burdwan, possibly due to extensive sand mining at the area. There were wide variations in activities in different samplings and are possibly the seasonal variations.

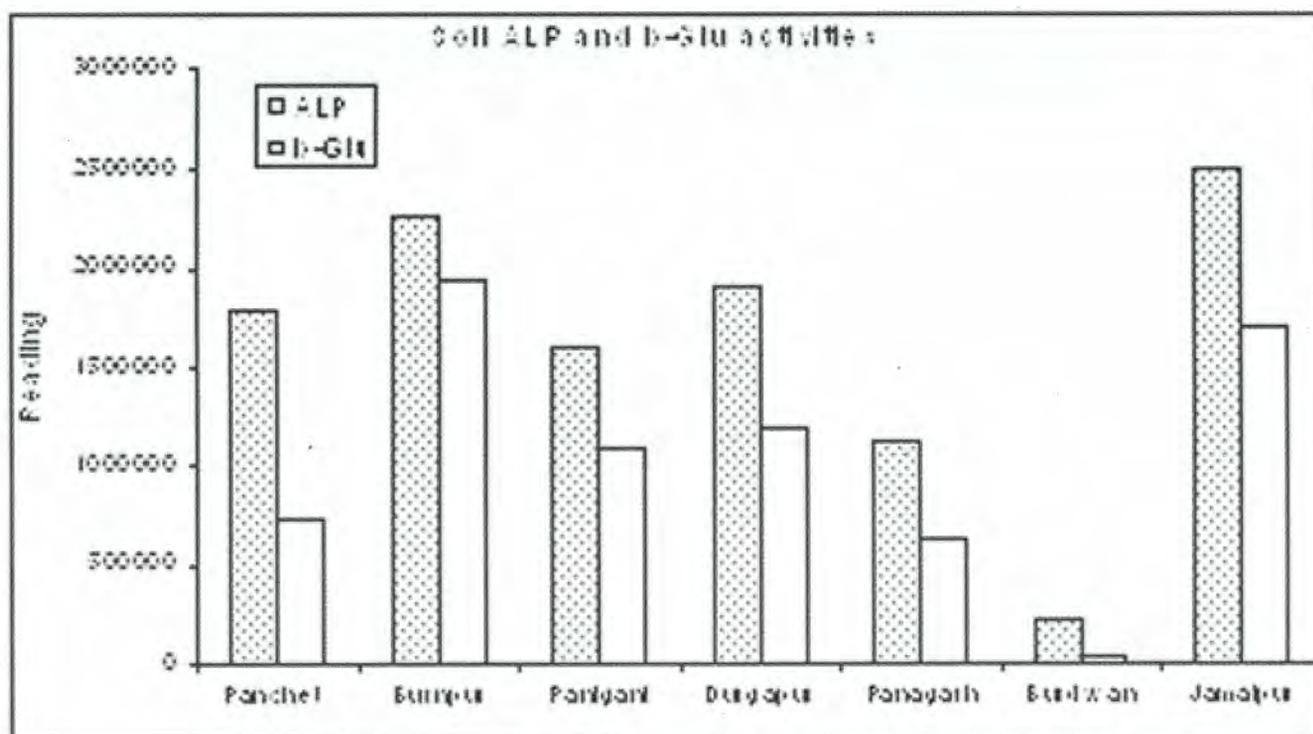


Fig-6 :Sediment ALP and b-Glucosidase comparative activities (reading gm<sup>-1</sup> h<sup>-1</sup>)

The present study so far indicated that, unlike available literatures from temperate regions, the observed enzyme activities seems to be high and could be estimated in low sample volumes and in less times. Overall, water ALP activities were much higher than that of  $\beta$ -Glu.

The river Damodar sediment dehydrogenase activity was high at Raniganj, Burnpur and Durgapur indicating increased microbial activity and respiration at industrial sites.

#### Assessment of plankton and benthic organisms

Based on estimated Shannon Diversity Index values (H: 2.507 to 3.014) of phytoplankton, this riverine stretch between Burnpur to Durgapur was moderately

polluted in surface and sub-surface level.

The obtained H values (1.060 and 1.704) of zooplankton for Durgapur and Burnpur have proved that these sites are moderately polluted in surface and column layer.

The dominance of Annelid at Burnpur (63.8%) and Arthropod at Durgapur (49%) and Namo-Mejia (52%) in total benthos have clearly indicated that these sites have developed anaerobic bottom zone.

#### Fish Health Assessment Index (HAI)

The quantitative health assessment index for rapid evaluation of fish condition in the field was done to evaluate the general health status of fish populations in river Damodar from a polluted and non-polluted site.

**Table 3 : Health assessment index values of *Labeo bata* from river Damoder**

Damoder river	HAI (mean)	SD	CV%
Panchet (reference site) S1	14.67	15.52	105.80
Namomejia (degraded site) S2	46.67	31.55	67.60
Jamalpur (reference site) S3	15.33	15.06	98.24

The average HAI of S1(14.67) and S3(15.33) respectively. (Table 3) reflected low HAI score. It indicated that water quality in this stretch is optimum for maintaining good health of *L. bata* and there is no major contaminant inputs in the system. But the average HAI values for S2 was high (46.67) indicating that the health of *L. bata* population is in a relatively poor condition compared to S1 & S2. Anomalies in three of the index variables liver, gills and parasites were mainly responsible for influencing the HAI of *L. bata* in S3 .

**Fish community studies:** Fish samples were collected at all the sites by experimental netting from all the habitats using different gears. The fish species abundance were recorded and all the fishes were categorized into various guilds for estimating 12 metrics of IBI. At present 55 species belonging to 22 families could be recorded. Significantly 5 exotic species have been recorded in the catches viz. *Cyprinus carpio* *Ctenopharyngodon idella*, *A. nobilis*, *Tilapia mossambica* and *T. nilotica*



**Exotic fish species *C. carpio* and *O. niloticus* in river Damoder**



### **Assessment of pollution biomarker gene expression in response to environmental pollutants**

Exposure of the fish to environmental pollutant in laboratories for gene specific transcript gene expression was done. *Labeo rohita* young fishes were exposed to three different concentrations of cadmium dissolved in 20 liters of water along with a control experiment in which the cadmium was not added. Fishes were exposed to 3 different concentrations; 1 mg<sup>l</sup><sup>-1</sup>, 5 mg<sup>l</sup><sup>-1</sup> and 10 mg<sup>l</sup><sup>-1</sup>. Two different set of metallothionein specific gene primers were utilized for detection of the expression of two different isoforms of metallothionein genes. The control fishes did not express the metallothionein genes as indicated by absence of cDNA amplification product. Detectable gene expression of only one isoform of metallothionein gene was observed.

### **Immunoproteomic analysis of tissue proteins**

Proteins from foot tissues of gastropods (*Bellamia bengalensis* and *Pyla globossa*) and foot, gill and mantle tissues of the bivalves (*Lamellidens marginalis*) molluscs collected from different sites of the river Damodar were analyzed by one-dimensional sodium dodecyl anellis polyacrylamide gel electrophoresis for their protein profiles analysis.

### **Determination of safe levels of pollutants to fish**

Experiment were conducted in laboratory with fingerlings of *Labeo rohita* kept in 30 litre jar water of pH 7.8-8.3, alkalinity 180-230 mg<sup>l</sup><sup>-1</sup> and hardness 180-200 mg<sup>l</sup><sup>-1</sup>. They were exposed for 30 days to sub lethal copper concentrations (0.02 mg<sup>l</sup><sup>-1</sup>, 0.03 mg<sup>l</sup><sup>-1</sup>, 0.04 mg<sup>l</sup><sup>-1</sup> and 0.05 mg<sup>l</sup><sup>-1</sup>). The results indicate that the fingerlings of *Labeo rohita* did not exhibit significant physiological changes in terms of Haemoglobin(7.6-8.0), blood pH(6.8-7.0), Cholesterol (158-227 mg/dL), Glucose(27-56mg/dL), Triglyceride(36.6-59 mg/dL) and Cortisol (54-93ng/ml) disturbing the homeostasis of fish.

### **Monitoring of metal and pesticide contamination in inland open waters.**

The metal content in water samples exhibited absence of any appreciable amount of the studied metals (Cd, Cu, Mn, Pb and Zn). Presence of Mn and Zn was noticed in water from Durgapur area only in one sampling.

Like water, the metal content in fish flesh samples exhibited absence of any appreciable amount of the studied metals (Cd, Cu, Mn, Pb and Zn). Only content of Zn was noticed in fish flesh up to 5.8 ppm.

**Table 4: Metal content in fish flesh of river Damodar (concentration in ppm or  $\mu\text{g g}^{-1}$ ).**

Sampling site	Month	Fish	Cd	Cu	Mn	Pb	Zn
Panchet	6.07	<i>M. seenghala</i>	0	0	0	0	0
Panchet	6.07	<i>L. calbasu</i>	0	0	0	0	5.28
Panchet	6.07	<i>L. bata</i>	0		0	0	0
Burnpur	6.07	<i>M. seenghala</i>	0	0	0	0	0
Durgapur	6.07	<i>M. seenghala</i>	0	0	0	0	0
Panchet	11.07	<i>M. seenghala</i>	0	0	0	0	2.31
Durgapur	11.07	<i>M. seenghala</i>	0	0	0	0	2.29
Panchet	2.08	<i>M. seenghala</i>	0	0	0	0	5.74
Panchet	2.08	<i>M. seenghala</i>	0	0	0	0	5.76
Durgapur	2.08	<i>M. seenghala</i>	0	0	0	0	5.44
Durgapur	2.08	<i>M. seenghala</i>	0	0	0	0	6.62
Durgapur	2.08	<i>M. seenghala</i>	0	0	0	0	0

The total organochlorene pesticide residue (including HCH, DDT, endosulfan, aldrin, dieldrin, endrin, heptachlore and their metabolites) content in water of river Damodar was evaluated. Among the sampling sites the Burnpur site exhibited highest content of the

pesticides. Occurrence of DDTs was noticed in all the samples analysed which even exceeded the permissible limit of EPA (USA) for aquatic life.



**Table 5 :Residues of organochlorine pesticides detected (ng l<sup>-1</sup> or ppt) in water of river Damodar**

Place of Sampling	Pesticide analysed					Total Ocs
	DDTs	HCHs	Endosulfans	Heptachlors	Aidrins	
Panchet	33.16	7.47	6.18	0.00	1.23	48.04
Burnpur	33.38	13.27	8.63	0.44	0.50	56.22
Raniganj	22.00	8.02	3.47	0.74	0.35	34.60
Durgapur	25.60	6.19	1.46	0.14	1.42	34.80
Burdwan	31.41	4.25	1.28	1.17	1.28	39.35

### Assessment of microbial diversity

#### *Microbial populations in river Damodar:*

Microbiological analysis of soil/ water samples from six sampling sites, viz. Noapara, Raniganj, Jamalpur, Panagarh, Panchet and Burnpur on river Damodar was estimated for following parameters : (a) Total aerobic, heterotrophic bacteria count (TPC), (b) Total *Aeromonas* count (c) Total coli/ *E.coli* count and (d) *Pseudomonas* count, which give an indication of degree of microbial pollution. The data indicated high microbial load in Burnpur ( $2.15 \times 10^6$  CFU/g) and Noapara ( $8.4 \times 10^5$ /g soil) compared to other sites. Comparatively low and erratic microbial load in water and sediment indicated much of chemical contamination/ pollution of the system. Although there was high load of *Pseudomonas* spp. ( $1.1 \times 10^2 - 1.6 \times 10^3$ /g soil) in most samples, *Aeromonas* count

was less and *E. coli* count was almost nil in most samples.

#### *Isolation of phenol resistant bacteria from river*

**Damodar:** A total of 19 bacterial isolates have so far been isolated for their tolerance to 5 phenolic compounds, viz., phenol, 2,4-dichlorophenol, methylphenol, pentachlorophenol and resorcinol. Five bacterial strains were examined for their resistance to phenol and pentachlorophenol and their degradation

**Table 6 :Phenol degradation of bacterial isolates**

Strain	After Test				
	100 ppm	200 ppm	400 ppm	600 ppm	600 ppm
OF Ph4	0	0	0	7.5	ND
OF PCP3	66	58.5	223	75	ND
DD PCP4	44	89.6	168	274	377
48uPh1	0	0	112	ND	Nd
OF PCP2	58	98	202	282	ND

**Table 7 :Pentachlorophenol resistance of bacterial isolates**

Strain					
	100 ppm	200 ppm	400 ppm	600 ppm	600 ppm
OF Ph4	+	+	+	-	-
OF PCP3	+	+	+	-	-
DD PCP4	+	+	+	-	-
48uPh1	+	+	-	-	-
OF PCP2	+	+	+	+	-

A spectrophotometric procedure for estimation of phenol in bacterial broth culture has been standardized. Standard curve of phenol for photometric estimation of phenol was drawn. Three bacterial strains were examined and were found to degrade phenol and pentachlorophenol, to different extents.

### Stress mediated genetic alteration in fish

Assessment of genetic changes were investigated in *Puntius ticto*, *Xenentodon cancila*, and *Gadusia chapra* samples from different locations on the river Damodar representing the upstream reference site with low pollution, Industrial polluted site and downstream of industrial site. The 4 RAPD-PCR oligo-degenerate primers were used for amplification of genomic DNA. Each primer was found to be highly polymorphic and the number of fragments amplified was large. The RAPD patterns were generated for all the samples collected from the above-mentioned locations. These fragment patterns were then analyzed for the presence and absence of amplified bands.

**Table 8 : Primer Sequences**

Primers	Sequence 5'-3'	%GC content
OP 1	GTGATCGCAG	60
OP 2	CAATCGCCGT	60
OP 3	CAAACGTCGG	60
OP 4	TTCGAGCCAG	60

PCR was carried out in 25 l reaction mixture containing 100 ng DNA, 100 pM of decamer primer, 10 mM dNTP mixture (Dynazyme), 10 X PCR buffer (Dynazyme), 1.5 mM MgCl<sub>2</sub> and 0.05 U of Taq polymerases (Dynazyme).

The DNA was also used to amplify the mitochondrial DNA genes. Several genes were amplified, Cytochrome b gene, Cytochrome oxidase II, 16S rRNA gene. The *Cytochrome b* gene amplification resulted in a amplification fragment of 360 bp. This 360 bp DNA fragment from *P. ticto*, *Xenentodon cancila* and *Gadusia chapra* were sequenced.

### Fish proteomics study

Tissue proteins viz. serum, muscle, lens and RBC membrane of fish *Rita rita* were subjected to proteomic analysis. *Rita rita* were collected from the local markets live. Serum, muscle, and lens proteins were analyzed by one-dimensional sodium dodecyl anellis polyacrylamide gel electrophoresis (1-D GE) and protein profiles were generated. These tissue proteins were also analyzed by 2-dimensional polyacrylamide gel electrophoresis (2-D GE) for generating proteome maps.

In the river Damodar muscle and lens proteins of *A. seenghala* were analyzed by 1- and 2- D GE and protein profiles were generated. Image analysis is being carried out.

Protein profile of fish mucus was determined by SDS-PAGE for identification of antibacterial proteins. The method is further standardized for removal of hindering factors like lipid, carbohydrates and non-soluble protein moieties.



Fig. 7 : SDS-PAGE 12% Profile peptides from skin mucus of control fish

## FISHERY RESOURCE ASSESSMENT

Investigations under the project was aimed at developing a model for assessment of water quality using remote sensing imagery. Water and soil quality were recorded from fourteen selected water bodies of two districts namely Purulia and Bankura in West Bengal during post-monsoon. The parameters of study were Temperature, Transparency, Dissolved Oxygen, Sp. Conductivity, pH, Total Dissolved Solid, Total Alkalinity, Free CO<sub>2</sub>, chlorinity, Salinity, NO<sub>3</sub>, Total Nitrogen, PO<sub>4</sub>, Sulphate, Silicate, hardness, Ca, Mg, Gross Primary Production, Net Primary Production and Respiration. Observations on soil characteristics were made on sand, silt, clay, pH, sp. Conductivity, organic Carbon, total Nitrogen, available Phosphate, Free CaCO<sub>3</sub> and available-N.

Further Topographical sheets of Murugama water shed in the block Jhalda , Purulia district were geo-referenced and mosaiced for the first second and third order streams . Database has been attached to vector file related to villages of the watershed.

The mapping of water bodies with area above 10 ha had been completed in the state of Madhya Pradesh with post monsoon data.

### Development and standardization of database on GIS platform for capture fisheries

**Fish Catch data :** Monthly data on fish catch are recorded at Guwahati for Brahmaputra river. The species like *A. morar* and *C. catla* are the dominant species in the catch. The estimated total catch is worked out at 259.56 t at the centre during 2007.

The catch data are recorded from the Ganga river

system at Allahabad centre. Common carp is the major contributor to the fishery during 2007. The total catch from Sadiapur has been worked out at 115.96 t and from Daragunj it has been worked out at 40.02 t.

The data collected at the centres, Allahabad and Guwahati have been compiled and stored in the database for future use. Catch data have been utilised for the creation of Geographical Information System (GIS) for the easy storage and retrieval.

**Development of software :** A software module has been developed using Visual Basic and Access as back end. Using key and images and sketches, the software will identify orders and family of the fish. Identifying genus and special images is under process.

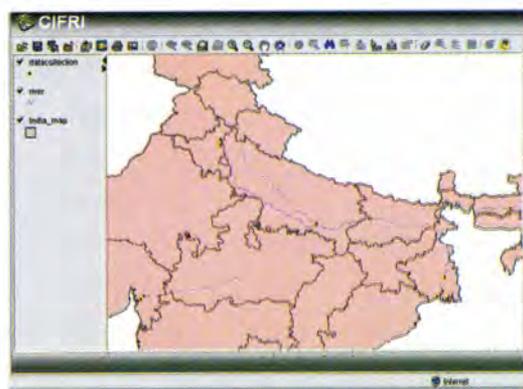


Fig. 8 : Catch data collection centres of CIFRI



Fig. 9 : Water bodies of West Bengal on web page



### **Fishery resource assessment in Assam**

Data were collected from 50 beels of Nagaon district of Assam for development of GIS on wetlands of Assam. Out of 50 beels, one beel namely Sildubi got silted. Many of the beels surveyed were well managed as evidenced by supplementary stocking pattern, macrophyte status and river connectivity status. Out of the 49 beels, 24 beels observed regular supplementary stocking as fisheries enhancement measures. Only 11 beels out of 49 beels have more than 50% macrophyte coverage, whereas 23 beels have less than 25% macrophyte. Also, most of the beels (39 out of 49) retained seasonal connection with the parent river to maintain their natural ecology.

### **Economic valuation of inland fishery resources in India**

The methodology for economic valuation of inland fisheries resources was finalized. Various components, functions and attributes of rivers, reservoirs, floodplain wetlands and estuaries were documented and consequently direct, indirect and non use values were enlisted. The valuation process involved three stages including i) defining overall objective or problem and choosing type of economic assessment approach, ii) define scope and limits of the analysis, enlist the information needs to conduct the assessment, and rank the uses for valuation iii) identification of resource constraints and finalisation of data collection methods and valuation techniques. Considering the objective of the project of valuation of inland fisheries resources with special reference to fisheries, partial valuation approach was adopted with collection of data through structured and semi structured formats following contingent valuation method for valuation. Preliminary information on

valuation and socio-institutional settings were collected from Chandania *beel* in 24 Parganas (N) district in West Bengal. The *beel* was under the multiple control of Welfare, Revenue and Fisheries Departments of Government of West Bengal. The fishing rights were with local co-operative. The *beel* was managed nicely for fisheries, with high co-operative spirit, abiding by rules and regulations for fishing and fish conservation and yield good fish catch.

### **Socio-economic evaluation of fishers in Assam Beels:**

Socio economic evaluation of fishers of two beels namely Amguri Bosapathar and Koya Kujia was carried out. The age distribution of the fisher community showed comparatively higher proportion of minors in both beels. It shows that most of the families are nuclear. In Amguri Bosapathar most of the families are at least literate up to middle class and in Koya Kujia, most of the fisher families are literate up to Primary level. Most of the fishing community lived in hut and kaccha houses. The land holding size was also small. In terms of fishing assets, the fisher of Amguri Bosapathar beel lacks in gears and crafts, in comparison Koyakujia fishers have both crafts and gears. Primary occupation of fishers of Koyakujia is fisheries whereas in Amguri Bosapathar, the fishers primary activity is agriculture. Variability also exist in income from fisheries, in Koyakujia, primary earning comes from fisheries whereas very low earning in Amguri Bosapathar beel.

### Developing site specific fish based farming systems in seasonally flooded area through community participation

The Damodar-Kangsabati basin in West Bengal has approximately 77.2 thousand ha of floodplains, which can be utilised for fish based farming system through deepwater rice-fish (DWR) cultivation. The Block Moyna comprising of 84 villages is in Purba Medinipore district of West Bengal is ideal site for DWR farming as it is a continuous sheets of low lands or saucer shaped depressions. Considering The present case study was conducted in Jankichak mouza of Moyna block of East Medinipur district of West Bengal. The benchmark information collected through community participation is mentioned below: The fishers are involved in different production activities, namely, agriculture. fish seed production and fish production.

