The activities and achievements reflected in this Annual Report covers the period April 2007 to March 2008 only.

This report includes unprocessed or semiprocessed data that would form the basis of scientific papers in due course. The material contained in the report, therefore, may not be made use of without the permission of this Institute, except for quoting it as a scientific reference.

Central Inland Fisheries Research Institute (CIFRI) Annual Report is not a priced publication. Recipients of complimentary copies are not permitted to sell the photocopies of the report in part or in full.

ISSN 0970-6267
# ANNUAL REPORT 2007-2008

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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 organizing 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 mg/l), 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 mg/l 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, Suvamavathy 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 a unit fish yield of 80.6 kg/ha. Interim recommendations for enhancing productivity of Suvamavathy 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 reassessed 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. cannetarius > 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 609 kg/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*, and *Clarias batrachus*. 
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 CO₂ 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, 5 mg/l and 10 mg/l 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 watershed 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.
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 organisations. 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 11,909 books, 4,312 reprints, 1,252 maps and 4,342 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) is also updated regularly by the Cell.
Budget Statement for the year 2007 - 2008 (Rs. in lakhs)

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

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![Bar chart showing budget and expenditure for 2005-06, 2006-07, and 2007-08 years. The chart compares non-plan and plan budget and expenditure.](chart.png)
**Staff Position as on March 31, 2008**

<table>
<thead>
<tr>
<th>Serial No.</th>
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<td>Scientific</td>
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<td>3.</td>
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<td>5.</td>
<td>Supporting</td>
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<tr>
<td><strong>Total</strong></td>
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<td>437</td>
<td>344</td>
</tr>
</tbody>
</table>

* 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"), 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"). However, it improved after joining number of tributaries and registered the level of 7.2 mg l" at Allahabad. Free CO\(_2\) was high in Delhi-Etawah stretch with maximum at Etawah (34.2 mg l"). Conductance was moderate at Badwala (235 µS cm" at 25°C) but was high in Delhi-Etawah stretch with a maximum of 1345 µS cm" at Etawah. Chloride was also very high in Delhi-Etawah stretch (198-230 mg l"). The nutrient status was poor at all the centres.

Productivity: Carbon production and net energy assimilated by producers were minimum at Badwala (90 mg Cm\(^2\)d\(^-1\) & 886 Cal m\(^2\)d\(^-1\)) and maximum at Agra (481 mg Cm\(^2\)d\(^-1\) & 4721 Cal m\(^2\)d\(^-1\)). The production rate showed sudden drop at Etawah supporting water quality deterioration.

Biotic communities

Plankton: Numerical abundance of plankton varied from 20 to 4680 Ul\(^-1\) 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 Ul\(^-1\) 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 U cm\(^-2\), with maximum at Badwala. In winter the density increased to 3160-22310 U cm\(^-2\) 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\(^-2\) with maximum at Mathura. In monsoon samples the biota was mainly represented by mollusces, 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 preceeding 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 preceding year catches. This year major carp fishery improved significantly (27.84 t) and was almost three times of the preceding 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

<table>
<thead>
<tr>
<th>Species</th>
<th>Sadiapur</th>
<th>Daraganj</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T</td>
<td>%</td>
</tr>
<tr>
<td>C. mrigala</td>
<td>9.78</td>
<td>8.4</td>
</tr>
<tr>
<td>C. catla</td>
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<tr>
<td>L. rohita</td>
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</tr>
<tr>
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<tr>
<td><strong>Major carps total</strong></td>
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</tr>
<tr>
<td>A. aor</td>
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</tr>
<tr>
<td>A. seenghala</td>
<td>4.37</td>
<td>3.8</td>
</tr>
<tr>
<td>W. attu</td>
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<td>0.9</td>
</tr>
<tr>
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</tr>
<tr>
<td>T. ilisha</td>
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<td>Others</td>
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<td>Common corp</td>
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<td>30.8</td>
</tr>
<tr>
<td>Tilapia</td>
<td>3.83</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>115.96</strong></td>
<td><strong>44.02</strong></td>
</tr>
</tbody>
</table>
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 m³/sec 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 Ul), periphyton (1710 Ucm⁻²) and net carbon production (348 mg cm⁻² day⁻¹) 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⁻¹), 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 puntigera, Melosira nummoloide, Pleurostigma normanii, Pseudo-nitzschia delicatissima, Navicula viridis (bacillariophyceae); Procentrum minimum, Gymnodium uncatureum, Alexandrium affine (dinophyceae); Oscillatoria sp. Gloecapsa sp. (blue-greens); Phacus, Trachelomonas (Euglonophyceae). 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. canneaus > M. macroaleps > 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 Metapeneaeus 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 \(90 \times 10^4\) m\(^3\). The winter and post winter months recorded an estimated flow rate of 40 m\(^3\) s\(^{-1}\) (Nov.)–15 (Jan) m\(^3\) 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 Gautami estuary (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 Kapilaswarapuram in the Gautami 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 Ul\(^1\) and 380 Ul\(^1\) respectively). Lowest (60 Ul\(^1\)) 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 Ul\(^1\).

**Macro-zoo-benthos:** Highest (222 nos. m\(^2\) and 266.64 nos. m\(^3\) ) macro-zoo-benthos concentration was observed at Antarvedi both during September and November, and lowest (89 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 µScm⁻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 mgC m⁻²d⁻¹.

**Fishery:** The average fish seed stocking rate for the years 2004 to 2007 was high, 979 Nos. ha⁻¹ 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 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. m⁻³. Chlorophyceae followed by Desmidaceae dominated the phytoplankton population. Among zooplankton, rotifers out numbered other groups in all the months. The gross primary production ranged from 12.50 mgC m⁻³hr⁻¹ to 75.0 mgC m⁻³hr⁻¹.