### Fish production in seasonally flooded waters

The fishers use traditional practices for fish production in the leased flooded waters with fingerlings. The species include *L. rohita*, *C. catla*, *C. mrigala*, silver carp common carp and other species 5% whatever numbers they can afford without any scientific approach. The fishers follow multiple harvesting with maximum harvest during November end to December, when the water reaches at the minimum level. The total number of fishing days varied from 25-30. The number of fishers/fishing labour is 25-30/day. The fishing group of 13 persons use 90 X 15 ft drag net for fishing. The fish yield varies from 0.4- 0.6 t/ha.

The above benchmark observations indicates that the fishers have been following traditional methods of fish and rice farming. The study area has scope for improvement in fish and rice production through

scientific intervention with community participation.

### OTHER PROJECTS

Apart from the institutional projects, the work was also executed for the sponsored projects and the achievements are as under:

- **Strengthening of database and information networking for fisheries sector** (Fisheries Division, Department of Animal Husbandry and Dairying, Ministry of Agriculture, New Delhi). The Central sector scheme was initiated in Dec 2003, with a view to map the inland water bodies in India using remote sensing satellite data, development of Geographical Information System (GIS) and sampling methodologies for catch assessment. In the scheme mapping water bodies of four states was completed using 5.8 m resolution data. Software was developed based on sampling methodologies for catch estimation of inland fish using visual basic and Ms Access. Many state fisheries officials were trained on the software and methodologies for estimation of fish catch of their respective states. During this year, water bodies of area above 0.5 ha have been identified and mapped using LISS III (23.5) and PAN (5.8 m) Imageries for three states namely Punjab, Haryana and Orissa. In order to make verification of water bodies identified from satellite data, ground truthing was done for water bodies having area more than 10 ha in 27 districts of Orissa and Uttar Pradesh using GPS and preliminary base map of water bodies created using RS Imageries. Information of water bodies and fishing activities was also collected during the field visit. Training programmes were organized on "Sampling Methodologies for Estimation of Inland Fish Catch in India and Catch Assessment Software" for 87 officials of different states at four centers of CIFRI namely Barrackpore, Allahabad, Guwahati and Bangalore.



- **The Ecology and Management of Aquatic Weeds in Ganga and Brahmaputra basin with particular reference to Fisheries enhancement (ICAR Cess Fund).** Under the project a total of 60 (30 Assam and 30 West Bengal) floodplain wetlands have extensively been surveyed in relation to macrophyte diversity, abundance and their impact on other biodiversity, such as plankton and benthos. A total of 51 species in Assam and 43 species of macrophytes could be collected, identified and photographed. The trend of macrophyte proliferation (phyto-sociology) in floodplain wetlands of Assam and West Bengal showed the greater dominance of errant vascular plants followed by theophytes, indicating (i) that the lakes are losing their aquatic characteristics by becoming shallow and heading towards a marshy condition, and ultimately to terrestrial habitat, (ii) that the greater dominance of errant vascular plants followed by geophytes in West Bengal and theophytes in Assam also indicate high level of eutrophication, (iii) that the aquatic regime in Wetlands of West Bengal is relatively better as compared to Assam as evidenced from the higher

percentage of Geophytes after Errant vascular plants, (iv) that only a few species tend to overtake the niches, leading to decline in the diversity of true hydrophytes. The fish fauna, plankton and macro-benthic diversity found positively correlated with the abundance of macrophytes. Apparently, the Beels of Assam and West Bengal need rehabilitation in terms of the management of macrophytes, especially the weeds for fisheries enhancement.

- **Popularisation of Organic Farming approach in Fisheries for Sustainable Development (ICAR Cess Fund).** The project work is being carried out at Kamarhati and Suryapur under the District of North 24 Parganas and Jayrambati under Bankura District in collaboration with Ramakrishna Vivekananda Mission. Main thrust has been given on utilization of organic inputs namely Raw Cow Dung, Compost, Poultry litter, Duck dropping and Vermicompost to grow fishes in the water bodies. Maximum production of 2800 kg/ha/6 months was obtained from a pond where duck dropping was used.

- **Database on Taxonomy and distribution of Freshwater fishes of India (ICAR Cess Fund)** in linkage with NBFGR, Lucknow. Under this project, indigenous fish species occurring in Maguri beel (a perennially open beel located near Guijan fish landing centre of River Dibru) in Tinsukia district and Dipor beel (a seasonally open beel located near Guwahati) was documented. Maguri beel recorded a few riverine forms (e.g., *Chela cachius*, *Botia dario*, *Puntius gelius*) in addition to *P. ticto*, *Mystus vittatus* and *Channa punctatus*. In Dipor beel (which has recently been declared as a Ramsar site) only 12 small economic fish species (*Colisa fasciatus*, *Nandus nandus*, *Anabas tesudineus*, *Mystus vittatus*, *H.*

*fossilis*, *Xenentodon cancila*, *Channa punctatus*, *Macrognathus pancalus*, *Chanda nama*, *Puntius conchoniis*, *P. sophore*, *Pseudambassis baculis*) was collected and documented.

Fish catch data of 22 species apart from miscellaneous group was collected from River Brahmaputra at Uzanbazar fish assembling centre, Guwahati during the period. Total monthly fish catch at this centre ranged from 7980 kg (June) to 44184 kg (August). Major annual contribution during the period came from a small-sized Cyprinid species, *Aspidoparia morar* (106245 kg) followed by small-sized catfish species, *Ailia coila* (31431 kg), miscellaneous species (20554 kg), *Catla catla* (14465 kg), *T. ilisha* (12828 kg) and *L. rohita* (12338 kg). The catches of *L. dyocheilus* were recorded only in the months of June, August-September and December with a total catch of 82.30 kg.



● **Impact, Adaptation and vulnerability of Indian agriculture to climate change – Effect of climatic change on inland fisheries.** (ICAR Plan Project)

The findings indicate there is a perceptible shift in geographic distribution of the fishes of river Ganga. The warm water fish species *Glossogobius giuris*, *Puntius ticto*, *Xenentodon cancila*, *Mystus vittatus*

earlier available only in the middle stretch of river Ganga are now available in the colder stretch of the river around Haridwar. In the Haridwar stretch during the period 1970-86 the annual mean minimum water temperature was 12.9 °C ( 13°C), while during the period 1987-2003 it increased to 14.5°C, an increase of 1.5°C is thus evident. As a result the stretch of river Ganga around Haridwar has become a congenial habitat for these warm water fishes.

Elevated temperature range (0.37°C–0.67°C) and alteration in the pattern of monsoon has been a major factor for shifting of the breeding period of Indian major carps in aquaculture from June to March in fish hatcheries of West Bengal and Orissa in the last two decades.

Ex situ experiment with *L. rohita* fingerlings for evaluating the unit growth in weight per unit rise in temperature indicated that the specific growth rate of the fishes in showing a rising trend at 8.54% between 29°C and 34°C. The maximum SGR 27.95% was recorded at 34°C. At 35°C the SGR values decreased by 30.5% compared to that of 34°C and indicated that a temperature beyond 34°C is detrimental for the fish growth.

● **CPPN 34: Improved fisheries productivity and management in tropical reservoirs.** The multidisciplinary project under CGIAR Challenge programme on Water and Food (CPWF), was initiated in 2005 and is aimed to increase productivity of water and provide sustainable livelihoods to rural poor through improved fisheries management. CIFRI is operating in Indo-Gangetic basin in which reservoir case studies have been selected in Uttar Pradesh (Pahuj) and Madhya Pradesh (Dahod). Main objectives are to develop, verify and implement



fisheries enhancement tools and strategies for increasing fish production and better community livelihood prospects in tropical reservoirs. Fisheries enhancement tools and strategies were finalized through (i) participation of reservoir stakeholders (ii) assessment of water quality and fish production potential including limnological investigations. Enhancement options included (a) direct fish seed stocking and stocking of fish seed raised in cages and pens (b) improvement of the institutional arrangements like fishing regime and practices, leasing mechanisms, fish production and marketing institutions; credit and infrastructure of fish marketing and transportation, etc. Fishers' capacity strengthening about fish marketing and macro-finance provided an insight into better marketing practices and incentive for self-savings among some fishers. The practices yielded good results.

● **NAIP project (under component 4) : Arsenic in food chain: cause, effect and mitigation.** The project was initiated in a consortium mode with six Institute partners including Bidhan Chandra Krishi Viswavidyalaya as the lead centre. The study areas were selected and include arsenic contaminated blocks

of Chakda and Haringhata of Nadia district and arsenic uncontaminated block Polba of Hooghly district. The villages, viz., Gontera, Ghentugachi, Mitrapur, Dakshin Panchpota, Nonaghata, have been surveyed in detail for arsenicosis, agriculture resources, including fishery resources. As per project objectives, arsenic contamination levels in the affected ponds, wet lands and fishes have been initiated. For assessing fish health status, proteomic analysis of foot of gastropod molluscs *Pila globosa*, and foot, gill, mantle tissues of bivalve *Lamellidens marginali* from arsenic contaminated and uncontaminated zones is under way. Progress has been made in isolation of soil and aquatic arsenic transforming/resistant bacteria for probable remediation.

● **Assessment of fisheries with regard to water quality in the river Ganga and Yamuna** (Sponsored by Central Pollution Control Board). The proposed study is to generate information on quality of river Ganga and Yamuna particularly on polluted river stretches identified by CPCB in relation to fishery status

**LIST OF ONGOING PROJECTS**

<b>Programme</b>	<b>Project</b>	<b>Scientific and technical Personnel</b>
<b>Riverine &amp; Estuarine Fisheries Programme</b> <b>RFM/NR/07/11/00</b> Developing conservation and fish stock management protocols for the rivers and associated ecosystem	RFM/NR/07/11/01 Generating benchmark information on ecology and fisheries of the Yamuna river system	<b>Dr. H. P. Singh</b> , Dr. D. Kumar, Dr. R. N. Seth, Dr. R. K. Tyagi, Dr. V. Pathak, Dr. B. K. Singh, Dr. R. S. Srivastava & Dr. K.D. Joshi, Shri S. K. Srivastava, Dr. K. Srivastava, Shri J. P. Mishra
	RFM/NR/07/11/02 Understanding the impact of specific river links on the ecology and production functions	<b>Dr. H. P. Singh</b> , Dr. D. Kumar, Dr. R. K. Tyagi, Dr. V. Pathak, Dr. R. S. Srivastava & Dr. K. D. Joshi, Shri S. K. Srivastava, Dr. K. Srivastava, Shri J. P. Mishra
	RFM/NR/07/11/03 To estimate environmental flow requirements of various categories of river in India	<b>Dr. V. Pathak</b> , Dr. R. K. Tyagi, Dr. R. S. Srivastava, & Dr. K. D. Joshi, Shri S. K. Srivastava, Dr. K. Srivastava, Shri J. P. Mishra
	RFM/NR/07/11/04 Assessing the feasibility of increasing water productivity in Canal command areas through Fishery intervention	<b>Dr. D. N. Mishra</b> , Dr. U. Moza, Dr. V. K. Sharma
<b>ESF/ER/07/12/00</b> Development of sustainable fisheries management protocols for estuaries and Associated water bodies	ESF/ER/07/12/01 Generating benchmark information/data on ecology and fisheries from east coast estuarine systems (Godavari/ Subarnarekha)	<b>Dr. A. Ghosh</b> , Dr. K. R. Naskar & Dr. B. B. Satpathy Dr. A. K. Chattopadhyay, Sri T. Chatterjee, Ms. K. Jacqueline, Sri D. Saha, Shri A. R. Barui, Sri A. Roychowdhury, Sri S. Mondal, Sri A. Jana
	ESF/ER/07/12/02 Generating information on the migratory pattern, behaviour and other relevant data for designing Fish passes/hydraulic structures for hilsa and other species for their migration	<b>Dr. M. K. Mukhopadhyay</b> , Shri N. P. Shrivastava & Dr. B. B. Satpathy Mr. K. Jacqueline, Ms. A. Sengupta, Sri K. P. Singh, Sri D. Saha, Shri A. K. Barui, Sri A. Roychowdhury, Sri C. P. Singh
	ESF/ER/07/12/03 Ecology, bio-diversity and fisheries of a brackish water lagoon - Pulicut	<b>Dr. B. C. Jha</b> , Dr. D. Nath & Shri N. P. Shrivastava Sri D. Sanfui, Ms. A. Sengupta, Sri B. N. Das, Sri A. Roychowdhury, Sri S. Mondal



	ESF/ER/07/12/04 Developing and testing software based model as a forecasting mechanism for west-coast estuarine ecosystems	<b>Dr. S. N. Singh</b> , Dr. K. Chandra Sri R. C. Mandi, Sri R. K. Sah, Sri T. K. Halder
<b>Reservoir Fisheries Programme</b>  <b>RES/SR/07/10/00</b> Improving the fish Productivity of Indian Reservoirs	RES/SR/07/10/01 Multi-location trials on improving fish yields in small reservoirs located in different agro-climatic zones (1a. Karnataka and 1b. Kerala)	<b>Dr. D. S. Krishna Rao</b> Shri M. Karthikeyan & Dr. (Smt.) Rani Palaniswamy Sri Sadhukhan, Smt. U. Unnithan
	RES/SR/07/10/02 Characterization of fishery and population trends using acoustics and experimental fishing	<b>Shri M. Feroz Khan</b> , Dr. Preetha Panikkar
	RES/SR/07/10/03 Development of models for fish yield estimation in reservoirs	<b>Dr. D. S. Krishna Rao</b> , Shri M. Karthikeyan
	RES/SR/07/10/04 Enhancement of Fish production in a small reservoir of Uttar Pradesh	<b>Dr. R. N. Seth</b> , Dr. B. K. Singh & Dr. P. K. Katiha Sri S. Srivastava, Dr. K. Srivastava
<b>Environment and Fish Health Management Programme</b> <b>FHE/ER/07/07/00</b> Environment and fish health management in inland open waters	FHE/ER/07/07/01 Developing fish-based indicator tools for environment monitoring	<b>Dr. M. K. Das</b> , Dr. P. K. Saha, Dr. M. K. Bandopadhyay, Dr. S. S. Mishra, Dr. S. Samanta, Dr. B. P. Mohanty, Dr. S. K. Manna, Shri P. Maurye & Shri M. P. Brahmane Sri S. Bhowmick, Sri L. Mahavar, Smt. K. Saha, Dr. R. Sinha, Sri H. C. Banik, Sri S. Bandopadhyay, Sri A. Ghosh
	FHE/ER/07/07/02 Metal and pesticide monitoring and its biomagnifications in stressed aquatic environment	<b>Dr. S. Samanta</b> , Dr. P. K. Saha Smt. K. Saha, Sri L. Mahavar, Sri S. Bandyopadhyay, Sri A. Ghosh
	FHE/ER/07/07/03 Microbial diversity assessment and their role in environmental mitigation in inland waters	<b>Dr. S. S. Mishra</b> , Dr. S. K. Manna, Dr. S. Samanta, Shri P. Maurye & Shri M. P. Brahmane Sri S. Bhowmick, Sri L. Mahavar, Sri H.C. Banik, Sk. Rabiul

	FHE/ER/07/07/04 Estimation of stress mediated genetic contamination in fishes from different stressed ecosystems	<b>Shri M. P. Brahmane</b> , Shri P. Maurye & Dr. S. K. Manna Dr. R. Sinha, Sri S. Bandyopadhyay, Sk. Rabiul
	FHE/ER/07/07/05 Developing health management protocols for inland aquatic ecosystems through proteomics	<b>Dr. B. P. Mohanty</b> , Dr. M. K. Bandopadhyay, Shri P. Maurye & Shri D. Karunakaran Sri S. Bhowmick, Dr. R. Sinha, Sk. Rabiul
<b>Fisheries Resource Assessment Programme</b> <b>FRA/ER/07/06/00</b> Assessment of resources and database Development in GIS Platform for Inland Fisheries using Remote Sensing Techniques	FRA/ER/07/06/01 Assessment of inland resources using remote sensing techniques	<b>Shri S. K. Mandal</b> , Dr. D. Nath, Shri S. K. Sahu, & Shri D. Karunakaran Smt. S. Majumder. Sri S. Mandal
	FRA/ER/07/06/02 Development and standardisation of database on Web GIS platform for capture fisheries	<b>Shri S. K. Mandal</b> , Shri S. K. Sahu & Shri D. Karunakaran Smt. S. Majumder
<b>Fisheries Economics Programme</b> <b>FSE/ER/07/01/00</b> Economic valuation of Inland Fisheries Resources in India	FSE/ER/07/01/00 Economic valuation of Inland Fisheries Resources in India	<b>Dr. P. K. Katiha</b> , Shri N. K. Barik Sri D. K. Biswas, Sri D. Saha, Sri S. Ghosh, Sri B. N. Das
<b>Wetland Fisheries Programme</b> <b>WLF/ER/07/15/00</b> Developing fishery management norms for sustainable fisheries in floodplain wetlands	WEF/ER/07/15/01 Testing and refinement of fish yield enhancement strategies in flood-plain wetlands	<b>Dr. M. A. Hassan</b> , Dr. A. Mukherjee, Mrs. G. K. Vinci, Dr. S. R. Das, Dr. A. K. Das, & Shri A. Hajra Dr. B. K. Biswas, Sri D. K. Biswas, Sri S. Ghosh, Ms. S. Saha, Sri S. Das, Sri B. Naskar, Mr. Y. Ali
	WLF/ER/07/15/02 Fish stock assessment in wetlands and application of population and biomass models for sustainable fishery management	<b>Dr. V. R. Suresh</b> , Dr. A. Mukherjee, Mrs. G. K. Vinci, Dr. A. K. Das & Shri S. K. Sahu Dr. B. K. Biswas, Sri D. K. Biswas, Sri S. Ghosh, Ms. S. Saha, Sri B. Naskar, Mr. Y. Ali



	WLF/ER/07/15/03 Developing site specific fish based farming system in seasonally flooded area through community participation	<b>Dr. U. Bhaumik</b> , Dr. P. K. Katiha, Shri G. Chandra Sri K. K. Sarma, Sri S. Saha, Sri A. Mitra
	WLF/NR/07/15/04 Multi-location testing of community based fish yield Enhancement approaches in U.P. Wetlands	<b>Dr. D. Kumar</b> , Dr. R. S. Srivastava & Dr. K. D. Joshi Sri S. Srivastava, Sri J.P. Mishra, Dr. K. Srivastava
<b>North-east Region</b> <b>FOR/NE/07/01/00</b> Pilot scale validation/ demonstration of fishery management packages, resources estimates & biodiversity estimation in Northeastern region in linkage with different stakeholders (NE component)	FOR/NE/07/01/01 Fishery resource assessment through GIS application	<b>Dr. R. K. Manna</b> , Dr. Md. Aftabuddin Sri K. K. Sarma, Sri P. Gogoi
	FOR/NE/07/01/02 Fish diversity (in collaboration with NBFGR) and catch estimates of river and wetlands	<b>Dr. B. K. Bhattacharya</b> Dr. A. Biswas, Sri K. K. Sarma, Sri P. Gogoi
	FOR/NE/07/01/03 Demonstration of enclosure culture technology in beels	<b>Dr. V. Kolekar</b> , Dr. B. K. Bhattacharya Dr. A. Biswas, Sri K. K. Sarma, Sri P. Gogoi
	FOR/NE/07/01/04 Extension out reach, service delivery and HRD activities	<b>Dr. V. Kolekar</b> , Dr. R. K. Manna, Dr. Md. Aftabuddin, Dr. B. K. Bhattacharya & Shri Ganesh Chandra Dr. A. Biswas, Sri K. K. Sarma, Sri P. Gogoi
<b>WLF/NE/07/18/00</b> Developing appropriate management protocols for harnessing sustainable fisheries from floodplain wetlands in Assam	WLF/NE/07/18/01 Standardizing fish stock management and enhancement protocols	<b>Dr. B. K. Bhattacharya</b> Dr. A. Biswas, Sri K. K. Sarma, Sri P. Gogoi
	WLF/NE/07/18/02 Evaluation of health and biodiversity implications of different enhancement regimes	<b>Dr. V. Kolekar</b> , Dr. R. K. Manna, Dr. Md. Aftabuddin Dr. A. Biswas, Sri K. K. Sarma, Sri P. Gogoi
	WLF/NE/07/18/03 Socio-economic evaluation and delivery mechanism in floodplain fisheries	<b>Shri Ganesh Chandra</b> Sri K. K. Sarma, Sri P. Gogoi

**TECHNOLOGY ASSESSED AND TRANSFERRED  
EXTENSION ACTIVITIES**

**Mass Awareness Programmes**

The following mass awareness campaigns were organized during the period

- ‘Need for Regulation of Indiscriminate Collection of Fish and Shrimp Seeds’ at Chimaguri, Sagar Island, 24 Pgs(S), West Bengal on 11.04.07 where 125 fishers were present.
- ‘Destructive fish and shrimp seed collection methods’ at Haripur, South 24-Parganas, West Bengal on 18<sup>th</sup> and 29<sup>th</sup> May 2007.
- ‘Stop wanton destruction of fish and shrimp seed’ at Satmile, Namkhaha, 24 Pgs(S) on 18.06.2007 where 53 fishers were present.
- ‘Conservation of Hilsa fishery’ at Nawabgunj on August 30, 2007, North 24 Parganas where 250 fishers were present.
- ‘Conservation of juveniles of prawn seed (freshwater)’ at Simurali, Nadia on 07.11.2007 where 130 fishers were present.
- ‘Conservation of juveniles of shrimp’ at Dash Mile, South 24 Parganas on December 27, 2007 where 87 fishermen and fisher women were present.
- ‘Conservation and Propagation of Mahseers’ at Bheemeshwari Fishing camp on 17.01.2007 on the Banks of River Cauvery.
- ‘Conservation of Fish Seed and Juveniles’ at Gangarampur, South 24 Parganas district on 20<sup>th</sup> January 2008, in which about 140 fishers participated.