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

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**Fig. 1. Fish catch and CPUE in Suvarnavathy reservoir**
Arjun Sagar (Uttar Pradesh): The reservoir has an area of 1890 ha 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/m² and 215 U/m², respectively. The rate of net carbon production was on average 372.2 mgC m⁻²d⁻¹, with a fish production potential of 126.6 kg ha⁻¹yr⁻¹. The present level of fish production was estimated at 18.3 kg ha⁻¹yr⁻¹ 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⁻¹yr⁻¹.

*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⁻¹. *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⁻¹.
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.
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). 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-531 g)

*Primary production:* The gross primary production estimates were 132, 155, 939, 392 and 330 mgC m⁻² h⁻¹ in Shyam Bundh, Kalindi, Poka Bundh, Gomukpota 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 (499Ul⁻¹) were recorded in Poka bundh, while minimum density was observed in Shyam bundh.

*Benthos:* Presence of Oligochaetes represented by *Tubifex tubifex* and *Lumbricus* was noted in all the wetlands studied. Kalindi bundh recorded low density (8 nos.m⁻²) 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 *phumdi* in Loktak Lake, and is an 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⁻¹). 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 144m³ were designed and fabricated using HDPE net of 1mm mesh and another cage having volume of 24m³ 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$^{-3}$ 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.
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*.

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 609 kg/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%).

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 1637 kg/ha.

**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 U/l (av. 506 U/l). Phytoplankton (95.25%) productivity was significantly higher with predominance of diatoms (48.55%). Moderate periphytic density (830 U/cm²) was recorded during post monsoon and which significantly increased in winter month (3651 U/cm²). Numerical abundance of associated micro flora and fauna in the wetland varied from 710 to 2100 U/cm² on average value basis. Infestation of macrophytes was poor, only shore areas had luxuriant growth of *Ipomea*...
Macrobenthic abundance in the wetland was recorded 258 and 692 nos.m⁻² (average 475 nos.m⁻²) 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⁻¹ yr⁻¹). 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 *O. 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., *Vallisneria* sp.) and marginal macrophytes (*Typha* sp.).

Water quality: Characterised by alkaline pH (7.4), moderate temperature (32°C), low dissolved oxygen (4 mgL⁻¹) and moderate free CO₂ (6 mgL⁻¹) concentrations, moderate total alkalinity (64 mgL⁻¹), low hardness (32 mgL⁻¹), moderate specific conductivity (95.6 µScm⁻¹) and total dissolved solids (46.3 ppm), low calcium (16.03 mgL⁻¹) and magnesium (6.5 mgL⁻¹).

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 danicus*, *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 CO₂ and total alkalinity as compared to other types of macrophytes. *Vallisneria* sp. showed strong negative influence on total alkalinity signifying its capacity to utilize HCO₃⁻ 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

<table>
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<tr>
<th>Macrophytes</th>
<th>Organic matter (%)</th>
<th>Soil pH</th>
<th>Sp. Conductivity (μS cm⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without macrophytes (Control)</td>
<td>6.48</td>
<td>6.5</td>
<td>246</td>
</tr>
<tr>
<td><em>Eichhornia crassipes</em></td>
<td>6.48</td>
<td>6.3</td>
<td>217</td>
</tr>
<tr>
<td><em>Salvinia molesta</em></td>
<td>6.37</td>
<td>6.4</td>
<td>246</td>
</tr>
<tr>
<td><em>Hydrilla verticilata</em></td>
<td>6.31</td>
<td>6.6</td>
<td>223</td>
</tr>
<tr>
<td><em>Ceratophyllum demersum</em></td>
<td>6.27</td>
<td>6.6</td>
<td>226</td>
</tr>
<tr>
<td><em>Vallisneria spiralis</em></td>
<td>6.07</td>
<td>6.1</td>
<td>216</td>
</tr>
</tbody>
</table>

Fig 5. Effect of macrophyte on sediment enzyme profile
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 4th 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 β-glucosidase activity increased owing to macrophyte addition with more in Vallisneria spiralis than Eichhornia crassipes during experiment except at 4th week. Dehydrogenase was significantly decreased during 2nd week in the entire chamber after which it started increasing. Prominent decrease in activity was observed during 2nd week to 8th 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 μg 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 μg 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), Bumpur (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 $\mu$S cm$^{-1}$ (average 234 $\mu$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 mg/l 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 mg/l). 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 mg/l$^{-1}$). In some cases presence of free ammonia was also noticed, though not at a higher level (observed range 0 – 0.01 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 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.
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 β-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 Damoder from a polluted and non-polluted site.
Table 3: Health assessment index values of *Labeo bata* from river Damoder

<table>
<thead>
<tr>
<th>Damoder river</th>
<th>HAI (mean)</th>
<th>SD</th>
<th>CV%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panchet (reference site) S1</td>
<td>14.67</td>
<td>15.52</td>
<td>105.80</td>
</tr>
<tr>
<td>Namomejia (degraded site) S2</td>
<td>46.67</td>
<td>31.55</td>
<td>67.60</td>
</tr>
<tr>
<td>Jamalpur (reference site) S3</td>
<td>15.33</td>
<td>15.06</td>
<td>98.24</td>
</tr>
</tbody>
</table>

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/l, 5 mg/l and 10 mg/l. 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/l and hardness 180-200 mg/l. They were exposed for 30 days to sub lethal copper concentrations (0.02 mg/l, 0.03 mg/l, 0.04 mg/l and 0.05 mg/l). 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 (27-56 mg/dL), Triglyceride (36.6-59 mg/dL) and Cortisol (54-93 ng/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 μg g⁻¹).