Mass awarness programme on conservation and propagation of Mahseers



Mass awarness campaigns and farmers training programmes

## Participation in National level Exhibitions

- “4<sup>th</sup> Fisheries Congress 07” at ICAR Complex, Patna during April 12 – 13, 2007.
- On the occasion of Rastriya Karyashala on “Parvatiya Matsyikee Paridrishya: Vikas, Prabandhan evam Sanrakshan” (in Hindi) organized by NRC-CWF, Bhimtal (Uttarakhand) during 6-7<sup>th</sup> April 2007 at Bhimtal.
- 'Sustain Aqua 07' at Indian Institute of Technology, Kharagpur during 27 September, 2007.
- 'Taal 2007', at the International Seminar on Lakes at Jaipur, Rajasthan, during 28<sup>th</sup> October-2<sup>nd</sup> November 2007.
- “Kshetriya Krishi Mela 2007-08” at Areraj, Eastern Champaran district of Bihar (Motihari) from 3-5 November 2007. It was jointly organized by Indian Vegetable Research Institute (ICAR) Varanasi, Director of Extension, Ministry of Agriculture, Government of India and Eastern Regional ICAR Complex, Patna.
- 8<sup>th</sup> Asian Fisheries Forum at Kochi during November 20-24, 2007.
- “Ecosystem health and fish for tomorrow” organised in connection with National Symposium held at CIFRI during December 14-16, 2007.
- 24<sup>th</sup> Yuva Mela, Taldi (Bahurupi Sangha), South 24 Parganas during 22.12.2007 to 01.01.2008
- Seva Bharti Kapgari Krishi Vigyan Kendra, Kapgari, Jhargram, Medinipore during February 4-5, 2008.

- The Kochi centre of CIFRI participated in the exhibition arranged in connection with the Honorable Union Agriculture Minister Shri Sharad Pawar's visit to CMFRI, for the celebration of Diamond Jubilee year during 4<sup>th</sup> to 7<sup>th</sup> Jan 2008.
- Bandhur Mahal Sunderbans Mela during 3-12<sup>th</sup> and Sanchita Krishi Utsav, Budge Budge, during 12-19<sup>th</sup> January 2008.
- Allahabad centre participated in “Rashtriya Kisan Mela evam Shabji Pradarshani” held at IIVR, Varanasi, from 9-10<sup>th</sup> Feb'08.
- Guwahati centre participated in Assam Matsya Mahotsav at Shilpgram, Guwahaty during 29<sup>th</sup> March to 31<sup>st</sup> March 2008.



Shri Sharad Pawar, Hon'ble Union Minister of Agriculture visits CIFRI stall at CMFRI, Kochi



Hon'ble Chief Minister of Assam, Shri Tarun Gogoi visiting CIFRI Pavilion during Assam Matsya Mahotsav 2008



The stall of CIFRI in Rashtriya Kissan Mela, Varanasi

**EDUCATION AND TRAINING**

**Trainings Organized**

Topic	Beneficiaries	Venue & Date
Inland Fisheries development	30 fish farmers	Kalyannagar, North 24 Parganas on 03.04.2007
Conservation of fin fish seed and prawn seed	27 fishermen	Nodakhali, South 24 Parganas on 17.05.07
Stop destructions of fish seed and shrimp seed	165 fishermen	Haripur, Namkhana, South 24 Parganas on 18.05.07 and 29.05.07
Value addition and net making	25 tribal fisher women	Mundapara, Kakdwip, North 24 Parganas during 11-16 <sup>th</sup> June, 2007
Fish farmers training	13 progressive fish farmers of Andhra Pradesh under ATMA Curriculum of Govt. of India	19-23 <sup>rd</sup> June, 2007
Recent Advances and technologies for fisheries development in Northeastern India	26 subject matter specialists of Krishi Vigyan Kendras of Northeastern region	Regional Centre of CIFRI, Guwahati during July 4 <sup>th</sup> to 6 <sup>th</sup> 2007
Freshwater Fish Farming	20 fishers from Jharkhand	CIFRI, Barrackpore, July 16-25 <sup>th</sup> , 2007
Value Addition of Fish Products and Net Making	50 women of fisher community	Mundapara and Debnibas, Sundarbans during July 11-16 <sup>th</sup> and 23-28 <sup>th</sup> , 2007
Empowerment of women through net making activity	25 fisher-women	Debnibas Namkhana, from 23.07.2007 to 28.07.2007
Training course for 'Matsya Mitra' of Jharkhand	40 Fishers, sponsored by the Department of Fisheries Govt. Of Jharkhand.	CIFRI, Barrackpore, July 16-25 <sup>th</sup> , 2007 and August 20-29 <sup>th</sup> , 2007.
Community capacity strengthening workshops under CP project	Fishermen community	Dahod reservoir and Pahuj reservoir, April 27 <sup>th</sup> , 2007 and August 21 <sup>st</sup> , 2007



Conservation of Hilsa Fishery	250 fishers	Nababganj, North 24-Parganas, West Bengal on August 30 <sup>th</sup> , 2007
Composite Fish Culture	20 Fisheries Officers of the Department of Fisheries, Govt. of Assam.	September 22-29 <sup>th</sup> , 2007 at Barrackpore
Modern fish Farming	20 officers of Dept. of Fisheries, Govt. of Assam	Sept. 21-29 <sup>th</sup> , 2007 at CIFRI Barrackpore
Inland Fisheries Development	80 Fish farmers of Bihar	September 21-30 <sup>th</sup> and October 3-12 <sup>th</sup> , 2007 at CIFRI, Barrackpore
Group Discussion	60 fishers	Oct. 5 <sup>th</sup> , 2007 at Kabini Reservoir, Bangalore
Integrated Fish Farming	20 Officers of Dept. of Fisheries, Govt. of Assam	CIFRI, Barrackpore on November 1-7 <sup>th</sup> , 2007
Survey methodology for Collection of statistical data and Estimation of inland fish catch and IFMS software	State fisheries officials of Tripura, Sikkim, Orissa and West Bengal	CIFRI, Barrackpore during 26-28 <sup>th</sup> , Nov. 2007
Management of Floodplain Wetlands	16 students and teachers of Srikishan Sarada College, Hailakhandi, Assam	Regional Centre of CIFRI, Guwahati during January 3-9 <sup>th</sup> , 2008
Fisheries Management of Floodplain wetlands	13 Students of Cachar College, Silchar, Assam	Regional Centre of CIFRI, Guwahati during January 29 <sup>th</sup> to February 4 <sup>th</sup> , 2008
Sampling Techniques of Data Collection for Fish Catch Estimation in Inland Water Bodies	Karnataka State Fishery Officers	Bangalore Centre of CIFRI, 16 <sup>th</sup> February 2008
Inland Fisheries	40 Fish farmers of Bihar	CIFRI, Barrackpore during February 18-27, 2008

Empowerment of Tribal Fisher Women for value added fish Products	39 Tribal women	Jhargram, Medinipore during March 24-29 <sup>th</sup> , 2008
Inland Fisheries Development	80 Fish farmers of Bihar	CIFRI Barrackpore during March 6-15 <sup>th</sup> , 2008 and March 25 - April 3 <sup>rd</sup> , 2008



HRD programme for fisheries development in Northeastern India



An interaction session between Dr. S. Ayyappan, DDG(Fy), ICAR and fish farmers of Bihar at CIFRI, Barrackpore



Fish farmers of Jharkhand are learning by doing



## AWARDS AND RECOGNITIONS

K. K. Vass	Awarded the <i>Fellowship of the Academy of Science, Engineering and Technology, Bhopal, India in July 2007</i>
N. P. Srivastava	Awarded the <i>Fellowship of the Academy of Science, Engineering and Technology, Bhopal, India in July 2007</i>
Preetha Panikkar	Awarded the <i>Young Scientist Award</i> by IFSI at the Symposium on Ecosystem Health and Fish for tomorrow organised by CIFRI and IFSI held during 14-16 December, 2007.
B.C. Jha	Awarded the <i>Congress of Zoology Medal for Outstanding Research and Academic contribution in Zoology</i> by Zoological Society of India, 2007

## **LINKAGES AND COLLABORATIONS**

### **Linkage and collaboration in India and abroad including externally funded projects:**

- Linkages have been made with National Remote Sensing Agency, Hyderabad to procure satellite maps. The help of Survey of India, Kolkata and NATMO, Salt Lake, Kolkata has been taken for using their wetland and other maps. Survey of India, Dehradun, was contacted to procure digital data on village boundaries and block boundaries maps.
- Linkage has been established with Central Pollution Control Board through a collaborative project entitled 'Assessment of fisheries with regard to water quality in the river Ganga and Yamuna'.
- Strengthening of database and information networking for fisheries sector, Fisheries Division, Deptt. Of A.H. & Dairying, Ministry of Agriculture,

New Delhi, December 2003 - Continued.

- CGIAR Challenge Programme on Water and Food(CPWF) Project on “Improved fisheries productivity and management in tropical reservoirs”(World Fish Centre, Penang, Malaysia). March 2005- Continued.
- The Vadodara Centre of CIFRI has developed linkages with Sardar Sarovar Narmada Nigam Limited, Gandhinagar, Department of Fisheries, Govt. of Gujrat; Gujrat Ecological Society, Vadodara and Department of Zoology, M.S.University of Borada on programmes of mutual interest.
- The Vadodara Centre of CIFRI is executing an externally funded project entitled “Fish conservational and hydro-biological perspectives of river Narmada with reference to Sardar Sarovar Project (SSP)”, sponsored by Govt. of Maharashtra.



## PUBLICATIONS

### Research Papers

- Das, M.K., P. Maurey, M.P. Brahmam, M.K. Mukhopadhyay and P.K. Saha, 2007. Impact, Adaptation and Vulnerability of Inland Fisheries to Climate Change. *Journal of Indian Association for Environmental Management* 34(2): 68-76.
- Desai, V.R., N.P. Shrivastava and D. Kumar, 2007. Constraints in reservoir fishery development-a case study of Ravishankar Sagar reservoir. *Fishing Chimes* 27(4): 19-22.
- Dey, S., Srivastava, P.K., Maji, S., Das, M.K., Mukhopadhyaya, M.K. and Saha, P.K. 2007. Impact of climate change on the breeding of Indian Major Carps in West Bengal. *J. Inland Fish. Soc. India* 39(1): 26-34.
- Ghosh, N., D. Nath and K.R. Naskar, 2007. Isolation and identification of some saprophytic fungi and quantification of nitrate and phosphate from leaf litter of dominant variations of mangroves of Sundarbans. *J. Mycopathol. Res.* 45(1): 82-84.
- Joshi, K.D., 2007. Migration in certain fish species of the Kali river system in Kumaon Himalaya. *Journal of Himalayan Ecology & Sustainable Development* 2: 37-46
- Karmakar, H.C., Amitabha Ghosh and K. Jacqueline, 2007. Length-weight relationship in *Oreochromis niloticus* (Linn.) from a sewage-fed wetland of East Kolkata. *J. Inland Fish. Soc. India* 39(2): 65-68
- Katiha, P.K., S. Duatta, S. Dey, G. Ziauddin, J.K. Jena, and H.K. De, 2007. Carp Polyculture for fish production in Kalahandi District of Orissa: Economics and Constraints, *J. Inland Fish. Soc. India* 39(1): 40-44
- Krishna Rao, D.S., 2007. Biology of the catfish *Mystus cavasius* in the Hemavathi reservoir (Cauvery River System, Karnataka). *J. Inland Fish. Soc. India* 39(1): 35-39.
- Manna, C., S. K. Manna, R. Das, K. Batabyal, and R. N. Roy, 2007. Development of in ovo vaccine against Newcastle disease of birds. *Current Science* 93 (9): 1305-1309.
- ⊗ Martin, S.A.M., B.P. Mohanty, P. Cash, D.F. Houlihan, and C. Secombes. 2007. Proteome analysis of Atlantic salmon (*Salmo salar*) cell line SHK-1 following recombinant IFN-8 Stimulation. *Proteomics* 7(13): 2275-2286.
- Mishra, D.N., U. Moza, C. Lakra and S. Kumar, 2007. Time scale changes in fisheries of river Yamuna. *J. Inland Fish. Soc. India* 39(2): 48-52.
- Mitra, K., V.R. Suresh, G. K. Vinci, N.N. Mazumdar, and D.K. Biswas, 2007. Biology and Fishery of Banded Gourami, *Colisa fasciata* (Bloch and Schneider, 1801) in a Floodplain Wetland of Ganga River Basin. *Asian Fisheries Science* 20(4): 409-423.
- Mohanty, B. P., R. Lahiri, S. Misra-Bhattacharya and S. K. Kar. 2007. *Brugia malayi* adult IgG4-reactive low molecular weight antigens induce differential cytokine response in lymphocytes of endemic normal and asymptomatic microfilariae carriers *in vitro*. *Journal of Clinical Immunology* 27(4): 397-408.
- Nath, D., R.N. Mishra, B.C. Jha and M.K. Mukhopadhyay, 2007. Hydrological investigation in river Damodar with special reference to aquatic pollution. *J. Inland Fish. Soc. India* 39(1): 45-50

● Preetha Panikkar and M. Feroz Khan 2008. Comparative mass-balanced trophic models to assess the impact of environmental management measures in a tropical reservoir ecosystem. *Ecological Modeling* 212: 280-291

● Saha, S., P. Das and Bhaumik. Utpal, 2007. Changing perspective of carp and cat fish availability in the open water systems of North 24 Parganas, West Bengal. *J. Inland Fish. Soc. India* 39(2): 53-58.

● Samanta, S., K. Chandra, S.K. Manna and K. Saha, 2007. Sediment status of the Hooghly and Haldi estuaries at Haldia industrial area with special reference to trace metals. *J. Indian Soc. Soil Sc.* 55(3): 349-359.

● Suresh, V.R., B.K. Biswas, G.K. Vinci, K. Mitra, and A. Mukherjee, 2007. Biology of *Amblypharyngodon mola* (Hamilton) (Cyprinidae) from a floodplain wetland, West Bengal, *Indian J. Fish* 54(2): 155-161.

● Suresh. V.R., 2007. The meat of giant African snail (*Achatina fulica*) as dietary animal protein for common carp (*Cyprinus carpio*). *Indian J. Fish*, 54(2): 203-210.

### **Technical Bulletin/Training Manual/Policy paper/Books/ Book Chapter/ Lecture Notes**

● Sahu, S.K., D. Karunakaran and S.K. Mandal. Assessing Inland Fisheries Resources and GIS. *Policy Paper No. 2*. ISSN: 0970-616X, Central Inland Fisheries Research Institute, Barrackpore, Kolkata.

● Das, M.K., S. Samanta and P.K. Saha, 2007. Riverine Health and Impact on Fisheries in India. *Policy Paper No. 1*, ISSN, 0970-616X42, Central

Inland Fisheries Research Institute, Barrackpore, Kolkata. 42p.

● Bhattacharjya, B.K., and R.K. Manna, 2007. Pen and Cage culture of fish in floodplain wetlands. In: *Recent advances and technologies for fisheries development in northeastern India*. CIFRI, Barrackpore and ZC Unit, Zone III, Barapani. pp. 74-79.

● Bhattacharjya, B.K., 2007. Management guidelines for Floodplain wetlands (*beels*) of northeast India. In: *Recent advances and technologies for fisheries development in northeastern India*. CIFRI, Barrackpore and ZC Unit, Zone III, Barapani. pp. 80-87.

● Bhattacharjya, B.K., 2007. Fisheries resources of north eastern India – Potential and constraints for development. In: Das, A., Kumaresan, A., Bardoloi, R. K., Bujarbaruah, K. M. and Naskar, S. (eds.), *Complementary Role of Livestock and Fisheries Towards Sustainable Farming in North East India*. ICAR Research Complex for NEH Region, Umiam, Meghalaya. pp. 187-201.

● Chandra, G., 2007. Entrepreneurship in Beel Fisheries of Assam: A case study of Haribhanga beel. In: Kohli, M.P.S. (Eds.) *Ecology and Fisheries in wetlands in India*. Indian Society of Fisheries Professional. Mumbai, India. Pp. 173-179.

● Dugan, P., Sugunan, V. V., Welcomme, R. L., Béné, C., Brummett, R. E., Beveridge, M. C.M., Abban, K., Amarasinghe, U., Arthington, A., Blixt, M., Chimatiro S., Katiha, P. K., King, J., Kolding, J., Khoa, S. N. and Turpie, J. 2007. Inland fisheries and aquaculture Freshwater fisheries. In: Molden, D.



(ed.), *Water for food, water for life: A comprehensive assessment of water management in Agriculture*. Earthscan, London and International Water Management Institute, Colombo. pp. 459-484.

● Joshi, K.D. and A.K. Laal, 2007. Status of piscine diversity in reservoirs of central India: measures for conservation. In: Lakra, W.S. and U.S. Sarkar (eds.), *Fresh Water Fish Diversity of Central India*. NBFGR, Lucknow. pp. 99-104.

● Katiha, P.K. and C. Chakraborty. 2008. An Econometric Analysis of Shrimp Farming. In: Roy, A. K. and Sarangi, N. (eds.), *Application of Bioinformatics, Statistics and Economics in Fisheries Research*. New Indian Publishing Agency, New Delhi. pp. 489-499.

● Mukherjee, A. and V.R. Suresh, 2007. Impact of Farakka Barrage on hilsa fisheries: an overview. In: Umesh C. Goswami (ed), *Natural and Anthropogenic Hazards on Fish and Fisheries*. Narendra Publishing House, New Delhi. pp.153-160.

● Pathak, V., N.P. Shrivastava, P.K. Chakraborty and A.K. Das. 2007. Ecological status and production dynamics of river Mahanadi. *CIFRI Bull. No. 149*, CIFRI, Barrackpore. 40p.

● *Training manual on "Management of floodplain wetlands"* for Students of S.S. College, Assam University, Silchar, January 3-9, 2008. Manna, R.K. and Aftabuddin, Md. (eds.). (Contributors: Bhattacharjya, B.K., Manna, R.K., Aftabuddin, Md., Chandra, G., Biswas, A., Sarma, K.K. and Gogoi, P.). 114p.

● *Training manual on "Fisheries management of floodplain wetlands"* for Students of Cachar College,

Assam University, Silchar, January 29-Feb. 4, 2008. Aftabuddin, Md. And Manna, R.K. (eds.). (Contributors: Bhattacharjya, B.K., Manna, R.K., Aftabuddin, Md., Chandra, G., Biswas, A., Sarma, K.K. and Gogoi, P.). 126p.

### Hindi publications

● M. Feroz Khan and Preetha Panikkar 2007. *Matsyakeeya kshetra mein naye tarang* Jaladhi 2006, CIFT Publication : 87-88

● Jha, B.C., 2007. *Bharat Ki Nadiyo Me Bideshi Mool Ki Matsya Prajation Ka Badta Prakop*. CIFRI Bulletin No.144.

● Jha, B.C., 2007. *Bihar me Jal sansadhan ka Vistar awem matsyeki ki sambhawnae*. CIFRI Training Manual on *Bihar me Matsyeki ki Sambhawnae*.

● Pillai, N.G.K. and Katiha, P.K. 2007. *Bharat mein Matsyaki aur Jalkrish Ka Vikas*. Central Marine Fisheries Research Institute, Kochi. 247 p.

● Singh, H.P. and K.D. Joshi (2007) Bihar ke Matsyikee Vikas men Maan, Chaur va Talabon kee Upyogita. In: *Smarika- Krishi vikas dwara jeevikoparjan suraksha*, published on the occasion of *Kshetriya Krishi Mela* organized at Motihari, Bihar from 3-5 Nov 2007 by IIVR, Varanasi, pp.171-173.

● Shrivastava, N.P., 2007. *Jalasaya matsyiki prabandhan (in Hindi)*. In: *Jharkhand Matsya Vikas Pustika-Takniki pahloo (a course manual of training programme)*, CIFRI pub.: 97-99.

● Shrivastava, N.P. and P.R. Rao (2007). *Tawa jalasaya: Paristhitiki avum matsyiki (in Hindi)* CIFRI pub. Bull.100: 1-34 pp.

- Shrivastava, N.P. and P.R.Rao (2007). *Hooghly-Matlah: Jwarnadmukhi paritantra-Ek aur Shrivastava, N.P adhyyan* (in Hindi). *CIFRI pub. Bull.109*, pp.1-18.
- Shrivastava, N.P. and P.R.Rao (2007). *Kaveri nadi-Paryavaran avum matsyiki* (in Hindi). *CIFRI pub. Bull.119*: 1-41 pp.
- Shrivastava, N.P. and P.R.Rao (2007). *Pen main machhli avum jhinga palan* (in Hindi). *Manual, CIFRI pub. Bull.146*: 1-65 pp.
- Singh, H.P. and K.D. Joshi, 2007. Bihar ke matsyikee vikas men maan, chaur va talon kee upyogita. In “*Smarika- Krishi Vikas Dwara Jeevikoparjan Suraksha*” published on the occasion of “Kshetriya Krishi Mela” organized at Motihari, Bihar from 3-5 November 2007 by IIVR, Varanasi. pp. 171-173.
- Vass, K.K., N.P. Shrivastava, P.K. Katiha, K. Mitra, and P.R. Rao (eds.), 2007. *Antarsthalia Matsyaki – Dishayen avam Ayaam*. Central Inland Fisheries Research Institute, Barrackpore. 266p.



## CONSULTANCIES

Title	Sponsoring Organisation	Period
Downstream plan for fisheries development in the Downstream of Sardar Sarovar Reservoir	Govt. Of Maharastra	September 2007, continuing
Study of migration of fishes in River Subansiri and creation of Hatcheries	NHPC, Assam	2007, continuing

## MEETINGS ORGANIZED

### Network Meeting of Fisheries Scientists in Agricultural Research Institutes :

The Fisheries Division of ICAR convened the third 'Network Meeting of Fisheries Scientists in Agricultural Research Institutes', on 14<sup>th</sup> April 2007, at Central Inland Fisheries Research Institute, Barrackpore. Dr. S. Ayyappan, DDG (Fy.), chaired the meeting. Dr. V. V. Sugunan ADG (I Fy) was also present. Fishery scientists from seven agricultural research institutes of ICAR, viz., National Research Center for Women in Agriculture, Bhubaneswar; Central Rice Research Institute, Cuttack; Central Agricultural Research Institute, Port Blair; ICAR Research Complex for Eastern Region, Patna; ICAR Research Complex for NEH Region, Barapani and ICAR Research Complex for Goa, Goa participated in the meeting DDG assured all possible assistance to the scientists from the Fisheries Division, ICAR. The participants appreciated the support and materials provided to them and the arrangements made for them at CIFRI and thanked Dr. K. K. Vass, Director. The following action points were recommended for implementation:

- ◆ Continued support to Fishery Scientists of Agricultural Research Institutes
- ◆ Strengthen network on fishery programs among these Institutes for greater interaction and partnership to attract funding for projects through NAIP
- ◆ Submit proposals to seek funding from NFDB for organizing training programs in fisheries
- ◆ Bring out region/ location specific 'Package of Practices' of technologies
- ◆ Take up fresh studies on methane emission from

Rice-Fish fields, in collaboration with CIFA, in the light of climate change concerns

- ◆ Study the importance of fish *vis-à-vis* crop/animal components and constraints in aquaculture in the NEH Region
- ◆ Extend gender mainstreaming programs to other parts of the country in a network mode and linkages with other agencies
- ◆ Take-up marine fish catch analysis through linkage with CMFRI and arrange orientation program for scientists on marine fisheries research
- ◆ Broaden fishery research activities through integrated approach with fish as a major component under the NRM fold
- ◆ Upscale and widen the ongoing mussel farming activities under mariculture activity

### ICAR-World Fish Centre collaborative project

"Achieving Greater Food security and Eliminating Poverty by Dissemination of Improved carp strains to fish farmers in India" (CARP –II) workshop was organized by Central Inland Fisheries Research Institute (CIFRI), Barrack pore and Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar, at Barrackpore on 15<sup>th</sup> April, 2007. The workshop was attended by Dr. S. Ayyappan, DDG (Fy); Dr. V. V. Sugunan, ADG (I Fy), Dr. Madan Mohan Dey, Regional Director World Fish Centre Malaysia; Dr. K. K. Vass, Director, CIFRI, Dr. N. Sarangi, Director, CIFA, Mr. N. Narshimha Rao, Commissioner of Fisheries, Andhra Pradesh, Dr. A. K. Roy, Director of Fisheries Assam, Mr. M. Gupta, Deputy Director of Fisheries, Chattishgarh. and scientists from CIFRI, Barrackpore. The project team of scientist of CIFA



3rd Network meeting of fisheries scientists

and CIFRI along with two aquaculture entrepreneurs from Andhra Pradesh, 3 Jayanti farmers from Orissa and 6 farmers from West Bengal presented their findings. Based on the results of the project; recommendations towards developing strategies and policies for dissemination of the Jayanti rohu in India were formulated.

### Research Advisory Committee Meeting

The meeting of Research Advisory Committee of Central Inland Fisheries Institute was convened during 23-24<sup>th</sup> April 2007. Dr. M.V. Gupta, Ex-ADG,



Workshop on ICAR-World Fish Project on Improved carp strains

ICLARM (World FishCentre), Chairman and other members Dr. C.S. Singh Retd. Dean, Fisheries, Dr. R.K. Sinha, Professor Zoology, Dept. of Zoology Patna University, Dr.S.Kaul:Director, Ministry of Environment And Forests, Dr. U.C. Goswami, Professor, Department of Zoology, Guwahati University, were present. The meeting was attended by Heads of Divisions viz. Riverine, Estuarine, Reservoir, Wetlands, Fish health & Environment, Fishery Resource Assessment and HRD & TOT of CIFRI. Apart from these officers the scientists at Barrackpore and from outstations attended this important meeting. All Heads of Divisions and a few Principal Scientists presented the progress made in their respective divisions on various research projects and their achievements before the committee members for their consideration, suggestion and direction. New projects were formulated with the approval of RAC. The main recommendations of the RAC meeting were:

- ◆ For overcoming the lacunae of trained personnel on taxonomy, services of experts on fish taxonomy in India should be taken for development of expertise in this field.
- ◆ The records of the training programmes organized by the Institute should be maintained and updated.
- ◆ At the Divisional level a log frame has to be prepared for future projection. Each project should also have log frame. Outcomes and outputs, short term and long term objectives must be carefully identified.
- ◆ All projects pertaining to reservoirs and wetlands should have strong socio-economic component so that livelihood concerns of participating stakeholders is addressed.



RAC meeting is in progress

◆ Work in reservoirs and wetlands should be taken up in a partnership mode with State Govt./NFDB so that outcome of the projects can be fruitfully utilized by the users. Community management of the resources are desirable. CIFRI may give technical guidance for reservoir fisheries development.

◆ Low productive reservoirs should also be selected so that management practices can be advocated for production enhancement through stocking or habitat enhancement.

◆ A lot of reservoirs were taken up in Co-ordinated research projects of the Institute and their productivity were enhanced before handing over to State Govt. A short study should be conducted by CIFRI to ascertain the present status of the reservoirs studied in terms of productivity and suggestions may be made for improvement.

◆ A consolidated review incorporating all the work on Hilsa fisheries done by previous workers needs to

be prepared. This would form a consolidated document for reference by workers.

◆ For development of models in estuaries contact may be established with Mekong river commission, Laos who possess excellent such models. Scientists can be sent on study tour for learning.

◆ The database developed for GIS should be enriched with various parameters which are capable of projecting future scenarios of Inland fisheries for for developing management strategies.

◆ All wetland projects should have a commonality in terms of objectives, activities and socio-economic component of study. Community participation is desirable.

◆ Study on the Environmental flow of rivers needs selecting proper and uniform methodology for deriving the data.

♦ CIFRI must explore on obtaining data on river discharge with other organization through dialogue. Some of the hydrological data on river Ganga may be available from CWC.

♦ In the valuation programme one reservoir and a stretch of river may be taken up. Collaboration with other institutes conducting economic study may be initiated for this study.

♦ Control of aquatic weeds should form an important part of the projects conducted in Assam.

### **Institute Research Committee Meeting**

The Annual Institute Research Committee Meeting was held at Barrackpore from 25<sup>th</sup> to 27<sup>th</sup> April, 2007 under the chairmanship of Dr. K.K. Vass, Director, CIFRI. The meeting was attended by all scientists at Head quarters besides, Scientists from outstations. In accordance with the suggestions of RAC held on April 23-24, 2007 the work programme for 2007-08 was submitted by different Divisions at Head Quarters and Regional Centres. Progress of work on going Projects during 2006-'07 were discussed The proposed programmes for the year 2007-'08 were discussed at length and the IRC approved 13 main themes for formulation of the Projects. The issues related to administrative and financial matters were also discussed in the meeting. The main recommendations of the meeting were:

- \*A Committee of scientists to look into the issue of revising methodology to be followed for plankton studies.



IRC meeting in progress

- For developing predictive production models the remote sensing group should discuss with statisticians and a brain storming session may be arranged for finalizing ways to work on a strategic model.

### **Hindi Pakhwara**

Hindi Pakhwara was celebrated at the Institute's Headquarters during the period from 14.09.2007 to 28.09.07. Dr. Amarnath Sharma, Professor, Dept. of Hindi, Calcutta University inaugurated the Hindi Pakhwara Celebrations. Dr. Sharma stressed on simple and easy usage of Hindi words in our daily official work. During this fortnight a number of Hindi



Staff members participating in the Hindi Pakhwara

competitions like *nibandh lekhan*, *tippany lekhan*, *shabdawali*, *samanya gyan*, *sulekh*, *prashnottari*, *hindi tankan* were conducted. A large number of officers and staff including many scientists participated in these competitions and won prizes. In the Valedictory function Dr. Shivnath Pandey, Professor of Hindi, Mohsin College, Chinsura was the Chief Guest and it was presided by Dr. K. K. Vass, Director, CIFRI. The message issued by the Honorable Minister of Agriculture, Govt. of India, Shri Sharad Pawar Ji was read on the occasion.

### Quinquennial Review Team meetings

The CIFRI Quinquennial Review Team (QRT) for 2002-07, constituted of Dr. P.V.Dehadrai Ex-DDG(Fy) ICAR as Chairman, and Prof M.S.Johal Head, Dept of Zoology Punjab University, Prof. D.P.Zutshi, Ex Director, CORD, Kashmir University, Dr. P.Kumar Ex-Prof. IARI and Prof. Kaushal Kumar Head, Dept of Zoology & Dean Faculty of Science D.D.U. Gorakhpur University held its first meeting at CIFRI Barrackpore on 20-21<sup>st</sup> July 2007. The achievements of all the projects were presented by scientists and reviewed. The QRT visited the Regional Research centres for reservoir fisheries at Hesaraghata, Bangalore during October 3-6, 2007, and for the North eastern region at Dispur, Assam CIFRI during 17-19 December 2007. The team visited the respective offices and participated in the interaction with Scientists and other members of staff.

A total of four visits and seven meetings were held at CIFRI HQ, Barrackpore, Kolkata and its Regional Centres at Bangalore, Guwahati and Allahabad. These visits and meetings helped the Team to get relevant feed back from the scientific,



QRT meeting is in progress

technical and administrative personnel, pertaining to the work/programmes undertaken during the period 2002 to 2007.

The Team examined all the points given in the terms of reference had detailed discussions with members of the staff. After thorough review of the overall research achievements of the Central Inland Fisheries Research Institute for the period 2002 to 2007, the team made recommendations for future research direction. These are grouped under Research, Policy support, Human resource development, Manpower, Infrastructure, Regional Centre activities and Administration.

**4<sup>th</sup> 'Network Meeting of Fisheries Scientists in Agricultural Research Institutes'**, convened by the Fisheries Division, ICAR, was held on 2<sup>nd</sup> February 2008, at CIFRI, Barrackpore. Eight fishery scientists from seven Agricultural Research institutes of ICAR participated in the meeting. Based on the discussions

the following Action Plans for future programs were finalized:

- ◆ Strengthen network on fishery programs among these Institutes for greater interaction and partnership and involve representatives from the fishery research Institutes in the network
- ◆ Give more thrust to studies on emission of green house gas from rice-fish systems
- ◆ Submit proposals to seek funding from NFDB for organizing training programs in fisheries
- ◆ Bring out region/ location specific 'Package of Practices' of technologies
- ◆ Involve 2-3 fisheries scientists of the Institute exclusively in marine fisheries research; take up sea-cage farming, stock assessment studies for important marine fish species and exploratory work at Nicobar Islands.
- ◆ Call a consultation meeting on marine fisheries with experts from outside and involving private fishers



Regional consultation on preparation of management plan for hilsa fisheries is in progress

- ◆ Expand fisheries research activities to open water resources in collaboration with CIFRI
- ◆ Bring out complete package of practices on *Pengba* and Swamp Eel farming in Manipur
- ◆ Extend area of coverage of fish integrated farming system models for water harvest structures to other states and take up fish seed production for stocking in these structures.
- ◆ Give more thrust to mariculture, marine ornamental fish breeding and hatchery and take up sea-cage farming activities in Goa, in collaboration with CMFRI
- ✳ Incorporate, fisheries programs as discussed in the EFC for XI plan

**Hilsa consultation :** Regional Consultation on preparation of management plan for Hilsa fishery was organized in collaboration with BOBP at Institute's headquarter Barrackpore during March 14-15, 2008. Delegates from Myanmar, Bangladesh, Thailand, C.I.F.R.I. and Govt. of India participated in the consultation.

**Meeting of the Nodal Officers of NEH Component in ICAR Fishery Research Institutes** was convened by The Fisheries Division, ICAR on 4<sup>th</sup> February 2008 at CIFRI, Barrackpore. Nodal Officers from CIFT, CIFE, CIFA, NBFGR, NRCCWF and CIFRI who execute the activities of NEH Component attended the meeting. Dr. S. Ayyappan, DDG (Fy.), ICAR, New Delhi welcomed all the participants. The DDG stated that the meeting is being held at a crucial juncture, when XI plan EFCs of all the Fisheries Institutes have been submitted to the Council. It is against this

backdrop that the progress of work for the current year is being reviewed. He informed the house that ICAR has set up Rs. 400 crores budget for NEH component during the XI plan, out of which Rs. 15 crores have been earmarked for the Fishery division under NEH component. The DDG appreciated that sincere efforts have been made by the concerned Institutes and the nodal officers associated with the execution of NEH Component, who often have to work in adverse conditions. He also put on record, the contributions of late Dr. M. Choudhury of CIFRI, Guwahati Center, for effectively executing and coordinating the NEH activities in the region. Although these efforts have started bearing fruits, the dimension of the responsibilities that lie ahead are enormous, he stressed. After the brief remarks, individual presentations were made by all nodal officers. The work plan for the next year was finalized.

◆ Work carried out by all the participating Institutes under the NEH Component during the X plan should be compiled, synthesized and published as a comprehensive document. It was decided that one comprehensive book/ compendium entitled, "Technology wise contribution of ICAR Fishery activities in the NE region" will be published.

◆ There should be atleast one research/extension paper per institute per year in referred journals.

◆ Institutes should use the facilities available at the Regional Center of CIFRI at Guwahati for conducting their programs related to NEH component.

**The Midterm Review Meeting of the ICAR Regional Committee-II** comprising the States of Andhra Pradesh, West Bengal, Andaman & Nicobar Islands, was held under the chairmanship of Dr. S. Ayyappan, DDG (Fy.) and Nodal Officer of the ICAR Region-II on 5<sup>th</sup> February 2008 at CIFRI, Barrackpore to take stock of the action taken by respective organizations on the identified action points at its 18<sup>th</sup> meeting. The chairman expressed overall satisfaction on the level of implementation of various issues and requested the distinguished participants to be ready for taking up many emerging challenges like global warming, increase in production & productivity, and value addition to agricultural products. A number of distinguished participants, who attended the review meeting were Dr. R.K. Samanta, Vice-Chancellor, BCKV, Dr. S.K. Bhattacharya, Director, NIRJAFT, Kolkata, Dr. M.P. Pandey, Director, CRRI, Cuttack, Dr. V. Krishnamurthy, Director, CTRI, Rajamundry, Dr. Ashwini Kumar, Director, WTCER, Bhubaneswar, Dr. N. Sarangi, Director, CIFA, Bhubaneswar, Dr. D.N. Hegde, Project Director, DOR, Hyderabad, Dr. B.C. Virakatamath, Project Director, DRR, Hyderabad, Dr. P.G. Karmakar, Officiating Director, CRIJAF, Barrackpore, the Dean and Faculty Members of SAUs viz. BCKV, WBUAFS, UBKV, ANGRAU, & OUAT, senior officers from the Govt. of West Bengal, heads and scientists from the ICAR regional stations and others. It was decided in the meeting that all actions to be completed by different organizations before next meeting is fixed by the CA in ICAR for the reconstituted region.



## Participation of Scientists in Conferences, Meetings, Workshops, Symposia, etc. (India and Abroad)

### Conference/Seminar/Symposium

12<sup>th</sup> World Lake Conference “TAAL 2007” at Jaipur, Rajasthan during October, 28 to November 3, 2007 and presented papers (Participated by K. K. Vass, Pradeep K. Katiha, N. P. Shrivastava, V. K. Sharma and S. Sarkar, M. K. Bandopadhyay, A. K. Das, N. P. Shrivastava, S. Samanta)

National Conference on Climate Change and Indian Agriculture organized by ICAR during 12-13 October 2007 at NAAS, New Delhi (Participated by M.K.Das).

International Symposium on “Management of Coastal Ecosystem: Technological Advancement and Livelihood Security” Jointly Organized by *Indian Soc. Of Coastal Agric Research and Central Soil Salinity Research institute*, Regional research Station, Canning Town., Salt lake City, October 27-30, 2007 and presented paper (Participated by A. Ghosh, A. K.



Interaction session in Midterm Review Meeting of ICAR Regional Committee-II is in progress

Chattopadhyay and K.R. Naskar, Dr. Utpal Bhaumik)

National Symposium on “Ecosystem Health and Fish For Tomorrow” jointly organized by Inland Fisheries Society of India and Central Inland Fisheries Research Institute, 14-16<sup>th</sup> December, 2007 at Barrackpore, Kolkata (Many scientists of CIFRI participated)

Seminar on “*Sustain Aqua 07*” held at Indian Institute of Technology, Kharagpur during September 27, to 29, 2007. (U. Bhaumik)

8<sup>th</sup> Asian Fisheries Forum on *Fisheries and aquaculture: Strategic outlook for Asia*, organized by Asian Fisheries Society, Indian Branch held at Kochi, India during November 20-23, 2007. (K. K. Vass, B.K. Singh, K.D. Joshi, Utpal Bhaumik, R. Palaniswami, V. K. Sharma, N. P. Shrivastava, P.K. Katiha, Amitabha Ghosh, D.S. Krishna Rao, M. Feroz Khan, M. Karthikeyan, Dr. Preetha Panikkar, A.K. Das, R.K. Manna, Md. Aftabuddin, Md. A. Hassan, D. N. Singh, P. K. Sukumaran)

UGC Sponsored Seminar on “*Structural Changes in the Indian Economy*” organized by the Department of Economics, Rabindra Bharati University, during March 13-14, 2008. Scientists presented paper.

Seminar on “Inductively Coupled Plasma Mass Spectrometry (ICP-MS) – Solutions” organized by Agilent Technologies India Pvt. Ltd. At Kolkata on 04 June, 2007. (S. Samanta)

Seminar-cum-Awareness programme on *Indigenous ornamental fish of Assam – Its prospect and marketing* jointly organized by the Directorate of Fisheries, Assam, MPEDA, Kochi and IIE,

Guwahati held at IIE on May 29, 2007. (B. K. Bhattacharjya).

### Workshops

National Workshop on “Partnerships for Reservoir Fisheries Development” organized by CIFRI, Barrackpore and held at CIAE, Bhopal during 27-28<sup>th</sup> July 2007. (Participated by K.K. Vass, D.S. Krishna Rao, N. P. Shrivastava, P.K. Katiha, A.K. Das, M. Karthikeyan, K.D. Joshi, V. Pathak, K.D. Joshi, S. N. Singh).

Basin Level Workshop under Challenge Program on Water and Food (CPWF) Project entitled *Improved fisheries Productivity and Management in tropical reservoirs* on 17<sup>th</sup> Dec. 2007 at CIFRI. (K.K. Vass, S. K. Mandal, A. K. Das, S. N. Singh and S. K. Sahu)

Annual Stakeholders Workshop under Challenge Program on Water & Food held at BARC, Dhaka (Bangladesh) on Feb. 27-28, 2008 (N.P. Srivastava)

*Interface workshop of key stake holders on promotion of ornamental fish production and trade in Karnataka* organized by Aqua REACH foundation, Department of Fisheries, Govt. of Karnataka and Karnataka Fisheries Development Corporation on 7.11.2007 at University of Agricultural Sciences, Bangalore (M. Feroz Khan, Preetha Panikkar)

Launch Workshop of the NAIP on “Arsenic in food chain : cause, effect and mitigation” at Bidhan Chandra Krishi Viswavidyalaya, Kalyani on 01.02.08. (S. Samanta, S.K. Manna, B.P. Mohanty).