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

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⁻¹ or ppt) in water of river Damodar

<table>
<thead>
<tr>
<th>Place of Sampling</th>
<th>Pesticide analysed</th>
<th>Total Ocs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DDTs</td>
<td>HCHs</td>
</tr>
<tr>
<td>Panchet</td>
<td>33.16</td>
<td>7.47</td>
</tr>
<tr>
<td>Burnpur</td>
<td>33.38</td>
<td>13.27</td>
</tr>
<tr>
<td>Raniganj</td>
<td>22.00</td>
<td>8.02</td>
</tr>
<tr>
<td>Durgapur</td>
<td>25.60</td>
<td>6.19</td>
</tr>
<tr>
<td>Burdwan</td>
<td>31.41</td>
<td>4.25</td>
</tr>
</tbody>
</table>

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 (2.15x 10⁶ CFU/g) and Noapara (8.4x 10⁵/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 x10⁵ – 1.6 x10⁵/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

<table>
<thead>
<tr>
<th>Strain</th>
<th>After Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 ppm</td>
</tr>
<tr>
<td>OF Ph4</td>
<td>0</td>
</tr>
<tr>
<td>OF PCP3</td>
<td>66</td>
</tr>
<tr>
<td>DD PCP4</td>
<td>44</td>
</tr>
<tr>
<td>48uPh1</td>
<td>0</td>
</tr>
<tr>
<td>OF PCP2</td>
<td>58</td>
</tr>
</tbody>
</table>

Table 7: Pentachlorophenol resistance of bacterial isolates

<table>
<thead>
<tr>
<th>Strain</th>
<th>100 ppm</th>
<th>200 ppm</th>
<th>400 ppm</th>
<th>600 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>OF Ph4</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>OF PCP3</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>DD PCP4</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>48uPh1</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>OF PCP2</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>Primers</th>
<th>Sequence 5’- 3’</th>
<th>%GC content</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP 1</td>
<td>GTGATCGCAG</td>
<td>60</td>
</tr>
<tr>
<td>OP 2</td>
<td>CAATCGCCGT</td>
<td>60</td>
</tr>
<tr>
<td>OP 3</td>
<td>CAAACGTCGG</td>
<td>60</td>
</tr>
<tr>
<td>OP 4</td>
<td>TTCGAGCCAG</td>
<td>60</td>
</tr>
</tbody>
</table>

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 MgCl₂, 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$_2$, Chlornitity, Salinity, NO$_3$, Total Nitrogen, PO$_4$, 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$_3$ and available-N.

Further Topographical sheets of Murugama water shed in the block Jhalda, Purulia district were georeferenced 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.
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.js 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) Imagery 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 Imagery. 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 therophytes, 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 therophytes 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 NBFRGR, Lucknow. Under this project, indigenous fish species occurring in Maguri beel (a perennally 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 tesudeineus, Mystus vittatus, H.
fossilis, Xenentodon cancila, Channa punctatus, Macrognathus pancellus, Chanda nama, Puntius conchonius, 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, wetlands 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**