DBT-sponsored 'Idea Generation Workshop in Aquaculture Biotechnology' held at CIFA, Kausalyaganga on 26-27 September, 2007, on

invitation from Director, CIFA. (B.P. Mohanty)

National Workshop on 'Sustainability of Indian Aquaculture Industry' (SUSTAIN-AQUA 07), organized by the IIT, Kharagpur, September 28-29, 2007. (B.P. Mohanty)

Training workshop on Aquatic epidemiology, surveillance and emergency preparedness organized by ICAR, New Delhi and NACA, Bangkok held at Chennai during September 3-7, 2007 (Md. Aftabuddin)

Annual workshop of project on Impact of Fisheries research in India held at CIBA, Chennai from August 2-3, 2007 (Ganesh Chandra)

Regional workshop on Fisheries Conservation and Enhancement: Linking Researchers and Stakeholders organized by NBFGR, Lucknow held at Guwahati on December 18-19, 2007 (B. K. Bhattacharjya Ganesh Chandra, Md. Aftabuddin)

State-level workshop for Formulation of fisheries legal comprehensive statute organized by ARIAS Society, Govt. of Assam on January 04, 2008 (B. K. Bhattacharjya)

Matsya Mahotsav & Seminar Cum Workshop on Development of Fisheries in Assam organized by Dept. of Fisheries, Govt. of Assam on 29<sup>th</sup> -31<sup>st</sup> March 2008 (B. K. Bhattacharjya, Ganesh Chandra, Md. Aftabuddin, K. K. Sarma and P. Gogoi)

### Meetings attended

Dr. K.K. Vass participated in the meeting of the International Scientific Committee – 12<sup>th</sup> World Lake Conference at CGO Complex, Lodi Road, New Delhi on 30<sup>th</sup> May, 2007



Dr. K.K. Vass participated in the QRT meeting at Bhubaneswar on 10-11<sup>th</sup> May, 2007 of Project Directorate for Cropping System Research, Modipuram, U.P.

Dr. K.K. Vass participated in the meeting with QRT Chairman and Dy. Director General (Fy.) to initiate QRT work of CIFRI during 11-14<sup>th</sup> May 2007.

Dr. K.K. Vass participated in the 78<sup>th</sup> Annual General Meeting of ICAR Society on 12<sup>th</sup> May, 2007 at NASC Complex, Pusa, New Delhi.

Dr. K.K. Vass participated in the Vigilance Administration & Management Training at CRRI, Cuttack during 16-18<sup>th</sup> April, 2007 organized by NAARM, Hyderabad.

Dr. K.K. Vass attended Board of studies meeting at Barkatullah University, Bhopal on 6<sup>th</sup> April 2007.

Dr. K.K. Vass participated in the QRT meeting at Project Directorate of Cropping Systems Research, Modipuram, Merrut U.P. on 10- 11<sup>th</sup> April, 2007

Dr. K.K. Vass participated in the meeting of the International Scientific Committee – 12<sup>th</sup> World Lake Conference on 4<sup>th</sup> June 2008

Dr. K.K. Vass participated in the General Body Meeting of National Academy of Agricultural Sciences, 4-5<sup>th</sup> June, 2007 at NASC Complex, Pusa, New Delhi

Dr. K.K. Vass discussed with IEM/MOEF on CIFRI linkage programme on 6<sup>th</sup> June, 2007 at New Delhi

Dr. K.K. Vass participated in the meeting at NRSA, Hyderabad on 7<sup>th</sup> June, 2007

Dr. K.K. Vass participated in the Fisheries Directors Meeting at S.V. Veterinary University, Tirupati on 9-10<sup>th</sup> June, 2007

Dr. K.K. Vass participated in the QRT meeting of PDCSR at on 27-29 June 2007 at UAS, Bangalore

Dr. K.K. Vass participated in the meeting at Barkatullah University and discussed on Reservoir workshop organization at Bhopal during 30<sup>th</sup> June-2<sup>nd</sup> July 2007.

Dr. K.K. Vass participated in the review meeting of foreign aided project at SMD in New Delhi on 2<sup>nd</sup> July 2007

Dr. K.K. Vass attended a meeting with QRT Chairman at New Delhi on 15<sup>th</sup> July at New Delhi

Dr. K.K. Vass participated in the Foundation Day/Award Ceremony/Director's Conference at NASC Complex, Pusa, New Delhi during 16-18<sup>th</sup> July, 2007

Mr. G. Chandra attended Meeting on discussion relating to Matsya Mitra scheme and Training of Fisheries extension officers organized by Commissioner and Secretary, Fisheries Deptt., Govt. of Assam held at Assam Secretariat, Dispur on 19<sup>th</sup> July 2007.

Dr. K.K. Vass participated in the Assessment & interview at Agricultural Scientists Recruitment Board at New Delhi. DG, FAO lecture at NAAS; Meeting at SMD; Office work at KAB-I & Krishi Bhawan during 4-8<sup>th</sup> August

Dr. B. K. Bhattacharjya attended meeting on Introduction of formulated fish feed in place of traditional fish feed organized by the State project

Director, ARIAS Society, Govt. of Assam on August 10, 2007.

Dr. K.K. Vass had meetings with DDG.(Fy.) for finalization of the XI Plan EFC of CIFRI at SMD/ICAR during 28-30<sup>th</sup> August 2007.

Dr. K.K. Vass participated in the XXXVII meeting of the academic council of CIFE, Mumbai on 7<sup>th</sup> September, 2007.

Dr. K.K. Vass participated in the Screening Committee Meeting of National Academy of Agricultural Sciences, New Delhi during 13-14<sup>th</sup> September, 2007

Dr. S. N. Singh attended NCA High Level Environment Group(HLEG) meeting on 19.9.2007 at Krishi Bhavan, ICAR, New Delhi, chaired by Joint Secretary, Ministry of Agriculture, Govt. of India, New Delhi.

Dr. K.K. Vass participated in the meeting with Prof.M.C.Varshneya, Vice Chancellor, Anand Agricultural University (A.A.U.), Anand, Gujarat regarding land matter of CIFRI, Centre in Gujarat during 23-24<sup>th</sup> Sept. 2007

Dr. K.K. Vass participated in the meeting in the Planning Commission, Govt.of India at New Delhi on 25<sup>th</sup> Sept.

Dr. K.K. Vass participated in the National River Linking Project “ First National Workshop IWMI-CPWF project of “The Strategic Analyses of India's River Linking Project” on 9-10<sup>th</sup> October, 2007, NASC Complex, New Delhi.

Dr. K.K. Vass participated in the 208<sup>th</sup> Meeting of the Governing Body of the Indian Council of Agricultural

Research Society on 16<sup>th</sup> October, 2007, NASC Complex, Pusa, New Delhi

Mr. S.K. Mandal, Principal Scientist, attended 7<sup>th</sup> Meeting of NNRMS Standing Committee at Space Application Centre, Ahmedabad on 17.10.07.

Mr. S. K. Mandal, Mr. S. K. Sahu and Mr. M. Karthikeyan attended the fifth TMC (Technical Monitoring Committee) meeting of the CSS project *Strengthening of Database and Information Networking for Fisheries Sector* at Cochin on 12<sup>th</sup> Nov. 2007.

Dr. R.K. Manna participated in the meeting on eradication of water hyacinth by biological control methods for improving fish production in Assam organized by NABARD, Assam at Guwahati on November 15, 2007.

Dr. D. Kumar participated in the Institute Management Committee Meeting of CIBA held at Chennai on 6<sup>th</sup> December 2007.

Dr. K.K. Vass participated in a discussion meeting of the SMD for finalization of the EFC of the Institute on 26-27 Dec 2007.

Dr. K.K. Vass was deputed to attend Project Planning Meeting of the NACA/ICEIDA Project on Reservoir Fisheries of Asian held on 14/15<sup>th</sup> January, 2008 at Bangkok, Thailand

Dr. K.K. Vass participated in the 209<sup>th</sup> meeting of the Governing Body of ICAR Society on 22<sup>nd</sup> January, 2008 at NAAS Complex, New Delhi

Dr. K.K. Vass participated in the ICAR 79<sup>th</sup> Annual General Meeting on 23<sup>rd</sup> January, 2008 at NAAS Complex, New Delhi



During 17-20 Feb 2008 Dr. K.K. Vass attended meetings and had discussions with State Fisheries Director, Secretary Commissioner of Fisheries, Secretary, Revenue Department, Govt. of Assam.

Mr. N.P. Srivastava participated in the Basin Focal Project (BFP) meeting under Challenge Program on Water & Food held at BARC, Dhaka (Bangladesh) on Feb. 26, 2008

Dr. S. N. Singh participated in BOBP Regional Consultation on Preparation of Management Plan for Hilsa Fisheries during March, 14–16, 2008.

Dr. K.K. Vass had discussion meeting with the Director of Fisheries, Govt. of Jharkhand regarding reservoir fisheries project and site visit on 19-20 March 2008 at Ranchi.

### **Training programmes attended**

Dr.B.P. Mohanty attended Liquid Chromatography (LC) School conducted by M/s Waters (India) Pvt. Ltd. at Hotel Hindusthan International, Kolkata on July 9-11, 2007.

Dr. B. B. Satpathy and S. Samanta Participated in the training course on “Water Quality and its Management” organized by National Institute of Hydrology, Roorkee and Cenral Soil and Materials Research Station, New Delhi at New Delhi, during 16 –20<sup>th</sup> July, 2007.

Dr.S.S. Mishra and S.K. Manna participated in “Summer School in Fish Biotechnology” organized by National Bureau of Fish Genetic Resources, Lucknow from August 7 to 27, 2007.

Dr. B. B. Satpathy attended ICAR Sponsored Summer

School on 'ICT Applications in Transfer of Agricultural Technologies. Organised by Department of Communication, G.B. Pant University of Agriculture and Technology, Pantnagar (Uttaranchal. Sept. 5 –25, 2005

Sri K.K. Sarma and Dr. A. Biswas, Technical Officers have attended 21 days Winter School on “Social Science Research Tools in Inland Fisheries Development” organized by Central Inland Fisheries Research Institute, Barrackpore from January 7 to January 27, 2008

### **Lectures delivered**

During the period scientists of the institute from Allahabad ,Guwahati Bangalore and Barrackpore delivered 25 lectures on various aspects of inland fisheries in programmes organised by different organizations



Prof. S. K. Pal, Director, Indian Statistical Institute being felicitated after Diamond Jubilee lecture



Matsya Utsav 2008 at CIFRI



Dr. Mangala Rai, Secretary DARE and DG, ICAR inaugurates National Symposium on Ecosystem Health and Fish for Tomorrow at CIFRI

## EVENTS ORGANISED

### *CIFRI Diamond Jubilee Celebration*

Central Inland Fisheries Research Institute (CIFRI), Barrackpore has completed 60 glorious years of dedicated service to the nation in the field of scientific research in inland fisheries with many notable achievements contributing towards Blue Revolution in the country. A series of events and functions were organized throughout the year 2007.

**Diamond Jubilee lectures:** As part of the Diamond Jubilee Celebrations of the Institute, a series of lectures by eminent scientists—Dr. S. Ayyappan, DDG (Fy.), ICAR, Dr. M. V. Gupta, FAO Consultant and Asst. Director World Fish Centre, Prof. S. K. Pal, Director ISI, Dr. Ramakrishna, Director ZSI, Dr. N. K. Tyagi, Member ASRB, Dr. M. L. Madan, Vice-Chancellor, Pt. DDU Veterinary University and Cattle Research Institute, Dr. C. D. Mayee, Chairman, ASRB, Dr. V. R. P. Sinha, former Director, CIFE, CIFRI and Consultant FAO, were organized during the year at CIFRI, Barrackpore.

### **National Symposium on 'Ecosystem Health and Fish for Tomorrow'**

National Symposium on *Ecosystem Health and Fish for Tomorrow* was jointly organized by CIFRI, Barrackpore and the Inland Fisheries Society of India, Barrackpore on 15-16<sup>th</sup> December 2007 as part of the conclusion of the Diamond Jubilee Celebrations of the Institute. The theme areas were (a) Environment health & climate change (b) Conservation of fish stocks, biodiversity & ecosystem (c) Sustainable enhancement of fishery of inland waters (d) Inland fisheries, integrated farming system & aquaculture (e) Management, policy & governance of inland fisheries (f) Biotechnology in fisheries & environment management.

Dr. Mangala Rai the Secretary, DARE, Govt. of India and DG, ICAR, inaugurated the symposium on 15<sup>th</sup> Dec 2007. Dr. C. D. Mayee, Chairman, ASRB, presided over the function and Shri Ajay Bhattacharya, Jt. Secretary DAHD & F, Govt. of India, was the Guest of Honor. Dr. S. Ayyappan, DDG (Fisheries), ICAR addressed the gathering. Dr. K. K. Vass, President, Inland Fisheries Society of India & Director, CIFRI welcomed the dignitaries, guests and all the participants of the symposium. In his address the Chief Guest, Dr. Mangala Rai mentioned about the dedicated service of CIFRI in the last 60 years towards the development of inland fisheries in India. He also referred to the galaxy of eminent fishery scientists produced by this Institute who have made a mark in the world fisheries sector. He projected the future frontier areas of research in inland fisheries to be taken up in right earnest to achieve new heights.

A large number of eminent fishery scientists, teachers, planners and researchers from all parts of the country attended the symposium. The galaxy of dignitaries including Dr. S. N. Dwivedi, Dr. P.V. Dehadrai, Dr. V. R. P. Sinha, Dr. S.A.H Abidi, Dr. M. Y. Kamal, Dr. S.D. Tripathi, Dr. S. P. Ayyar, Dr. K. V. Devaaj, Dr. M. Sinha, Dr. V. R. Desai, Dr. V. V. Sugunan, Dr. Dilip Kumar, Dr. N. Sarangi, Dr. W.S. Lakra, Dr. P. C. Mahanta, Prof. D. P. Zutshi, Prof. N. C. Datta, Prof. Brij Gopal, Prof. H. R. Singh, Dr. P. Das, Prof. R. K. Sinha, Dr. U.C. Goswami, Prof. B. B. Jana Dr. H. S. Sen, Dr. S. Bhattacharya, Dr. K. L. Sehgal, Dr. Kuldeep Kumar, Dr. Apurba Ghosh, Dr. D. Nath, Dr. Kaushal Kumar, Dr. Sadamate, Dr. R.K. Samanta were felicitated by the Chief Guest.

Ten eminent researchers were conferred fellowships of IFSI (FIFSI). One Young scientist award was given and 12 publications were released on this occasion.

An exhibition 'Matsya Utsav-2007' was organized in which ICAR Fishery Institutes, State Fisheries Departments, NFDB and IFSI participated.

In four Technical Sessions there were 145 papers with theme oriented keynote lectures by experts. From intensive deliberations the key issues identified were:

- Climate change
- Community-based management for more productive fisheries
- Managing ecosystem services
- Managing water productivity through ecological intervention
- Institutionalizing a framework for utilizing synergy between restoration and creation of water bodies for water harvesting and fishery
- Capacity building and governance

### ● ICAR Eastern Zonal Sports Meets

● CIFRI organized the ICAR Eastern Zonal Sports Meet at the Cantonment Board ground and at Sukanta Sadan, Barrackpur during 29 May to 2 June, 2007. Sixteen ICAR institutes participated in the meet. CRRI, Cuttack won the champion trophy as well as the best athlete and the best women athlete awards.



Inaugural function of the ICAR Zonal Sports Meet (Eastern Zone) 2006-07 in Barrackpore army ground

ICAR Zonal Sports (Eastern Zone) for 2007-08 was organized at State Armed Police (SAP) Battalion I, II and VII grounds, and Sukanta Sadan Barrackpore during 4-8 Feb 2008. Sri Vivek Sahay, IPS, Special IG and DIG of Armed Police, Barrackpore was the Chief Guest and Dr. S. Ayyappan, DDG (Fy.), ICAR was Guest of Honour in the inaugural function. A total of 434 participants from 14 ICAR Institutes spread over 8 states participated in 31 sports events. CRRI, Cuttack

was adjudged the Overall Champion Institute. Sri A. N. Mallick, Commandant, 6<sup>th</sup> Battalion, State Armed Police, Barrackpore was the Chief Guest in the valedictory programme and distributed the medals to the prize winners.



Inaugural function of the ICAR Zonal Sports Meet (Eastern Zone) 2007-08

### Winter School

A Winter School entitled “Social science research tools in inland fisheries development” was organized at this Institute during 7-27<sup>th</sup> January 2008. The Winter school was inaugurated by Dr. R.K.Samanta, V.C. BCKVV. The school provided an opportunity to the researchers/scholars to develop proper perspective on social science and acquainted them with the tools and techniques for conducting research in fisheries sector. A total of 22 participants from State Agricultural Universities, Conventional Universities, State Fisheries Departments and Research Scholars of various Institutions underwent the course. The resource persons across the country belonged to ICAR Organizations, State Agricultural Universities and Retired Scientists, of which personalities like Dr. R.K.Samanta, BCKV, Prof.



PRA exercise being conducted at Ullan village for winter school participants

D.K.Marothia, Former Chairman, Agricultural cost and Price Commission, Govt. of India, Dr. P.Kumar, Former Consultant, World Fish Centre, Dr. D.Sen, Former Director of Extension, BCKV, Prof. Joyshree Roy, Dept. of Economics, Jadavpur University, Dr. P.Das, Former Director NBFGR are worth mentioning. Apart from theoretical and practical aspects, the participants were exposed to seminar, debate, media preparation and a PRA exercise for 4 days was also conducted at Ullan



Group photo of participants of the Winter School on social science research tools in inland fisheries development

Lakshmikantapur, South 24 Parganas. Dr. V.V.Sugunan, Asst. Director General (I.Fy.), ICAR distributed the certificates and awards to the participants in the valedictory function.

### **Workshops**

#### **National Workshop on Partnerships for Reservoir Fisheries Development**

Central Inland Fisheries Research Institute, Barrackpore (CIFRI), National Fisheries Development Board, Hyderabad (NFDB), Asian Fisheries Forum, Indian Branch, Mangaluru and Academy of Science, Engineering and Technology, Bhopal (ASET) jointly organized a National Workshop on “**Partnerships for Reservoir Fisheries development**” at Central Institute of Agricultural Engineering, Bhopal (CIAE) during July 27-28, 2007. The workshop focused on available technologies, financial support and problems in reservoir fisheries development and aimed at creating partnerships for enhancement of fishery productivity from reservoirs in the country. His Excellency, Dr. Balram Jakhar, Governor, Madhya Pradesh was the Chief Guest and inaugurated the workshop. Shri Moti Kashyap, Hon<sup>ble</sup> Minister of Fisheries, Govt. of Madhya Pradesh presided over the function.

Secretaries of concerned departments in GoI, and State Governments of Madhya Pradesh, Uttar Pradesh and Punjab attended the workshop. The Directors or their representatives from the States of Uttarakhand, Jharkhand, Uttar Pradesh, Madhya Pradesh, Chhattisgarh and Karnataka participated actively in the deliberations. Senior level officers from ICAR, NFDB, NABARD, NCDC, FISHCOFED, NVDA, MPFISHFED, ASET etc. were present on the occasion.

Honourable Dr. B. Jakhar, Governor conferred Fellowship of Academy of Science, Engineering and Technology, Bhopal to eminent persons, who had excelled in different fields of fisheries, engineering, academics, medical, journalism, art *etc.* Dr.K.K.Vass, Director, CIFRI and Shri N.P.Shrivastava, Principal Scientist, CIFRI were also the recipients of this fellowship.

Dr. S.N.Dwivedi, President, ASET, Dr. S.Ayyappan, DDG (Fy), ICAR & CE, NFDB, Dr.K.K.Vass, Director CIFRI, Shri Bhartiya, NABARD, Dr. Sarvadeva, NCDC, Shri Mishra, FISHCOFED, Shri Uday Verma, NVDA, Dr. N. Sarangi, Director CIFA, Dr. W.S. Lakra, Director NBFGR, Dr. V.V.Sugunan, ADG (I.Fy.), ICAR and State Fisheries Directors of Uttarakhand, Jharkhand, Uttar Pradesh, Madhya Pradesh and Karnataka made the key presentations. Several national fishery experts like Dr.P.V.Dehadrai, Dr.M.Y.Kamal, Dr.S.A.H.Abidi, Dr.V.R.Desai, Dr.G.P.Dubey, Dr.Dilip Kumar and other eminent scientists participated in the deliberations and contributed significantly in the workshop. Over 125 participants attended the technical sessions. Shri Sompal Shastri, Vice Chairman, State Planning Board presided over the valedictory function of the workshop. He indicated that the State Planning Board would provide required support for the reservoir fisheries development in Madhya Pradesh.