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<th>Programme</th>
<th>Project</th>
<th>Scientific and technical Personnel</th>
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<tr>
<td>Riverine &amp; Estuarine Fisheries Programme</td>
<td>RFM/NR/07/11/01 Generating benchmark information on ecology and fisheries of the Yamuna river system</td>
<td>Dr. H. P. Singh, Dr. D. Kumar, Dr. R. N. Seth, Dr. R. K. Tyagi, Dr. V. Pathak, Dr. B. K. Singh, Dr. R. S. Srivastava &amp; Dr. K.D. Joshi, Shri S. K. Srivastava, Dr. K. Srivastava, Shri J. P. Mishra</td>
</tr>
<tr>
<td>RFM/NR/07/11/00 Developing conservation and fish stock management protocols for the rivers and associated ecosystem</td>
<td>RFM/NR/07/11/02 Understanding the impact of specific river links on the ecology and production functions</td>
<td>Dr. H. P. Singh, Dr. D. Kumar, Dr. R. K. Tyagi, Dr. V. Pathak, Dr. R. S. Srivastava &amp; Dr. K. D. Joshi, Shri S. K. Srivastava, Dr. K. Srivastava, Shri J. P. Mishra</td>
</tr>
<tr>
<td>RFM/NR/07/11/03 To estimate environmental flow requirements of various categories of river in India</td>
<td>ESF/ER/07/12/01 Generating benchmark information/data on ecology and fisheries from east coast estuarine systems (Godavari/Subarnarekha)</td>
<td>Dr. A. Ghosh, Dr. K. R. Naskar &amp; Dr. B. B. Satpathy Dr. A. K. Chattopadhyay, Sri T. Chatterjee, Ms. K. Jacquline, Sri D. Saha, Shri A. R. Barui, Sri A. Roychowdhury, Sri S. Mondal, Sri A. Jana</td>
</tr>
<tr>
<td>ESF/ER/07/11/04 Assessing the feasibility of increasing water productivity in Canal command areas through Fishery intervention</td>
<td>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</td>
<td>Dr. M. K. Mukhopadhyay, Shri N. P. Shrivastava &amp; Dr. B. B. Satpathy Mr. K. Jacquline, Ms. A. Sengupta, Sri K. P. Singh, Sri D. Saha, Shri A. K. Barui, Sri A. Roychowdhury, Sri C. P. Singh</td>
</tr>
<tr>
<td>ESF/ER/07/12/00 Development of sustainable fisheries management protocols for estuaries and Associated water bodies</td>
<td>ESF/ER/07/12/03 Ecology, bio-diversity and fisheries of a brackish water lagoon - Pulicut</td>
<td>Dr. B. C. Jha, Dr. D. Rath &amp; Shri N. P. Shrivastava Sri D. Sanfui, Ms. A. Sengupta, Sri B. N. Das, Sri A. Roychowdhury, Sri S. Mondal</td>
</tr>
</tbody>
</table>
| Reservoir Fisheries Programme | ESF/ER/07/12/04 Developing and testing software based model as a forecasting mechanism for west-coast estuarine ecosystems | Dr. S. N. Singh, Dr. K. Chandra  
Sri R. C. Mandi, Sri R. K. Sah,  
Sri T. K. Halder |
|-------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------|
| 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) | Dr. D. S. Krishna Rao  
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 | Shri M. Feroz Khan, Dr. Preetha Panikkar |
| RES/SR/07/10/03 Development of models for fish yield estimation in reservoirs | Dr. D. S. Krishna Rao, Shri M. Karthikeyan |
| RES/SR/07//10/04 Enhancement of Fish production in a small reservoir of Uttar Pradesh | Dr. R. N. Seth, Dr. B. K. Singh & Dr. P. K. Katiha  
Sri S. Srivastava, Dr. K. Srivastava |
| Environment and Fish Health Management Programme | FHE/ER/07/07/01 Developing fish-based indicator tools for environment monitoring | Dr. M. K. Das, 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. Maurya & Shri M. P. Brahmane  
Sri S. Bhowmick, Sri L. Mahavar, Smt. K. Saha, Dr. R. Sinha, Sri H. C. Banik, Sri S. Bandopadhyaya, Sri A. Ghosh |
| FHE/ER/07/07/02 Metal and pesticide monitoring and its biomagnifications in stressed aquatic environment | Dr. S. Samanta, Dr. P. K. Saha, Smt. K. Saha, Sri L. Mahavar, Sri S. Bandopadhyaya, Sri A. Ghosh |
| FHE/ER/07/07/03 Microbial diversity assessment and their role in environmental mitigation in inland waters | Dr. S. S. Mishra, Dr. S. K. Manna, Dr. S. Samanta, Shri P. Maurya & Shri M. P. Brahmane  
Sri S. Bhowmick, Sri L. Mahavar, Sri H.C. Banik, Sk. Rabiul |
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<th>Project Code</th>
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<td>FHE/ER/07/07/04</td>
<td>Estimation of stress mediated genetic contamination in fishes from different stressed ecosystems</td>
<td>Dr. P. Maurye &amp; Dr. S. K. Manna</td>
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<td>Dr. R. Sinha, Sri S. Bandyopadhyay, Sk. Rabiul</td>
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<tr>
<td>FHE/ER/07/07/05</td>
<td>Developing health management protocols for inland aquatic ecosystems through proteomics</td>
<td>Dr. B. P. Mohanty, Dr. M. K. Bandopadhyay, Shri P. Maurye &amp; Shri D. Karunakaran</td>
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<td>Sri S. Bhowmick, Dr. R. Sinha, Sk. Rabiul</td>
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<tr>
<td>FRA/ER/07/06/01</td>
<td>Assessment of inland resources using remote sensing techniques</td>