**Inaugural Session of the National Workshop on partnerships for reservoir fisheries development**



## **Basin Level Workshop of Challenge Program Project**

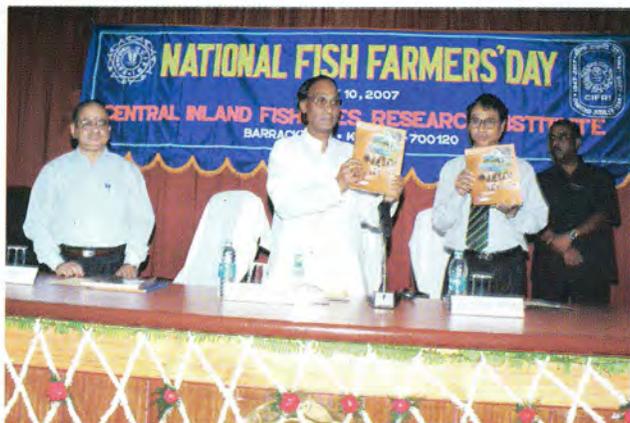
Second Indo-Gangetic Basin Level workshop of CGIAR Challenge Program on Water and Food (CPWF) Project “Improved Fisheries Productivity and Management in tropical Reservoirs” was organized on December 17, 2007 at Central Inland Fisheries Research Institute, Barrackpore. Dr. S. Ayyappan, Deputy Director General (Fy), ICAR, New Delhi, Dr. K. K. Vass, Director CIFRI, Barrackpore, Dr. V. V. Sugunan, Assistant Director General (Inland Fy), ICAR, New Delhi, Prof. H. R. Singh, Former Vice Chancellor, Allahabad University; high officials from Department of Fisheries, Governments of Uttar Pradesh, Uttarakhand, Rajasthan, Jharkhand and Madhya Pradesh, reservoir fishers from Uttar Pradesh, CIFRI scientists and project research staff participated in the workshop. Dr. Vass explained the project activities and expected output. Dr. Sugunan mentioned about the implementation of the project since its inception. Dr. Ayyappan suggested the states to select limited number of reservoirs during XI plan for overall fisheries development. He assured full financial support from National Fisheries Development Board and technical support from CIFRI, Barrackpore. He wanted that the benefits of these efforts should reach the poor fisher community. The representatives from all the participating states presented the status, problems, challenges and suggestions for reservoir fisheries development in their states. Elaborate discussions were held on i) meeting the fish seed demands for reservoir fisheries enhancements; ii)

community-based/co management in reservoir fisheries; iii) prospects of cage and pens for raising the fish seed; iv) training needs for overall reservoir development; v) creation of reliable data-base and its updation; vi) mechanism for NFDB funding for reservoir fisheries enhancement; vii) ensuring improvement in harvest & post harvest, value addition and marketing.

The Community Capacity Strengthening Workshops under CP project at Dahod Reservoir on April 27, 2007 and at Pahuj Reservoir on August 21, 2007. The Consensus Building Workshops were held on July 23, 2007 at Dahod Reservoir and on August 22, 2007 at Pahuj Reservoir.

## **National Fish Farmers' Day**

The National Fish Farmers' day to commemorate first success of Induced breeding by the renowned Scientist Dr. Hiralal Choudhuri of CIFRI was celebrated by Central Inland Fisheries Research Institute at Barrackpore on 10 July, 2007. Hon'ble Fisheries minister of Assam Sri Nurjamal Sarkar was the chief guest and Prof. C.S. Chakraborty, Vice-Chancellor, WBUAFS presided over the function. C.I.F.R.I. conferred Fish Farmer Award to 5 fish farmers and fishermen of Manipur, Jharkhand, Madhya Pradesh, Himachal Pradesh, Assam and Orissa for their outstanding contribution in fisheries sector. During the occasion, Sri Nurjamal Sarkar, Honorable Minister of Fisheries, Assam released a special souvenir entitled 'Reminiscence' as part of CIFRI Diamond Jubilee celebration.



Sri Nurjamal Sarkar, Hon'ble Minister of Fisheries, Assam releases souvenir in the National Fish Farmer's Day

### **CIFRI Recreation club activities**

CIFRI recreation club celebrated different occasions and activities in the year 2007-08 with enthusiasm. The Club took active part in organizing cultural and sports activities in celebrating Diamond Jubilee of the Institute. Rabindranath Tagore birth anniversary celebration was organized on 9 May 2007. Members of the staff and their children took part in the cultural programme. On the auspicious occasion of Institute's foundation day, Dr. K.K. Vass, Director and Mrs. Girija Vass distributed study materials to the students of local schools, belonging to



Dr. K. K. Vass, Director, distributes books to poor student in the eve of R. N. Tagore's birthday celebration

the poorer section of the society as a part of the social welfare activities of the club. Moreover, 74 numbers of new books were purchased for the readers apart from 84 monthly magazines.

**CIFRI Sports meet:** As part of the Diamond Jubilee celebration of CIFRI a Sports Meet of staff members at Headquarter, Barrackpore was held on 26<sup>th</sup> and 27<sup>th</sup> February, 2007. One hundred ninety eight staff members enthusiastically participated in the indoor games and 71 members took part in outdoor games.



## DISTINGUISHED VISITORS

The following distinguished persons visited the Institute during the period

Name	Institute & Address
Dr. Mangala Rai	Secretary, DARE, Govt. Of India and DG, ICAR
Dr. S. Ayyappan	Deputy Director General (Fy.) ICAR, New Delhi
Dr. C. D. Mayee	Chairman, ASRB, New Delhi
Dr. S. N. Dwivedi	Ex. D.G., MPCOST, Bhopal
Dr. P. V. Dehadrai	Ex. DDG (Fy), ICAR, New Delhi
Dr. S.A.H. Abidi	Ex. Member, ASRB
Dr. M. Y. Kamal	Ex. V.C., SKUAST, Kashmir
Dr. V.R.P. Sinha	Ex. Director, CIFE & FAO Consultant
Dr. K.V. Devaraj	Ex. V.C., Bangalore Agricultural University
Shri Ajay Bhattacharya	Jt. Secretary (Fy), DAHDF, GOI, New Delhi
Dr. M. L. Madan	V.C., Pt. DDU Veterinary University & Cattle Research Institute, Mathura
Dr. S. D. Tripathi	Ex. Director, CIFE, Mumbai
Dr. S. P. Ayyar	Ex. Director, CIFRI, Barrackpore
Dr. V. V. Sadamate	Advisor, Planning Commission, New Delhi
Dr. V. V. Sugunan	ADG (I.Fy), ICAR, New Delhi
Dr. Dilip Kumar	Director, CIFE, Mumbai
Dr. N. Sarangi	Director, CIFA, Bhubaneswar
Dr. W. S. Lakra	Director, NBFGR, Lucknow
Dr. P.C. Mahanta	Director, NRCCWF. Bhimtal
Dr. R. K. Samanta,	Vice Chancellor, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Dist. Nadia, West Bengal.
Prof. D. K. Marothia	Former Chairman, Agriculture Cost & Price Commission, Krishak Nagar, Raipur.
Dr. P. Kumar	Former Prof. Division of Agricultural Economics, IARI, New Delhi & Consultant, World Fish Centre, Penang, Malaysia.

Prof. (Mrs.) Joyshree Roy	Professor and Head, Department of Economics, Jadavpur University, Kolkata
Prof. Rajkumar Sen	Prof. of Economics, Rabindra Bharati University, Kolkata.
Dr. S.P. Ayyar	Former Director, CIFRI, Barrackpore
Dr. A. D. Diwan	Assistant Director General (M.Fy), ICAR, New Delhi
Dr. A. G. Ponniah	Director, CIBA, Chennai.
Dr. A. K. Roy	Director of Fisheries, Assam
Dr. M. V. Gupta	Ex-ADG, ICLARM, FAO Consultant
Sri Nurjamal Sarkar	Hon'ble Minister of Fisheries, Soil Conservation & Irrigation, Govt. of Assam.
Prof. C. S. Chakraborty	Vice-Chancellor, WBUAFS
Mr. R.P.S. Kahalon	Principal Secretary, Fisheries Dept., Govt. of W. Bengal
Dr. Sankar Pal	Director, Indian Statistical Institute, Kolkata.
Dr. Ramakrishna	Director, Zoological Survey of India, Kolkata
Dr. N. K. Tyagi	Member, ASRB, ICAR, New Delhi.
Smt. Rajbala Verma	Secretary, Jharkhand
Mr. Rajeeb Kumar	Director, Fisheries, Jharkhand
Dr. Madan De	World Fish Centre, Malayasia
Prof. U. C. Goswami	Prof., Dept. of Zoology, Gauhati University
Prof. R. K. Sinha	Prof., Dept. of Zoology, Patna University
Dr. C. S. Singh	Retd. Dean, Fisheries, G.P. Panthnagar University
Prof. Brij Gopal	School of Env., JNU, New Delhi
Prof. H. R. Singh	Ex-VC Allahabad University
Dr. K. L. Sehgal	Ex-Director NRCCWF, Bhimtal



Dr. Bengali Baboo, Director, Indian Institute of Natural Resins and Gums, Ranchi is in discourse with scientist in the Lab.

## PERSONNEL

**(Managerial position only, from April 2007 to March 2008)**

### CIFRI, Barrackpore, West Bengal

Dr. K. K. Vass, Director

### Riverine Division, Allahabad, Uttar Pradesh

Dr. H.P. Singh, Principal Scientist, Head of Division (Acting)

### Reservoir Division, Bangalore, Karnataka

Dr. D.S.K. Krishna Rao, Principal Scientist, Head of Division (Acting)

### Estuarine Division, Barrackpore, West Bengal

Dr. M. K. Mukhopadhyaya, Principal Scientist  
Head of Division (Acting) upto January 2008  
Dr. D. Nath, Principal Scientist, ( from February ,2008)

### Fish Health & Environment Division,

### Barrackpore, West Bengal

Dr. Manas Kr. Das, Principal Scientist,  
Head of Division (Acting)

### Floodplain Wetlands Division, Guwahati,

### Assam

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

### Resource Assessment Division, Barrackpore,

### West Bengal

Shri S.K.Mondal, Principal Scientist,  
Head of Division (Acting) (upto January 2008)  
Dr. Manas Kr. Das, Principal Scientist

(additional chrage from February, 2008)

### Human Resource Development& transfer of technology Division

Dr. Utpal Bhaumik, Principal Scientist,  
Head of Division (Acting)

### Senior Administrative Officer, CIFRI, Barrackpore

Shri U.C.Prasad

### Finance & Accounts Officer, CIFRI, Barrackpore

Shri Z.H. Khilji

## Any other relevant information

**Infrastructure created :** Development of an office and infrastructure under CPWF project “Improved fisheries productivity and management in tropical reservoirs” at CIFRI, Barrackpore. During the period the work on our new laboratories at Barrackpore was completed by CPWD and their furnishing is under

way. Similarly, under CPPN project a number of specialized laboratory facilities were also created at Barrackpore. Under the Mega Seed project, one organized fishery hatchery has also been created at the Head Quarter. More facilities have been created at our research Centres at Bangalore and Guwahati.



Fish hatchery developed at CIFRI Barrackpore under Mega Seed Project



# वार्षिक प्रतिवेदन

**2007 – 2008**



केन्द्रीय अंतरस्थलीय मात्स्यिकी अनुसंधान संस्थान  
(भारतीय कृषि अनुसंधान परिषद)  
बैरकपुर, कोलकाता - 700120

### प्राक्कथन

इस अवधि के दौरान संस्थान ने अंतर्स्थलीय जलीय संसाधनों जैसे-नदी, जलाशय, ज्वारनदमुख, आर्द्र क्षेत्र की प्रबन्धन प्रणालियों के विकास हेतु इनकी उत्पादन प्रक्रिया को समझने की दिशा में और अधिक सूचनाएं प्राप्त करने हेतु अनुसंधान कार्य किया। जलाशय व आर्द्र क्षेत्रों की मत्स्य उत्पादकता की वृद्धि हेतु विकसित प्रणालियों का मानकीकरण एवं इन्हें अपनाने की दिशा में भी कार्य किया गया। इस दौरान भौगोलिक सूचना प्रणाली के अंतर्गत अंतर्स्थलीय जलीय क्षेत्रों का डिजिटल मानचित्र भी तैयार करने का प्रयास किया गया। अंतर्स्थलीय क्षेत्रों के पर्यावरण एवं जलवायु परिवर्तन के संदर्भ में परितंत्र स्वास्थ्य एवं मत्स्य सम्पदा पर इसके प्रभाव का मूल्यांकन किया गया। विभिन्न विषैले पदार्थों से दूषित अंतर्स्थलीय जलीय क्षेत्रों का अपह्रास पर भी पर्याप्त कार्य किया गया। इस अवधि के दौरान सभी अनुसंधान कार्यों से महत्वपूर्ण सूचनाएं मिलीं जिनसे हम अपने पाठकों को अवगत कराएंगे। संस्थान की मूल परियोजनाओं के अतिरिक्त विभिन्न बाहरी संगठनों द्वारा प्रायोजित अनेक परियोजनाओं व परामर्शक सेवाओं पर भी कार्य किया। संस्थान में एक NAIP परियोजना पर भी कार्य किया जा रहा है। विभिन्न संस्थानों के साथ अपने संबंध सुदृढ़ करते हुए इस संस्थान ने कई संगठनों व राज्य सरकारों से जलाशयों में कार्य करने हेतु संबंधों की स्थापना भी की है।

इस वर्ष काफी चिन्तन-मनन के पश्चात् 11वीं योजना का प्रस्ताव परिषद् मुख्यालय को प्रस्तुत किया गया जिसकी स्वीकृति प्राप्त हो गई। इस स्वीकृत योजना प्रस्ताव को चरण बद्ध तरीके से कार्यान्वित किया जा रहा है। संस्थान ने स्वीकृत VISION 2020 भी प्रकाशित किया जिसमें संस्थान की भावी अनुसंधान योजनाओं को दर्शाया गया है।

सिफरी परिवार के लिए वर्ष 2007 काफी विशेष रहा। इस वर्ष संस्थान ने अंतर्स्थलीय मात्स्यिकी क्षेत्र में अपना 60 वर्ष का कार्यकाल पूरा किया। अप्रैल से दिसम्बर, 2007 के दौरान अनेक कार्यक्रमों का आयोजन किया गया। इस हीरक जयन्ती के अवसर पर अनेक विशेषज्ञों ने जैसे - डा. एस. अय्यप्पन, उप-महानिदेशक

मात्स्यिकी, भा. कृ. अनु. प; डा. एम. वी. गुप्ता, वर्ल्ड फिश लारेट, प्रो. एस. के. पाल, निदेशक भारतीय सांख्यिकी संस्थान; डा. रामकृष्ण, निदेशक, भारतीय जीव-जन्तु सर्वेक्षण; डा. सी. डी. मायी, अध्यक्ष, ए. एस. आर. बी.; डा. एन. के. त्यागी, सदस्य, ए.एस.आर.बी; डा. वी. आर. पी. सिन्हा, पूर्व-निदेशक, केन्द्रीय मत्स्य शिक्षा संस्थान व परामर्शक, खाद्य व कृषि संगठन; डा. एम. एल. मदान, उप-कुलपति, पं. दीन दयाल उपाध्याय वेटिनरी युनिवर्सिटी एवं केटल रिसर्च इन्सटिट्यूट, मथुरा ने हीरक जयन्ती व्याख्यान दिया। हीरक जयन्ती वर्ष के समापन के रूप में 15-16 दिसम्बर 2007 के दौरान संस्थान ने इनलैंड फिशरीज सोसाईटी के साथ संयुक्त रूप से एक राष्ट्रीय कार्यशाला का आयोजन किया। इस अवसर पर संस्थान के पूर्व व वर्तमान वैज्ञानिकों को सम्मानित किया गया जिन्होंने इस संस्थान के उत्थान में अपना योगदान दिया।

इस रिपोर्ट में दर्शायी गई सभी उपलब्धियाँ संस्थान के समस्त अधिकारियों व कर्मचारियों के सामूहिक प्रयास के परिणाम हैं जिसके लिए वे सभी बधाई के पात्र हैं, आशा करता हूँ कि वे भविष्य में भी इसी तरह सहयोग करते रहेंगे।

मैं आशा करता हूँ कि संस्थान का यह संक्षिप्त रिपोर्ट विवृत्त जल क्षेत्र मात्स्यिकी और जैव विविधता संरक्षण व सतत मात्स्यिकी हेतु परितंत्रों के प्रबन्धन में रुचि रखनेवाले सभी व्यक्तियों व संगठनों के लिए उपयोगी होगा। मैं व्यक्तिगत तौर पर उनसे आशा करता हूँ कि वे इस कार्य में सुझाव दें ताकि आनेवाले वर्षों में इसे और अधिक उपयोगी बनाया जा सके।

डॉ. मंगला राय, सचिव, कृषि अनुसंधान शिक्षा विभाग एवं महानिदेशक, भारतीय कृषि अनुसंधान परिषद को संस्थान के विभिन्न गतिविधियों में उनके सहयोग हेतु हृदयपूर्वक धन्यवाद देता हूँ। मैं डॉ. एस. अय्यप्पन, उपमहानिदेशक मात्स्यिकी, भा.कृ.अनु. प. के प्रति आभारी हूँ जिन्होंने संस्थान के अनुसंधान कार्यों की प्रगति में निरन्तर सहयोग एवं दिशा निर्देश दिया है। परिषद के मात्स्यिकी प्रभाग के अधिकारीगण विशेषकर डॉ. वी.वी.सुगुणन,



सहायक महानिदेशक (अं.मा.), डॉ. ए.डी.दिवान, सहायक महानिदेशक (स.मा.), डॉ. वी. आर. चित्रांशी एवं श्री अनिल अग्रवाल, प्रधान वैज्ञानिक तथा श्री ए. एस. भाटिया, अवर सचिव को भी धन्यवाद देता हूँ जिन्होंने समय समय पर संस्थान को सहायता प्रदान की है।

मैं डॉ. मानस कुमार दास, प्रधान वैज्ञानिक को धन्यवाद देता हूँ जिन्होंने इस रिपोर्ट का संकलन कर मसौदा तैयार किया। उन

सभी अधिकारियों व कर्मचारियों को भी धन्यवाद देता हूँ जिन्होंने इस कार्य में अपना सहयोग दिया है। इस रिपोर्ट में हिन्दी खण्ड तैयार करने वाले श्री पी. आर. राव के कार्य की भी सराहना करता हूँ।

बैकपुर, कोलकाता  
अगस्त, 2008

कुलदीप कुमार वास  
निदेशक

## विशिष्ट सारांश

केन्द्रीय अंतर्स्थलीय मात्स्यिकी अनुसंधान संस्थान अपनी स्थापना मार्च 1947 से प्रगति करते हुये अंतर्स्थलीय मात्स्यिकी क्षेत्र में एक प्रमुख संस्थान के रूप में प्रतिष्ठित हुआ है। यह संस्थान पश्चिम बंगाल राज्य के बैरकपुर, कोलकाता में स्थित है। इस समय संस्थान में 53 वैज्ञानिक, 77 तकनीकी कर्मचारी, 65 प्रशासनिक तथा 148 सहायक कर्मचारी कार्यरत हैं।

संस्थान ने अपने अनुसंधान कार्य को अनुसंधान सलाहकार समिति के मार्गदर्शन पंचवर्षीय समीक्षा दल की सिफारिशों तथा विजन 2020 प्रलेख व 11वीं योजना हेतु पहचान किए गए पहलुओं के अनुसार व्यवस्थित किया। संस्थान में एक प्रबन्धन समिति भी है जो संस्थान की गतिविधियों का मार्गदर्शन करती है। संस्थान में अनेक आंतरिक समितियां भी हैं, जो संस्थान के प्रबन्धन में महत्वपूर्ण योगदान देती हैं जैसे – अनुसंधान समिति, संयुक्त कर्मचारी परिषद्, राजभाषा कार्यान्वयन समिति आदि।

संस्थान ने वर्ष के दौरान संस्थान की अनुसंधान परियोजनाओं, प्रायोजित परियोजनाओं, ठेके का अनुसंधान कार्य, परामर्शक सेवाओं पर ध्यान केन्द्रित किया। इस दौरान प्रौद्योगिकी हस्तांतरण, मानव संसाधन विकास – आंतरिक व बाह्य लोगों का, जन जागृति, विभिन्न संगठनों से संबंध आदि पर पर्याप्त ध्यान दिया गया।

अनुसंधान कार्यक्रमों की रूपरेखा इस प्रकार तैयार की गई कि संसाधन मूल्यांकन, पारिस्थितिकी, जैव-विविधता, मत्स्य सम्पदा व उपज मूल्यांकन तथा पर्यावरण अनुमापन व प्रबन्धन पर विशेष ध्यान रखा जाए। इस अवधि के दौरान संस्थान ने 7 अनुसंधान कार्यक्रमों में कार्य किया जिनके तहत 31 परियोजना गतिविधियां हुईं तथा इनके अतिरिक्त बाहरी संगठनों द्वारा प्रायोजित 6 परियोजनाओं व अंतर्राष्ट्रीय परियोजना पर भी कार्य किया गया। विभिन्न कार्यक्रमों के तहत उपलब्धियां निम्नलिखित हैं—

### नदीय पारिस्थितिकी एवं मात्स्यिकी

● यमुना नदी के 11 केन्द्रों बदवाला (देहरादून) से इलाहाबाद (गंगा नदी के साथ संगम स्थल) तक के क्षेत्र में अन्वेषण कार्य किया गया। इस अध्ययन से ज्ञात होता है कि क्षेत्र में भारी प्रदूषण है, दिल्ली-इटावा क्षेत्र में आक्सीजन की कमी है। इटावा की स्थिति काफी भयावह 1.2 मि.ग्रा/ली. है। उस स्थान की स्थिति बेहतर (7.2 मि. ग्रा/ली.) है जहाँ उपनदियाँ इसमें मिलती हैं।