<td>Shri S. K. Mandal, Dr. D. Nath, Shri S. K. Sahu, &amp; Shri D. Karunakaran</td>
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<td>Smt. S. Majumder, Sri S. Mandal</td>
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<tr>
<td>FRA/ER/07/06/02</td>
<td>Development and standardisation of database on Web GIS platform for capture fisheries</td>
<td>Shri S. K. Mandal, Shri S. K. Sahu &amp; Shri D. Karunakaran</td>
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<td>Smt. S. Majumder</td>
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<tr>
<td>FSE/ER/07/01/00</td>
<td>Economic valuation of Inland Fisheries Resources in India</td>
<td>Dr. P. K. Katiha, Shri N. K. Barik</td>
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<td>Sri D. K. Biswas, Sri D. Saha, Sri S. Ghosh, Sri B. N. Das</td>
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<tr>
<td>WEF/ER/07/15/01</td>
<td>Testing and refinement of fish yield enhancement strategies in flood-plain wetlands</td>
<td>Dr. M. A. Hassan, Dr. A. Mukherjee, Mrs. G. K. Vinci, Dr. S. R. Das, Dr. A. K. Das, &amp; Shri A. Hajra</td>
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<td>Dr. B. K. Biswas, Sri D. K. Biswas, Sri S. Ghosh, Ms. S. Saha, Sri S. Das, Sri B. Naskar, Mr. Y. Ali</td>
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<tr>
<td>WEF/ER/07/15/02</td>
<td>Fish stock assessment in wetlands and application of population and biomass models for sustainable fishery management</td>
<td>Dr. V. R. Suresh, Dr. A. Mukherjee, Mrs. G. K. Vinci, Dr. A. K. Das &amp; Shri S. K. Sahu</td>
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<td>Dr. B. K. Biswas, Sri D. K. Biswas, Sri S. Ghosh, Ms. S. Saha, Sri B. Naskar, Mr. Y. Ali</td>
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<tr>
<td>Code</td>
<td>Project Description</td>
<td>Implementing Team</td>
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<tr>
<td>WLF/ER/07/15/03</td>
<td>Developing site specific fish based farming system in seasonally flooded area through community participation</td>
<td>Dr. U. Bhaumik, Dr. P. K. Katiba, Shri G. Chandra, Sri K. K. Sarma, Sri S. Saha, Sri A. Mitra</td>
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<tr>
<td>WLF/NR/07/15/04</td>
<td>Multi-location testing of community based fish yield Enhancement approaches in U.P. Wetlands</td>
<td>Dr. D. Kumar, Dr. R. S. Srivastava &amp; Dr. K. D. Joshi, Sri S. Srivastava, Sri J.P. Mishra, Dr. K. Srivastava</td>
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<tr>
<td>North-east Region</td>
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<tr>
<td>FOR/NE/07/01/00</td>
<td>Pilot scale validation/ demonstration of fishery management packages, resources estimates &amp; biodiversity estimation in Northeastern region in linkage with different stakeholders (NE component)</td>
<td>Dr. R. K. Manna, Dr. Md. Aftabuddin, Sri K. K. Sarma, Sri P. Gogoi</td>
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<tr>
<td>FOR/NE/07/01/02</td>
<td>Fish diversity (in collaboration with NBFGR) and catch estimates of river and wetlands</td>
<td>Dr. B. K. Bhattacharya, Dr. A. Biswas, Sri K. K. Sarma, Sri P. Gogoi</td>
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<td>FOR/NE/07/01/03</td>
<td>Demonstration of enclosure culture technology in beels</td>
<td>Dr. V. Kolekar, Dr. B. K. Bhattacharya, Dr. A. Biswas, Sri K. K. Sarma, Sri P. Gogoi</td>
</tr>
<tr>
<td>FOR/NE/07/01/04</td>
<td>Extension out reach, service delivery and HRD activities</td>
<td>Dr. V. Kolekar, Dr. R. K. Manna, Dr. Md. Aftabuddin, Dr. B. K. Bhattacharya &amp; Shri Ganesh Chandra, Dr. A. Biswas, Sri K. K. Sarma, Sri P. Gogoi</td>
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<tr>
<td>WLF/NE/07/18/00</td>
<td>Developing appropriate management protocols for harnessing sustainable fisheries from floodplain wetlands in Assam</td>
<td>Dr. B. K. Bhattacharya, Dr. A. Biswas, Sri K. K. Sarma, Sri P. Gogoi</td>
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<tr>
<td>WLF/NE/07/18/01</td>
<td>Standardizing fish stock management and enhancement protocols</td>
<td>Dr. V. Kolekar, Dr. R. K. Manna, Dr. Md. Aftabuddin, Dr. A. Biswas, Sri K. K. Sarma, Sri P. Gogoi</td>
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<tr>
<td>WLF/NE/07/18/02</td>
<td>Evaluation of health and biodiversity implications of different enhancement regimes</td>
<td>Shri Ganesh Chandra, Sri K. K. Sarma, Sri P. Gogoi</td>
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<tr>
<td>WLF/NE/07/18/03</td>
<td>Socio-economic evaluation and delivery mechanism in floodplain fisheries</td>
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</tbody>
</table>
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 18th and 29th 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 20th January 2008, in which about 140 fishers participated.
Participation in National level Exhibitions

- “4th Fisheries Congress 07” at ICAR Complex, Patna during April 12-13, 2007.

- On the occasion of Rastriya Karyashala on “Parvatiya Matsyikee Paridrshya: Vikas, Prabandhan evam Sanrakshan” (in Hindi) organized by NRC-CWF, Bhimtal (Uttarakhand) during 6-7th April 2007 at Bhimtal.


- “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.


- 24th 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 4th to 7th Jan 2008.

- Bandhur Mahal Sunderbans Mela during 3-12th and Sanchita Krishi Utsav, Budge Budge, during 12-19th January 2008.

- Allahabad centre participated in “Rashtriya Kisan Mela evam Shobji Pradarshani” held at IIVR, Varanasi, from 9-10th Feb’08.

- Guwahati centre participated in Assam Matsya Mahotsav at Shilpgram, Guwahaty during 29th March to 31st March 2008.
# EDUCATION AND TRAINING

## Trainings Organized

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<th>Topic</th>
<th>Beneficiaries</th>
<th>Venue &amp; Date</th>
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<tr>
<td>Inland Fisheries development</td>
<td>30 fish farmers</td>
<td>Kalyannagar, North 24 Parganas on 03.04.2007</td>
</tr>
<tr>
<td>Conservation of fin fish seed and prawn seed</td>
<td>27 fishermen</td>
<td>Nodakhali, South 24 Parganas on 17.05.07</td>
</tr>
<tr>
<td>Stop destructions of fish seed and shrimp seed</td>
<td>165 fishermen</td>
<td>Haripur, Namkhana, South 24 Parganas on 18.05.07 and 29.05.07</td>
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<tr>
<td>Value addition and net making</td>
<td>25 tribal fisher women</td>
<td>Mundapara, Kakdwip, North 24 Parganas during 11-16&quot; June, 2007</td>
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<tr>
<td>Fish farmers training</td>
<td>13 progressive fish farmers of Andhra Pradesh under ATMA Curriculum of Govt. of India</td>
<td>19-23\textsuperscript{rd} June, 2007</td>
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<tr>
<td>Recent Advances and technologies for fisheries development in Northeastern India</td>
<td>26 subject matter specialists of Krishi Vigyan Kendras of Northeastern region</td>
<td>Regional Centre of CIFRI, Guwahati during July 4\textsuperscript{th} to 6\textsuperscript{th} 2007</td>
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<tr>
<td>Freshwater Fish Farming</td>
<td>20 fishers from Jharkhand</td>
<td>CIFRI, Barrackpore, July 16-25\textsuperscript{th}, 2007</td>
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<td>Value Addition of Fish Products and Net Making</td>
<td>50 women of fisher community</td>
<td>Mundapara and Debnibas, Sundarbans during July 11-16\textsuperscript{th} and 23-28\textsuperscript{th}, 2007</td>
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<tr>
<td>Empowerment of women through net making activity</td>
<td>25 fisher-women</td>
<td>Debnibas Namkhana, from 23.07.2007 to 28.07.2007</td>
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<td>Training course for ‘Matsya Mitra’ of Jharkhand</td>
<td>40 Fishers, sponsored by the Department of Fisheries Govt. Of Jharkhand.</td>
<td>CIFRI, Barrackpore, July 16-25\textsuperscript{th}, 2007 and August 20-29\textsuperscript{th}, 2007</td>
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<tr>
<td>Community capacity strengthening workshops under CP project</td>
<td>Fishermen community</td>
<td>Dahod reservoir and Pahuj reservoir, April 27\textsuperscript{th}, 2007 and August 21\textsuperscript{st}, 2007</td>
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<tr>
<td>Activity</td>
<td>Participants</td>
<td>Location and Date</td>
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<tr>
<td>Conservation of Hilsa Fishery</td>
<td>250 fishers</td>
<td>Nababganj, North 24-Parganas, West Bengal on August 30\textsuperscript{th}, 2007</td>
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<td>Composite Fish Culture</td>
<td>20 Fisheries Officers of the Department of Fisheries, Govt. of Assam</td>
<td>September 22-29\textsuperscript{th}, 2007 at Barrackpore</td>
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<td>Modern fish Farming</td>
<td>20 officers of Dept. of Fisheries, Govt. of Assam</td>
<td>Sept. 21-29\textsuperscript{th}, 2007 at CIFRI Barrackpore</td>
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<tr>
<td>Inland Fisheries Development</td>
<td>80 Fish farmers of Bihar</td>
<td>September 21-30\textsuperscript{th} and October 3-12\textsuperscript{th}, 2007 at CIFRI, Barrackpore</td>
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<td>Group Discussion</td>
<td>60 fishers</td>
<td>Oct. 5\textsuperscript{th}, 2007 at Kabini Reservoir, Bangalore</td>
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<tr>
<td>Integrated Fish Farming</td>
<td>20 Officers of Dept. of Fisheries, Govt. of Assam</td>
<td>CIFRI, Barrackpore on November 1-7\textsuperscript{th}, 2007</td>
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<td>Survey methodology for Inland Fisheries</td>
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<td>CIFRI, Barrackpore during 26-28\textsuperscript{th}, Nov. 2007</td>
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<td>Management of Floodplain Wetlands</td>
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<td>Regional Centre of CIFRI, Guwahati during January 3-9\textsuperscript{th}, 2008</td>
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<td>Fisheries Management of Floodplain wetlands</td>
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<td>Regional Centre of CIFRI, Guwahati during January 29\textsuperscript{th} to February 4\textsuperscript{th}, 2008</td>
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<td>Sampling Techniques of Data Collection for Fish Catch Estimation in Inland Water Bodies</td>
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<td>Bangalore Centre of CIFRI, 16\textsuperscript{th} February 2008</td>
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<tr>
<td>Inland Fisheries</td>
<td>40 Fish farmers of Bihar</td>
<td>CIFRI, Barrackpore during February 18-27, 2008</td>
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</table>
## Empowerment of Tribal Fisher Women for value added fish Products

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<th>Inland Fisheries Development</th>
<th>39 Tribal women</th>
<th>Jhargram, Medinipore during March 24-29th, 2008</th>
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<td>80 Fish farmers of Bihar</td>
<td>CIFRI Barrackpore during March 6-15th, 2008 and March 25 - April 3rd, 2008</td>
</tr>
</tbody>
</table>

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

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


- 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


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


• 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.


Hindi publications


## CONSULTANCIES

<table>
<thead>
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<th>Title</th>
<th>Sponsoring Organisation</th>
<th>Period</th>
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<td>Downstream plan for fisheries development in the Downstream of Sardar Sarovar Reservoir</td>
<td>Govt. Of Maharastra</td>
<td>September 2007, continuing</td>
</tr>
<tr>
<td>Study of migration of fishes in River Subansiri and creation of Hatcheries</td>
<td>NHPC, Assam</td>
<td>2007, continuing</td>
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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 14th 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), Barrackpore and Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar, at Barrackpore on 15th 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
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 23-24th April 2007. Dr. M.V. Gupta, Ex-ADG, 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.
• 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 25th to 27th 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.

- 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...
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 20-21st 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 Hessaraghata, 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, 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.

4th ‘Network Meeting of Fisheries Scientists in Agricultural Research Institutes’, convened by the Fisheries Division, ICAR, was held on 2nd 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

* 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\(^{th}\) February 2008 at CIFRI, Barrackpore. Nodal Officers from CIFT, CIFE, CIAA, 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 at least 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 5th February 2008 at CIFRI, Barrackpore to take stock of the action taken by respective organizations on the identified action points at its 18th 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, CIFPA, Bhubaneswar, Dr. D.N. Hegde, Project Director, DOR, Hyderabad, Dr. B.C. Virakatamath, Project Director, DRR, Hyderabad, Dr. P.G. Karmakar, Officiating Director, CRJJAF, 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 the 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


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).


National Symposium on “Ecosystem Health and Fish For Tomorrow” jointly organized by Inland Fisheries Society of India and Central Inland Fisheries Research Institute, 14-16th 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)


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,
Workshops


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 stakeholders 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 29th-31st 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 – 12th World Lake Conference at CGO Complex, Lodi Road, New Delhi on 30th May, 2007
Dr. K.K. Vass participated in the QRT meeting at Bhubaneswar on 10-11th 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 11-14th May 2007.

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

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

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

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

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

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

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

Dr. K.K. Vass participated in the Fisheries Directors Meeting at S.V. Veterinary University, Tirupati on 9-10th 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 30th June-2nd July 2007.

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

Dr. K.K. Vass attended a meeting with QRT Chairman at New Delhi on 15th 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 16-18th 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 19th 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 4-8th 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 28-30th August 2007.

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

Dr. K.K. Vass participated in the Screening Committee Meeting of National Academy of Agricultural Sciences, New Delhi during 13-14th 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 in the Planning Commission, Govt. of India at New Delhi on 25th Sept.