● सदियापुर एवं दारागंज मत्स्य अवतरण केन्द्रों से मत्स्य अवतरण क्रमशः 115.96 तथा 44.02 टन आंका गया। सदियापुर केन्द्रों में छोटी प्रजातियों की प्रचुरता देखी गई जो लगभग 34.6 प्रतिशत है। इसके बाद का स्थान है, विदेशी प्रजातियों का विशेषकर कॉमन कार्प प्रजाति का जो 34 प्रतिशत है। ये प्रजातियाँ पिछले वर्षों की तुलना में 79 प्रतिशत अधिक पाई गई हैं।

### जलाशय पारिस्थितिकी एवं मात्स्यिकी

● सुवर्णावती जलाशय में मार्च 2007-फरवरी 2008 के दौरान किए गए अन्वेषण से ज्ञात हुआ है कि कुल प्राप्त उपज में 39.5 टन, 95 प्रतिशत उपज भारतीय मेजर कार्प मछलियों का है और इनके बाद का स्थान तिलापिया मछलियों का है। उपज प्रति युनिट प्रयास दर 12.3 कि.ग्रा पाया गया। जलाशय से उपज दर 80.6 कि.ग्रा./हे. पाया गया। जलाशय की उत्पादकता को बढ़ाने के लिए आवश्यक अंतरिम सुझाव दिए गए।

● कर्नाटक, राजस्थान, महाराष्ट्र, तमिलनाडु, उत्तर प्रदेश, हरियाणा, केरल, हिमाचल प्रदेश, आन्ध्र प्रदेश, उड़ीसा, मध्य प्रदेश और पंजाब राज्यों के जलाशयों से सेकेन्डरी डाटा जैसे-भूआकृतिक विवरण, मत्स्य उपज के आंकड़े, उत्पादन क्षमता, प्राथमिक उत्पादकता आदि



सूचनाओं को एकत्रित कर विश्लेषण किया गया ताकि साफ्टवेयर मॉडल का विकास किया जा सके। क्षेत्रफल के साथ उपज, औसत गहराई और प्राथमिक उत्पादकता व अन्य प्राचलों की आपसी संबंध जानने के लिए डाटा का प्राथमिक सांख्यिकीय विश्लेषण किया गया।

### ज्वारनदमुखी पारिस्थितिकी एवं मात्स्यिकी

● पुलीकेट लेक का भौतिक व रसायनिक गुण, मृदा की गुणवत्ता व गठन, प्राथमिक उत्पादकता, जैविक उत्पादन आदि का गहन अध्ययन किया गया। पुलीकेट की मात्स्यिकी विशेषकर पी. इंडिकस, मल्लेट (एम. सिफालस > एम. टेड > एम. केनियस > एम. मेकोलेपिस > लिजा परसिया और चनोस चनोस) पर निर्भर है। सन् 1970 एवं 80 के दशकों की प्रधानता वाली प्रजाति चनोस चनोस अब यदा कदा ही पाई जाती है। इसी प्रकार उस अवधि में अधिकतर पाई जानेवाली टाइगर झींगा पी. मोनोडॉन भी अब काफी घट गई है। औसत प्राप्त उपज प्रति मछुआरा प्रति दिन भी काफी घट कर मात्र 300-500 ग्रा/दिन रह गई है।

● अब तक गोदावरी ज्वारनदमुख से 68 मत्स्य प्रजातियां दर्ज हुईं जो 37 फेमली और 12 आर्डर से संबंधित हैं।

### आर्द्र क्षेत्र की पारिस्थितिकी एवं मात्स्यिकी

● पश्चिम बंगाल के उत्तर 24 परगना, नदिया एवं हुगली जिलों में स्थित 7 आर्द्र क्षेत्रों की मत्स्य उपज तथा अन्य पर्यावरणीय प्राचलों का अध्ययन किया गया। इन आर्द्र क्षेत्रों में प्राकृतिक आपूर्ति से प्राप्त मत्स्य उपज 139-609 कि. ग्रा/हे. के बीच रहा। प्राप्त उपज के विश्लेषण से स्पष्ट होता है कि आर्द्र क्षेत्र की उपज में अधिकतर योगदान पंकटियस एसपीपी वर्ग (6-20%) की है और इसके बाद का स्थान चन्नस एसपीपी (7-18%) और झींगों का (5-12%) है।

● पश्चिम बंगाल राज्य के बीलों से 55 जेनेरा और 30 फेमली से संबंधित 76 प्रजातियां दर्ज की गईं। विदेशी मत्स्य प्रजातियां जैसे- बारबोनिमस गोनियोनोटस (पंकटियस गोनियोनोटस), पंगसियानोडान हाइपोफथेलामस (पंगसियस सूची), क्लारियस गैरीपीनस, ओरियोक्रोमिस निलोटीकस निलोटीकस, टेरीगोप्लीकथस डिसजंकटिवस और पियारेकटस ब्रककिपोमस आदि दर्ज हुईं।

### मत्स्य स्वास्थ्य एवं पर्यावरण

● दामोदर नदी से एकत्रित जल के नमूनों के विश्लेषण से देखा गया कि सभी नमूनों में डी.डी.टी. मौजूद है, वास्तव में EPI द्वारा जलीय-जीवों के निर्धारित स्तर से भी अधिक मात्रा में पाई गई।

● दामोदर नदीय क्षेत्र के एक अत्यधिक औद्योगिक एककों वाले क्षेत्र में किए गए IIBI अध्ययन के दौरान 22 फेमिलियों से संबंधित 55 मत्स्य प्रजातियां दर्ज हुईं। पहली बार 5 विदेशी प्रजातियां पाई गईं।

● दामोदर नदी से फिनोल को कम करने वाले 19 प्रकार के बैक्टीरिया प्रजातियों की पहचान की गई।

● लेबियो रोहिता मछली को कैडमियम के तीन प्रकार के सांद्रण 1 मि. ग्रा./ली., 5 मि. ग्रा./ली. तथा 10 मि. ग्रा./ली. उद्भासित करने पर मेटालोथियोनीन जीन के केवल एक आइसोफार्म में जीन एक्सप्रेशन पहचान योग्य पाई गई।

● असम राज्य के बीलों के लिए GIS विकास हेतु नगांव जिले के 50 बीलों से आंकड़े एकत्रित किए गए। इनमें से केवल 11 बीलों में ही 50 प्रतिशत से अधिक मेकोफाइट कवरेज है, 23 बीलों में 25 प्रतिशत से भी कम है। अधिकतर बील मुख्य नदी से ऋतु विशेष के दौरान जुड़े रहते हैं जिससे इनकी प्राकृतिक पारिस्थितिकी संतुलित होती है।

### अन्य गतिविधियाँ

संस्थान में स्टाफ रिसर्च काउंसिल, अनुसंधान सलाहकार समिति, प्रबन्धन समिति, हिन्दी कार्यान्वयन समिति आदि के बैठकों का आयोजन निर्धारित समय पर किया गया। इन बैठकों में संबंधित विषयों पर चर्चा की गई एवं संस्थान के अनुसंधान तथा उचित

प्रबन्धन हेतु आवश्यक दिशा-निर्देश दिए गए।

यह संस्थान देश की विभिन्न संस्कृतियों का प्रतिनिधित्व करता है। प्रत्येक सदस्य संस्थान द्वारा आयोजित विभिन्न राष्ट्रीय दिवसों व अन्य आयोजनों में बड़े उत्साह, सद्भाव एवं भाईचारे के साथ भाग लेता है।



*Barbonymus gonionotus*



*Piaractus brachypomus*



*Oreochromis niloticus niloticus*



*Pterygoplichthys disjunctivus*

**Exotic fish species recorded from wetlands**



**Fish catch from Suvarnavathy reservoir**



## संक्षिप्त इतिहास

### भूमिका

केन्द्रीय सरकार की कृषि, वानिकी तथा मात्स्यिकी से संबंधित उप-समिति के प्रस्ताव पर 17 मार्च 1947 को भारत सरकार के खाद्य व कृषि मंत्रालय के अंतर्गत केन्द्रीय अंतर्स्थलीय मात्स्यिकी अनुसंधान केन्द्र की स्थापना कलकत्ता में हुई। एक छोटे पैमाने पर प्रारंभ किया गया यह केन्द्र अपने कार्यकलापों के बल पर वर्ष 1959 में एक पूर्ण संस्थान के रूप में परिणत हुआ तथा बैरकपुर, पश्चिम बंगाल के नवनिर्मित भवन में इसका स्थानांतरण हुआ। कालान्तर में यह संगठन समूचे राष्ट्र की अंतर्स्थलीय मात्स्यिकी एवं जलकृषि का सर्वश्रेष्ठ अनुसंधान संस्थान के रूप में प्रतिष्ठित हुआ। वर्ष 1967 से यह संस्थान भारतीय कृषि अनुसंधान परिषद्, कृषि अनुसंधान एवं शिक्षा विभाग, भारत सरकार का विधिवत् सदस्य है।

प्रारम्भ में संस्थान का मुख्य उद्देश्य देश के अंतर्स्थलीय मात्स्यिकी संसाधनों का उचित मूल्यांकन तथा इनके संरक्षण व अधिकतम समुपयोजन के लिए उपयुक्त प्रणालियों का विकास करना था। इस उद्देश्य पूर्ति के लिए संस्थान ने देश में उपलब्ध सभी अंतर्स्थलीय जल संसाधनों की पारिस्थितिकी एवं इनकी उत्पादन क्षमताओं के साथ साथ तालाबों की पारिस्थितिकी एवं उत्पादन से संबंधित कृषि पद्धतियों का भी अध्ययन किया जिससे प्रति युनिट इकाई मत्स्य उत्पादन में वृद्धि की जा सके।

1960 और 1970 के दशक में संस्थान ने भारत सरकार के योजनास्वरूप जलकृषि अनुसंधान एवं विकास पर अपना ध्यान केन्द्रित करना आरम्भ किया। देश की मात्स्यिकी अनुसंधान एवं कृषि पद्धति में महत्वपूर्ण उपलब्धियों को प्राप्त करने के बाद संस्थान ने वर्ष 1971-73 के दौरान 4 अखिल भारतीय समन्वित अनुसंधान परियोजनाओं का कार्य प्रारम्भ किया। ये परियोजनायें थीं - मिश्रित मत्स्य पालन, नदीय मत्स्य बीज उत्पादन, वायु श्वासी मत्स्य पालन, जलाशयों की पारिस्थितिकी व मात्स्यिकी प्रबंधन तथा खाराजल मत्स्य पालन। वर्ष 1974 में प्रारम्भ की गई मिश्रित मत्स्य पालन व नदीय मत्स्य बीज उत्पादन नामक संयुक्त परियोजना की सफलता भारत में मत्स्य पालन के लिए एक ऐतिहासिक घटना थी जिसे देश के मीठाजल जीव पालन के विकास का आधार स्तम्भ

माना जाता है। इस सफलता के परिणामस्वरूप वर्ष 1977 में धौली, उड़ीसा में केन्द्रीय मीठाजल जीवपालन अनुसंधान एवं प्रशिक्षण केन्द्र की स्थापना हुई जो वर्ष 1987 में केन्द्रीय मीठाजल जीवपालन अनुसंधान संस्थान के रूप में परिणत हुई। इसी प्रकार संस्थान ने केन्द्रीय खाराजल जीवपालन अनुसंधान संस्थान तथा राष्ट्रीय शीतजल मात्स्यिकी अनुसंधान केन्द्र की स्थापना किया जिनका कार्य खाराजल जीव पालन एवं शीतजल मात्स्यिकी अनुसंधान करना था। अतः के. अं. मा. अनु. संस्थान को तीन प्रमुख अनुसंधान संस्थान प्रारम्भ करने का श्रेय प्राप्त है।

### हमारा मिशन

मात्स्यिकी की वृद्धि, जैव विविधता संरक्षण पारिस्थितिक कार्यों में निष्ठा हेतु सफल प्रबंधन तथा खुले जल क्षेत्रों से सामाजिक लाभ प्राप्त करना।

### दृष्टिकोण

जीविका व सामाज के उत्थान के लिए खुले जल क्षेत्रों की उत्पादकता व मत्स्य उत्पादन में पारिस्थितिक मैत्रीपूर्ण वृद्धि।

### अधिदेश

बदलते परिदृश्य तथा वर्तमान अनुसंधान व विकास की आवश्यकताओं को ध्यान में रखते हुए अनुसंधान प्राथमिकताओं का पुनःसंस्करण आवश्यक है ताकि मत्स्य उत्पादन सतत बना रहे। जैव विविधता का संरक्षण अति महत्वपूर्ण है जो किसी भी उत्पादन व्यवस्था का आधार स्तम्भ है। संस्थान की अनुसंधान प्राथमिकताओं में निम्नलिखित परिवर्तन किए गए हैं—

- उत्पादन में वृद्धि से उत्पादकता को सतत बनाए रखने पर ध्यान देना

● केवल मत्स्य लाभ से परितंत्र के स्वास्थ्य व लाभ की ओर ध्यान देना

इन परिवर्तनों के कारण संस्थान का अधिदेश इस प्रकार है—

- ✓ अंतरर्स्थलीय विवृत्त जल क्षेत्रों जैसे—नदी, जलाशय, झील, ज्वारनदमुख व संबद्ध जल क्षेत्रों में मौलिक, सामरिक व व्यावहारिक अनुसंधान कार्य।
- ✓ अधिदेशित जल निकायों की उत्पादकता बढ़ाने हेतु परितंत्र विशेष के लिए तकनीकों व प्रणालियों को विकसित करना।
- ✓ बदलते पर्यावरण का अनुमापन एवं मात्स्यिकी पर इसका प्रभाव तथा इसके समाधान हेतु अन्य संगठनों के सहयोग से योजनाएँ बनाना।
- ✓ अंतरर्स्थलीय विवृत्त जल क्षेत्रों के प्रति जागृति पैदा करना, प्रशिक्षण व परामर्शक सेवाएँ प्रदान करना आदि।

### संठन

संस्थान द्वारा विजन-2020 में दर्शाए गए प्रभागों का संशोधित पुनर्गठन की स्वीकृति प्राप्त होने तक संस्थान ने अपने अनुसंधान कार्य को 7 प्रभागों के अंतर्गत विभाजित किया और इन प्रभागों की सहायता हेतु कुछ अनुभागों व सेवा एककों का भी गठन किया। उत्तर प्रदेश के इलाहाबाद स्थित नदीय प्रभाग देश के नदीय संसाधनों एवं इनकी मात्स्यिकी के अनुमापन एवं उपयुक्त प्रबन्धन प्रणालियों को विकसित करने में जुटा हुआ है। इस कार्य के दौरान नदीय पर्यावरण एवं मत्स्य सम्पदा पर भी विशेष ध्यान दिया जाता

है। संस्थान का जलाशय प्रभाग कर्नाटक के बैंगलोर में है और यह प्रभाग बड़े, मध्यम तथा छोटे जलाशयों की मत्स्य उपज वृद्धि हेतु प्रबन्ध प्रणालियों को विकसित करने पर कार्य कर रहा है। इन प्रभागों के अलावा अन्य सभी प्रभाग बैरकपुर स्थित हैं। इनमें ज्वारनदमुखी प्रभाग ज्वारनदमुखी मात्स्यिकी एवं पारिस्थितिकी, तटीय आर्द्र क्षेत्र एवं सुन्दरवन मैंग्रोव पर कार्य कर रहा है। मत्स्य स्वास्थ्य व पर्यावरणीय अनुमापन प्रभाग विवृत्त जल क्षेत्र जैसे – नदीय संसाधन, आर्द्र क्षेत्र, जलाशय एवं ज्वारनदमुखों के पर्यावरण एवं मत्स्य स्वास्थ्य संबंधी विभिन्न पहलुओं को सुलझाने में प्रयासरत है। यह प्रभाग पर्यावरणीय अनुमापन एवं प्रबन्धन हेतु जैव-रसायनिक, सूक्ष्मजैविकी तथा जैव-प्रोद्योगिकी पहलुओं पर भी कार्य कर रहा है। परितंत्रों के पुनरुद्धार योजनाओं का विकास भी इस प्रभाग का दायित्व है। बाढ़कृत मैदानी आर्द्र क्षेत्र मात्स्यिकी प्रभाग आर्द्र क्षेत्रों की उत्पादन प्रक्रिया तथा मत्स्य उत्पादन में वृद्धि हेतु कार्य करता है। इस कार्य के तहत जैव विविधता संरक्षण व पारिस्थितिक अनुकूल प्रणालियों का विकास करना है। संसाधन मूल्यांकन प्रभाग देश की मत्स्य सम्पदा व जलीय संसाधनों का डाटाबेस तैयार करने का प्रयास करता है। यह प्रभाग विभिन्न पापुलेशन मॉडलों व भौगोलिक सूचना प्रणाली के अंतर्गत संसाधन प्रबन्धन डाटाबेस का विकास कर रहा है जिससे अंतरर्स्थलीय मत्स्य सम्पदा सतत प्राप्त होती रहे। संस्थान का मानव संसाधन विकास एवं प्रोद्योगिकी हस्तांतरण प्रभाग संस्थान के अधिकारियों/कर्मचारियों के अलावा मात्स्यिकी से जुड़े अन्य संगठनों के कर्मियों को प्रशिक्षित करता है। प्रोद्योगिकी हस्तांतरण के तहत मत्स्यपालकों, मछुआरों, उद्यमियों, विस्तार कार्यकर्त्ताओं को प्रदर्शनियों, सलाहकार सेवाएँ, मत्स्य पालक दिवस, चर्चाएँ, फिल्म शो आदि के माध्यम से अंतरर्स्थलीय मात्स्यिकी से संबंधित विभिन्न तकनीकों को हस्तांतरित करता है।

संस्थान के अनुसंधान प्रबन्धन में निदेशक का पद सर्वोच्च है तथा संस्थान का समस्त प्रबन्धन कार्य निदेशक की अध्यक्षता में ही



सम्पन्न किया जाता है। स्टाफ रिसर्च काउंसिल तथा अनुसंधान सलाहकार समिति संस्थान के अनुसंधान व विस्तार गतिविधियों से संबंधित सुझाव प्रदान करते हैं। अनुसंधान परियोजनाओं का कार्य बैरकपुर मुख्यालय तथा केन्द्रों से निष्पादित किया जाता है।

### पुस्तकालय व सूचना अनुभाग

संस्थान का पुस्तकालय मुख्यालय व अनुसंधान केन्द्रों में कार्यरत वैज्ञानिकों की आवश्यकताओं के अलावा अन्य संगठनों के शोधकर्त्ताओं, अध्यापकों, विद्यार्थियों तथा अधिकारियों को भी अपनी सेवाएँ मुहैया कराता है। इस अवधि के दौरान पुस्तकालय ने अपने भंडार में 540 पुस्तकें जिनमें 217 हिन्दी पुस्तकें हैं तथा 12 अन्य विविध प्रकाशन, जरनलों के 598 अंक संग्रहित किया। इस अवधि

में 16 विदेशी, 37 भारतीय जरनलों के अलावा 102 ई-जरनलों की भी व्यवस्था की गई। इस समय पुस्तकालय में कुल 11907 पुस्तकें, 4312 पुनर्मुद्रित लेख, 1252 मानचित्र और 4342 विविध प्रकाशनों का संग्रह है।

विगत वर्षों की तरह इस वर्ष भी पुस्तकालय ने संस्थान के विभिन्न प्रकाशनों को अनेक अनुसंधान संस्थानों, विश्वविद्यालयों, उद्यमियों तथा मत्स्य पालकों को भेजता रहा ताकि वर्तमान अनुसंधान से वे अवगत रहें। इंडियन फिशरीज एब्सट्रैक्ट का प्रकाशन जारी रखा गया। पुस्तकालय में अनेक देश-विदेशी संगठन से पुस्तक विनिमय का प्रावधान किया गया। वर्ष 2007-08 के दौरान पुस्तकालय हेतु 30,66,737/- रुपये का बजट प्रावधान किया गया जिसे पूरी तरह पुस्तकों जरनलों आदि की खरीद हेतु खर्च किया गया।

# भारतीय कृषि अनुसंधान परिषद्

उप-महानिदेशक मात्स्यकी

अनुसंधान  
सलाहकार समिति

निदेशक

प्रबंधन समिति

अनुसंधान प्रभाग

नदीय

ज्वारनदमुखी

जलाशय

बाढ़कृत मैदानी आर्द्र-  
क्षेत्र/सरोवरीय

मत्स्य स्वास्थ्य एवं पर्यावरण  
अनुमापन

संसाधन मूल्यांकन

मानव संसाधन विकास एवं  
तकनीकी हस्तांतरण

प्रशासन

सामान्य प्रशासन

भंडार व परिवहन

वर्क्स व युटिलिटी

हिन्दी कक्ष

वित्त

लेखा व लेखा परीक्षण

पेंशन कक्ष

अनुसंधान सहयोग

पुस्तकालय

एरिस सेल

प्रलेखन



## परियोजना अनुमापन एवं प्रलेखन अनुभाग

इस अनुभाग द्वारा विभिन्न अनुसंधान परियोजनाओं की वार्षिक प्रगति तथा प्रत्येक वैज्ञानिक के योगदान संबंधी सूचनाएं प्राईमरी प्रोजेक्ट फाईल तथा साईटिस्ट फाईल के माध्यम से रख-रखाव किया गया। अनुसंधान संबंधी प्रगति रिपोर्ट आी. पी. एफ. I,II,III के माध्यम से अनुमापन किया गया है। इस अनुभाग के दायित्वों में एक्टिविटी माइलस्टॉन, तिमाही व वार्षिक रिपोर्ट महत्वपूर्ण हैं। विभिन्न परियोजनाओं की प्रगति संबंधी तकनीकी विवरणों का संकलन कर परिषद् मुख्यालय, कृषि मंत्रालय तथा अन्य अधिकारियों को समय समय पर भेजा जाता है। संस्थान की अनुसंधान गतिविधियां से संबंधी जानकारियों के लिए