Mr. S.K. Mandal, Principal Scientist, attended 7th 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 12th 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 6th 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 Fisheris of Asian held on 14/15th January, 2008 at Bangkok, Thailand.


Dr. K.K. Vass participated in the ICAR 79th Annual General Meeting on 23rd 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 Central Soil and Materials Research Station, New Delhi at New Delhi, during 16-20th 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 onICT Applications in Transfer of Agricultural Technologies. Organised by Department of Communication, G.B. Pant University of Agriculture and Technology, Panchnagar (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.
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 15-16th 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 15th 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. Devaaaj, 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. Sekhar, Dr. Kuldeep Kumar, Dr. Apurba Ghosh, Dr. D. Nath, Dr. Kaushal Kumar, Dr. Sadamata, 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.
was adjudged the Overall Champion Institute. Sri A. N. Mallick, Commandant, 6th Battalion, State Armed Police, Barrackpore was the Chief Guest in the valedictory programme and distributed the medals to the prize winners.

Winter School

A Winter School entitled “Social science research tools in inland fisheries development” was organized at this Institute during 7-27th January 2008. The Winter school was inaugurated by Dr. R.K. Samanta, V.C. BCKV. 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. 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 NBFGP 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.
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’ble Minister of Fisheries, Govt. of Madhya Pradesh presided over the function.

Secretaries of concerned departments in Goll 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. Shrivasata, 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 NBFG, 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.
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 Nurjaman 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 Nurjaman Sarkar, Honorable Minister of Fisheries, Assam released a special souvenir entitled 'Reminiscence' as part of CIFRI Diamond Jubilee celebration.
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 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 26th and 27th February, 2007. One hundred ninety eight staff members enthusiastically participated in the indoor games and 71 members took part in outdoor games.
The following distinguished persons visited the Institute during the period:

<table>
<thead>
<tr>
<th>Name</th>
<th>Institute &amp; Address</th>
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</thead>
<tbody>
<tr>
<td>Dr. Mangala Rai</td>
<td>Secretary, DARE, Govt. Of India and DG, ICAR</td>
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<tr>
<td>Dr. S. Ayyappan</td>
<td>Deputy Director General (Fy.) ICAR, New Delhi</td>
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<tr>
<td>Dr. C. D. Mayee</td>
<td>Chairman, ASRB, New Delhi</td>
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<tr>
<td>Dr. S. N. Dwivedi</td>
<td>Ex. D.G., MPCOST, Bhopal</td>
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<tr>
<td>Dr. P. V. Dehadrai</td>
<td>Ex. DDG (Fy), ICAR, New Delhi</td>
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<tr>
<td>Dr. S.A.H. Abidi</td>
<td>Ex. Member, ASRB</td>
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<tr>
<td>Dr. M. Y. Kamal</td>
<td>Ex. V.C., SKUAST, Kashmir</td>
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<tr>
<td>Dr. V.R.P. Sinha</td>
<td>Ex. Director, CIFE &amp; FAO Consultant</td>
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<tr>
<td>Dr. K.V. Devaraj</td>
<td>Ex. V.C., Bangalore Agricultural University</td>
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<tr>
<td>Shri Ajay Bhattacharya</td>
<td>Jt. Secretary (Fy), DAHDF, GOI, New Delhi</td>
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<tr>
<td>Dr. M. L. Madan</td>
<td>V.C., Pt. DDU Veterinary University &amp; Cattle Research Institute, Mathura</td>
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<tr>
<td>Dr. S. D. Tripathi</td>
<td>Ex. Director, CIFE, Mumbai</td>
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<tr>
<td>Dr. S. P. Ayyar</td>
<td>Ex. Director, CIFRI, Barrackpore</td>
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<tr>
<td>Dr. V. V. Sadamate</td>
<td>Advisor, Planning Commission, New Delhi</td>
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<tr>
<td>Dr. V. V. Sugunan</td>
<td>ADG (I.Fy), ICAR, New Delhi</td>
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<tr>
<td>Dr. Dilip Kumar</td>
<td>Director, CIFE, Mumbai</td>
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<tr>
<td>Dr. N. Sarangi</td>
<td>Director, CIFA, Bhubaneswar</td>
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<tr>
<td>Dr. W. S. Lakra</td>
<td>Director, NBFGR, Lucknow</td>
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<tr>
<td>Dr. P.C. Mahanta</td>
<td>Director, NRCCWF. Bhimtal</td>
</tr>
<tr>
<td>Dr. R. K. Samanta,</td>
<td>Vice Chancellor, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Dist. Nadia, West Bengal.</td>
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<tr>
<td>Prof. D. K. Marothia</td>
<td>Former Chairman, Agriculture Cost &amp; Price Commission, Krishak Nagar, Raipur.</td>
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<tr>
<td>Dr. P. Kumar</td>
<td>Former Prof. Division of Agricultural Economics, IARI, New Delhi &amp; Consultant, World Fish Centre, Penang, Malaysia.</td>
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<tr>
<td>Name</td>
<td>Position</td>
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<tr>
<td>Prof. (Mrs.) Joyshree Roy</td>
<td>Professor and Head, Department of Economics, Jadavpur University, Kolkata</td>
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<tr>
<td>Prof. Rajkumar Sen</td>
<td>Prof. of Economics, Rabindra Bharati University, Kolkata.</td>
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<tr>
<td>Dr. S.P. Ayyar</td>
<td>Former Director, CIFRI, Barrackpore</td>
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<tr>
<td>Dr. A. D. Diwan</td>
<td>Assistant Director General (M.Fy), ICAR, New Delhi</td>
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<td>Dr. A. G. Ponniah</td>
<td>Director, CIBA, Chennai.</td>
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<tr>
<td>Dr. A. K. Roy</td>
<td>Director of Fisheries, Assam</td>
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<td>Dr. M. V. Gupta</td>
<td>Ex-ADG, ICLARM, FAO Consultant</td>
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<tr>
<td>Sri Nurjamal Sarkar</td>
<td>Hon’ble Minister of Fisheries, Soil Conservation &amp; Irrigation, Govt. of Assam.</td>
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<tr>
<td>Prof. C. S. Chakraborty</td>
<td>Vice-Chancellor, WBUAFS</td>
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<tr>
<td>Mr. R.P.S. Kahalon</td>
<td>Principal Secretary, Fisheries Dept., Govt. of W. Bengal</td>
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<tr>
<td>Dr. Sankar Pal</td>
<td>Director, Indian Statistical Institute, Kolkata.</td>
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<tr>
<td>Dr. Ramakrishna</td>
<td>Director, Zoological Survey of India, Kolkata</td>
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<tr>
<td>Dr. N. K. Tyagi</td>
<td>Member, ASRB, ICAR, New Delhi</td>
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<tr>
<td>Smt. Rajbala Verma</td>
<td>Secretary, Jharkhand</td>
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<tr>
<td>Mr. Rajeeb Kumar</td>
<td>Director, Fisheries, Jharkhand</td>
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<tr>
<td>Dr. Madan De</td>
<td>World Fish Centre, Malaysia</td>
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<tr>
<td>Prof. U. C. Goswami</td>
<td>Prof., Dept. of Zoology, Gauhati University</td>
</tr>
<tr>
<td>Prof. R. K. Sinha</td>
<td>Prof., Dept. of Zoology, Patna University</td>
</tr>
<tr>
<td>Dr. C. S. Singh</td>
<td>Retd. Dean, Fisheries, G.P. Panthnagar University</td>
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<tr>
<td>Prof. Brij Gopal</td>
<td>School of Env., JNU, New Delhi</td>
</tr>
<tr>
<td>Prof. H. R. Singh</td>
<td>Ex-VC Allahabad University</td>
</tr>
<tr>
<td>Dr. K. L. Sehgal</td>
<td>Ex-Director NRCCWF, Bhimtal</td>
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</tbody>
</table>
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.M. Mukhopadhyya, 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