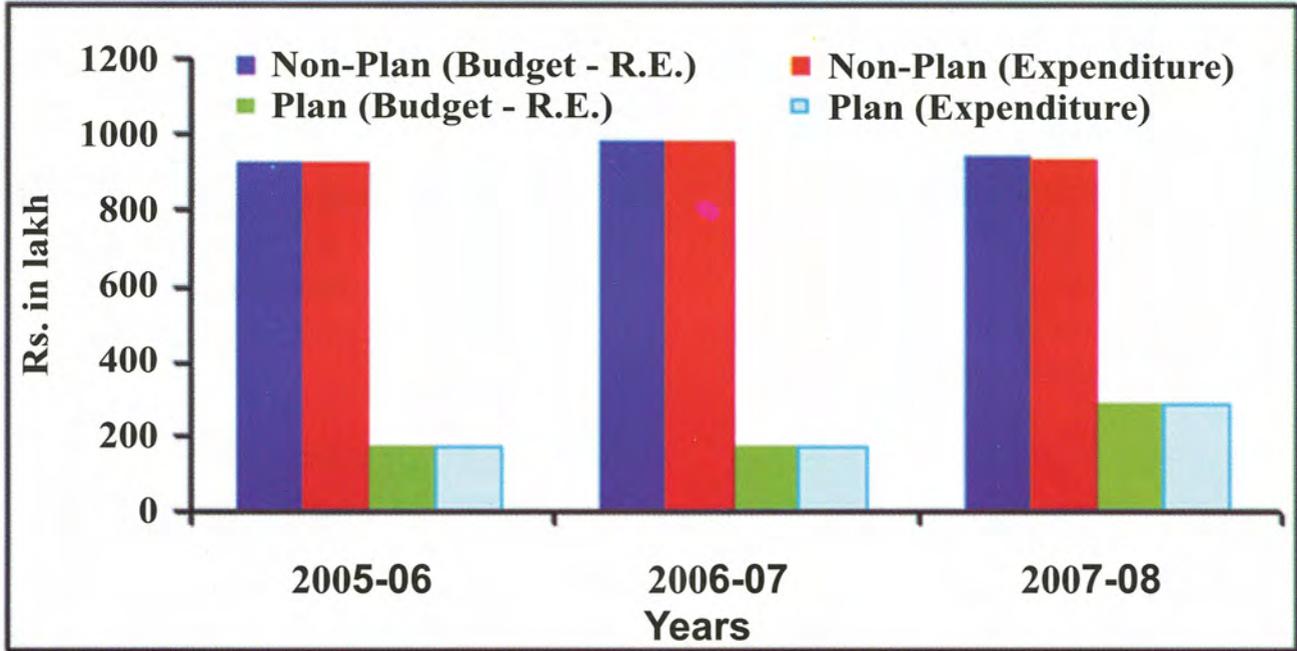
देश-विदेश से आये प्रश्नों का समाधान भी इस अनुभाग द्वारा किया जाता है। संस्थान के वैज्ञानिकों द्वारा प्रस्तुत वैज्ञानिक लेखों को विभिन्न जर्नलों तथा संगोष्ठी, कार्यशालाओं में प्रस्तुत करने हेतु प्रोसेस किया जाता है। इस वर्ष के दौरान इस अनुभाग द्वारा संस्थान की वार्षिक रिपोर्ट, 2 न्यूजलेटर तथा 4 बुलेटिन प्रकाशित किये गये हैं।

## कृषि अनुसंधान सूचना प्रणाली

इस कक्ष द्वारा वैज्ञानिकों एवं कर्मचारियों को कम्प्यूटर से संबंधित सुविधाएं प्रदान की जाती हैं। मुख्यालय में LAN System की व्यवस्था एवं वैज्ञानिकों को इंटरनेट की सुविधा दी गई है।

## संस्थान का बजट (वर्ष 2007-2008)

लेखा	संशोधित बजट (लाखों में)			खर्च गैर योजना
	योजना	गैर योजना	योजना	
वेतन व अन्य भत्ते समयोपरि भत्ता सहित	-	820.40	-	820.40
यात्रा भत्ता	21.00	6.40	21.00	5.77
अन्य खर्च-उपकरण, पुस्तक, सुचना प्रौद्योगिकी एवं मानव संसाधन विकास सहित	257.00	90.65	257.00	90.65
वर्क्स	-	16.55	-	18.55
अन्य	-	-	-	-
कुल योग	278.00	936.00	278.00	935.36



अधिकारियों व कर्मचारियों की संख्या 31 मार्च, 2008 तक

क्रम सं.	वर्ग	स्वीकृत पद	कार्यरत
1.	निदेशक (अनुसंधान प्रबन्धन पद)	01	01
2.	वैज्ञानिक	98	53*
3.	तकनीकी	90	77
4.	प्रशासनिक	80	65
5.	सहायक (सपोर्टिंग स्टाफ)	168	148
6.	कुल	437	344



## महत्वपूर्ण बैठकें

● संस्थान के मुख्यालय बैरकपुर में दिनांक 14 अप्रैल, 2007 के दिन भारतीय कृषि अनुसंधान परिषद के मात्स्यकी प्रभाग द्वारा आयोजित कृषि अनुसंधान संस्थानों के मात्स्यकी वैज्ञानिकों की तीसरी नेटवर्क मीटिंग संपन्न हुई। इस बैठक की अध्यक्षता डा. एस. अय्यप्पन, उप-महानिदेशक मात्स्यकी ने की। बैठक में डा. वी. वी. सुगुणन, सहायक महानिदेशक, अन्तर्स्थलीय मात्स्यकी ने भी भाग लिया। भारतीय कृषि अनुसंधान परिषद के 7 कृषि अनुसंधान संस्थानों के मत्स्य वैज्ञानिकों ने इस बैठक में भाग लिया। इन संस्थानों के नाम हैं— नेशनल रिसर्च सेन्टर फार वुमेन इन एग्रीकल्चर, भुवनेश्वर; केन्द्रीय चावल अनुसंधान संस्थान, कटक; केन्द्रीय कृषि अनुसंधान संस्थान, पोर्ट ब्लेयर; आई.सी.ए.आर. रिसर्च कम्प्लैक्स फार इस्टर्न रीजन, पटना; आई.सी.ए.आर.रिसर्च कम्प्लैक्स फार एन.इ.एच. रीजन, बारापानी; आई.सी.ए.आर.रीसर्च कम्प्लैक्स फार गोवा, गोवा। बैठक के दौरान उप-महानिदेशक, मात्स्यकी ने सभी वैज्ञानिकों को परिषद की मात्स्यकी प्रभाग द्वारा सभी सम्भव सहायता का आश्वासन दिया। प्रतिभागियों ने उनको दी गई सामग्री व सहायता तथा संस्थान द्वारा की गई व्यवस्था के लिए संस्थान के निदेशक डॉ. कुलदीप कुमार वास को धन्यवाद दिया। बैठक में निम्नलिखित पहलुओं के कार्यान्वयन की सिफारिश की गई।

- ✓ कृषि अनुसंधान संस्थानों के मत्स्य वैज्ञानिकों को निरंतर सहयोग।
- ✓ इन अनुसंधान संस्थानों में मात्स्यकी योजनाओं के नेटवर्क को सुदृढ़ बनाया जाए ताकि NAIP से वित्तीय सहायता प्राप्त किया जा सके।
- ✓ मात्स्यकी क्षेत्र में प्रशिक्षण कार्यक्रमों के लिए NFDB से वित्तीय सहायता प्राप्त करने हेतु प्रस्ताव प्रस्तुत करना।
- ✓ प्रदेश/क्षेत्र विशेष के लिए तकनीकी प्रणालियों का पैकेज ऑफ प्रेक्टिस प्रकाशित करना।

- ✓ CIFA के सहयोग से चावल व मत्स्य खेतों से निकलने वाले मिथेन पर आधुनिक अध्ययन करना।
- ✓ उत्तर पूर्वी पर्वतीय क्षेत्र में मछलियों की महत्ता तथा मत्स्य पालन की कठिनाईयों का अध्ययन।
- ✓ जेन्डर मेनस्ट्रीमिंग कार्यक्रमों को देश के विभिन्न भागों तक पहुंचना व अन्य अभिकरणों से संबधों की स्थापना।
- ✓ CMFRI के सहयोग से समुद्रीय मत्स्य उपज के आंकड़ों का विश्लेषण तथा वैज्ञानिकों को समुद्रीय मात्स्यकी अनुसंधान में प्रशिक्षित करना।
- ✓ मेरीकल्चर के अंतर्गत मसल फार्मिंग को बढ़ावा देना।

● भारतीय कृषि अनुसंधान परिषद एवं वर्ल्ड फिश सेन्टर के सहयोगिक परियोजना *Achieving Greater Food Security and Eliminating Poverty by Dissemination of Improved carp strains to fish farmers in India (CARP-II) workshop* की बैठक का आयोजन इस संस्थान तथा केन्द्रीय मीठा जल-जीव पालन संस्थान, भुवनेश्वर ने संयुक्त रूप से बैरकपुर में दिनांक 15 अप्रैल, 2007 को किया। इस बैठक में डा. एस. अय्यप्पन, उप-महानिदेशक(मत्स्य), डा. वी.वी. सुगुणन, सहायक-महानिदेशक (अंतर्स्थलीय मात्स्यकी) डा. मदन मोहन डे, क्षेत्रीय निदेशक, वर्ल्ड फिश सेन्टर, मलेशिया डा. कुलदीप कुमार वास, निदेशक, केन्द्रीय अंतर्स्थलीय मात्स्यकी अनुसंधान संस्थान, बैरकपुर डा. एन. सारंगी, निदेशक, केन्द्रीय मीठा जल जीव पालन अनुसंधान संस्थान, भुवनेश्वर, श्री एन. नरसिम्हा राव, मत्स्य आयुक्त, आंध्र प्रदेश, डा. ए. के. रॉय, मत्स्य निदेशक, असम, श्री एम. गुप्ता, उप-निदेशक (मत्स्य), छत्तीसगढ़ और इस संस्थान के वैज्ञानिकों ने भी भाग लिया। इस परियोजना में कार्यरत इस संस्थान तथा केन्द्रीय मीठा जल जीव पालन संस्थान के वैज्ञानिकों के अलावा, आन्ध्र प्रदेश के दो जल-कृषि उद्यमी, उड़ीसा के 3 जयन्ती किसान तथा पश्चिम बंगाल के 6 मत्स्य पालकों ने इस बैठक में अपने कार्यों को प्रस्तुत किया। परियोजना से प्राप्त परिणामों के आधार पर भारत

में जयन्ती प्रसार के विकास योजनाओं व नीति निर्धारण किया गया।

● संस्थान की अनुसंधान सलाहकार समिति की बैठक का 23-24 अप्रैल, 2007 के दौरान आयोजन किया गया। इस बैठक में समिति के अध्यक्ष डा. एम. वी. गुप्ता, पूर्व सहायक-महानिदेशक, वर्ल्ड फिश तथा अन्य सदस्य डा. सी. एस. सिंह सेवानिवृत्त डीन, मत्स्य विभाग, डा. आर. के. सिन्हा, प्रोफेसर जन्तु विज्ञान, जन्तु विज्ञान विभाग, पटना विश्वविद्यालय डा. एस. कौल, निदेशक, पर्यावरण एवं वन मंत्रालय, डा. यू.सी. गोस्वामी, जन्तु विभाग, गुवाहाटी विश्वविद्यालय ने भाग लिया। समिति की इस बैठक में संस्थान के विभिन्न प्रभागों के अध्यक्षों के अलावा संस्थान के मुख्यालय व अन्य केन्द्रों के वैज्ञानिक भी उपस्थित हुए हैं। विभिन्न प्रभागों के अध्यक्ष तथा इनमें कार्यरत कुछ प्रधान वैज्ञानिकों ने अपने प्रभाग से संबंधित परियोजनाओं के तहत किए गए कार्य एवं उपलब्धियों को समिति के समक्ष विचारार्थ तथा सुझाव व दिशा-निर्देशों के लिए प्रस्तुत किया। समिति की सहमति से नई परियोजनाओं को तैयार किया गया। समिति की मुख्य सिफारिशें निम्नलिखित हैं-

- ✓ वर्गीकरण विज्ञान के क्षेत्र में प्रशिक्षित कर्मियों की कमी को दूर करने के लिए देश के वर्गीकरण विज्ञान के विशेषज्ञों की सेवाएं ली जाएं।
- ✓ संस्थान द्वारा आयोजित विभिन्न प्रशिक्षण कार्यक्रमों से संबंधित आंकड़ों का सही रख-रखाव।
- ✓ प्रत्येक परियोजना के लिए एक लॉग फ़्रेम रखना चाहिए ताकि इसके परिणाम तथा अल्पकालिक व दीर्घकालिक उद्देश्य दर्ज किया जा सके।
- ✓ जलाशय एवं आर्द्र क्षेत्र से संबंधित परियोजनाओं में सामाजिक व आर्थिक पहलुओं का सामावेश किया जाये ताकि जीविका से संबंधित पहलुओं पर भी प्रकाश डाला जा सके।
- ✓ जलाशय एवं आर्द्र क्षेत्रों से संबंधित कार्य राज्य

सरकार व राष्ट्रीय मत्स्य विकास बोर्ड के सहयोग से किया जाए ताकि परिणामों का सही उपयोग किया जा सके।

- ✓ निम्न उत्पादकता वाले जलाशयों पर भी अध्ययन किया जाना चाहिए ताकि संग्रहण या आवासीय सुधार द्वारा प्रबंधन प्रणालियों का विकास किया जा सके।
- ✓ संस्थान द्वारा कई जलाशयों में सहयोगिक अनुसंधान परियोजना कार्य किया गया और उनकी उत्पादकता में वृद्धि की गई।
- ✓ हिल्सा मात्स्यिकी पर पूर्व शोधकर्ताओं ने जो कार्य किया इसका एक समेकित समीक्षा तैयार किया जाए ताकि वर्तमान शोधकर्ता इससे संदर्भ ले सकें।
- ✓ ज्वारनदमुखों में मॉडलो के विकास के लिए मिर्कॉग रिवर कमिशन, लाओस से संबंध स्थापित करें जिनके पास ऐसे मॉडल हैं।

● संस्थान की अनुसंधान समिति की बैठक मुख्यालय बैरकपुर में 25-27 अप्रैल, 2007 के दौरान संस्थान के निदेशक की अध्यक्षता में सम्पन्न हुई। इस बैठक में मुख्यालय के समस्त वैज्ञानिकों के अतिरिक्त केन्द्रों में कार्यरत वैज्ञानिकों ने भी भाग लिया। अप्रैल 23-24, 2007 को सम्पन्न अनुसंधान सलाहकार समिति के सुझावों के अनुरूप वर्ष 2007-08 हेतु अनुसंधान कार्य की सूची विभिन्न प्रभागों व प्रादेशिक केन्द्रों द्वारा इस बैठक में प्रस्तुत की गयी। वर्ष 2007-08 के दौरान विभिन्न परियोजनाओं के अंतर्गत किए गए कार्य पर चर्चा एवं सलाहकार समिति द्वारा अनुमोदित 13 परियोजनाओं के मुख्य उद्देश्यों की रूपरेखा प्रस्तुत की। समिति की बैठक में प्रशासनिक व वित्तीय मामलों पर भी चर्चा हुई।

### हिन्दी पखवाड़ा

● संस्थान के मुख्यालय में 14.09.07 से 28.09.07 के दौरान हिन्दी पखवाड़ा का आयोजन किया गया। इस आयोजन का उद्घाटन कलकत्ता विश्वविद्यालय के हिन्दी विभाग के प्रो. डा. अमरनाथ शर्मा ने किया। उद्घाटन सत्र



के दौरान प्रो. शर्मा ने सभा को सम्बोधित करते हुए हिन्दी भाषा का सरल एवं सुगम उपयोग पर जोर दिया एवं कुछ उदाहरण भी प्रस्तुत किए हैं हिन्दी पखवाड़ा के दौरान निबन्ध लेखन, टिप्पणी लेखन, हिन्दी शब्दावली, सामान्य ज्ञान, सुलेख, प्रश्नोत्तरी, हिन्दी टंकण आदि प्रतियोगिताओं का आयोजन किया गया। मुख्यालय के अधिकारी एवं कर्मचारी भारी संख्या में इन प्रतियोगिताओं में भाग ले कर नगद राशि पुरस्कार के रूप में प्राप्त किए हैं।

हिन्दी पखवाड़ा समापन समारोह में चिन्सुड़ा स्थित मोहसिन कालेज के प्रो. डा. शिवनाथ पाण्डे मुख्य अतिथि रहे एवं समारोह की अध्यक्षता संस्थान के निदेशक डा. कुलदीप कुमार वास ने किया। माननीय कृषि मंत्री, भारत सरकार श्री शरद पवार जी द्वारा परिषद् के अधिकारियों व कर्मचारियों को दिए गए संदेश को इस अवसर पर संस्थान के वरिष्ठ प्रशासनिक अधिकारी श्री उमेश चन्द्र प्रसाद ने पढ़कर सुनाया।

### पंचवर्षीय समीक्षा दल की बैठक

संस्थान के पंचवर्षीय समीक्षा दल के अध्यक्ष डा. पी. वी. देहादराय हैं तथा दल के सदस्य हैं— प्रो. डी. पी. जुत्शी, प्रो. कौशल कुमार एवं डा. पी. कुमार। दल ने मुख्यालय बैरकपुर में 20–21 जुलाई 2007 के दौरान अपनी पहली बैठक की। वैज्ञानिक द्वारा सभी परियोजनाओं से संबंधित उपलब्धियों की समीक्षा की गई। समीक्षा दल ने संस्थान के बैंगलूर केन्द्र का दिनांक 3–6 अक्टूबर 2007 के दौरान तथा उत्तर पूर्वी केन्द्र, दिसपुर, असम का निरीक्षण 17–19 दिसम्बर 2007 के दौरान किया। समीक्षा दल को इन केन्द्रों की अनुसंधान कार्य तथा प्रशासनिक कार्यों से अवगत कराया गया। समीक्षा दल के सदस्यों ने वैज्ञानिकों एवं अन्य कर्मचारियों से चर्चाएँ कीं।

### नेटवर्क बैठक

भारतीय कृषि अनुसंधान परिषद् की मात्स्यकी प्रभाग ने संस्थान के मुख्यालय बैरकपुर परिसर में कृषि अनुसंधान संस्थानों के वैज्ञानिकों की चौथी नेटवर्क बैठक दिनांक 2 फरवरी, 2008 को आयोजित किया। इस बैठक में परिषद् के सात कृषि अनुसंधान संस्थानों में कार्यरत 8 मत्स्य वैज्ञानिकों ने भाग लिया।

### केन्द्रीय अंतर्स्थलीय मात्स्यकी अनुसंधान संस्थान तथा बी. ओ. बी. पी. के सहयोग से परामर्श

हिल्सा मात्स्यकी के प्रबन्धन प्लान की तैयारी करने हेतु बी. ओ. बी. पी. के सहयोग से संस्थान के मुख्यालय परिसर में दिनांक 14–15 मार्च, 2008 को एक क्षेत्रीय परामर्श का आयोजन किया गया। इस परामर्श में म्यांमार, बंगलादेश, थाईलैण्ड, सीफरी तथा भारत सरकार के अनेक प्रतिनिधियों ने भाग लिया।

### नोडल अधिकारियों की बैठक

भारतीय कृषि अनुसंधान परिषद् के मात्स्यकी प्रभाग ने संस्थान के मुख्यालय, बैरकपुर में 4 फरवरी 2008 एन.ई. एच. कम्पौनेंट इन आई.सी.ए.आर. फिशरी रीसर्च इन्स्टीट्यूट के नोडल अधिकारियों की एक बैठक का आयोजन किया। डा. एस. अय्यप्पन, उप-महानिदेशक, मात्स्यकी ने प्रतिभागियों का स्वागत करते हुए इस संस्थान के निदेशक तथा अन्य मात्स्यकी संस्थानों के निदेशकों को एन.ई.एच. कम्पौनेंट कार्यक्रम में उनके सहयोग के लिए धन्यवाद दिया। उप-महानिदेशक महोदय ने सदस्यों को सूचित किया कि परिषद् ने एन.ई.एच. कम्पौनेंट के लिए 11वीं योजना के दौरान 400 करोड़ रूपयों की बजट बनाई जिसमें से पन्द्रह करोड़ रूपये फिशरी के लिए चिन्हित किया गया।