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 अंतर्श्लीय मात्स्यिकी अनुसंधान संस्थान
(भारतीय कृषि अनुसंधान परिषद)
बैरकपुर, कोलकाता - 700120
प्राक्कलन

इस अंक के दौरान संस्थान ने अंशभूमिका जलीय संसाधनों जैसे-नदी, जलस्रोत, जलप्रदा सहित संसाधनों की प्राण्वन और अधिक संरचनाएं प्रस्ताव करने हेतु अनुसंधान कार्य किया। जलस्रोत व आर्द्र क्षेत्रों के साथ उत्पादकता की तद्देश हेतु विशेषता प्राण्वनों का मानकीकरण एवं इन्हें अस्तुलीकरण की दिशा मे सार्थ कार्य किया गया।

इस दौरान वाणिज्यिक संसाधन के अंतर्गत अंतर्तिय जलीय क्षेत्रों का विस्तार मानविक सार्थ की तद्देश करने का प्रयास किया गया।

अंतर्तिय जलीय क्षेत्रों के पूर्व श्रेणी एवं जलस्रोत पहुंचने के संदर्भ में परिवर्तन स्वतंत्र एवं माला प्रसंस्करण किए गए। विभिन्न विशेषता पद्धतियों द्वारा उसकी अंतर्तिय जलीय क्षेत्रों का अनुभव पर भी प्रभाव कार्य किया गया।

इस अवधि के दौरान सभी अनुसंधान कार्यों के माध्यम से दृष्टिकोण उपयोग किए गए। संस्थान की शृंखला परियोजनाओं के अधिक विभिन्न संगठनों द्वारा प्रयोजित अनेक परियोजनाओं एवं परम्परागत साइंटिफिक सार्थ कार्य किया।

संस्थान में एक NAIP परियोजना पर भी कार्य किया जा रहा है। विभिन्न संगठनों के साथ अपने संबंध सुधार करते हुए इस संस्थान ने कई संगठनों के संस्थानिक संस्थापन कम संस्थानिक संस्थापन केंद्र के बाहर वि-2020 भी प्रारंभित किया।

इस वर्ष कार्यक्रम-मनान द्वारा इसके प्रति 11वीं योजना का प्रसार परिशिष्ट स्वयं परिवहन को प्रस्तुत किया गया जिसकी चौकी प्रसार हो गया। इस संस्थान को चरण बदल दिखाएं एवं कार्यकाल का अनुरोध किया जा रहा है।

संस्थान ने चौकी VISION 2020 भी प्रारंभित किया। इसके अनुसार संस्थान की भारतीय अनुसंधान योजनाओं को दर्शाया गया।

सितारों परिवार के लिए यह 80 वर्ष 2007 कार्यक्रम रहा। इस संस्थान ने अंतर्तिय विज्ञानिकी अर्द्र एवं मानव प्रदा स्वीकारिता व तत्साहित्रांकन हेतु अवधि में प्रस्ताव हेतु रखनेवाले सभी विषयों के लिए उपयोगी होगा।

यह विश्वसनीय तीव्र उपनगरासा आशा करता है कि वे इस कार्य के सुझाव दें ताकि आगामी वर्षों में इसे और अधिक उपयोगी बनाया जा सके।

मैं आशा करता हूँ कि संस्थान का यह संक्षेपित प्रस्ताव विभिन्न पश्चिम अर्द्र एवं मानव प्रदा स्वीकारिता तत्साहित्रांकन हेतु परिवर्तनों के श्रेणी में अधिक रखनेवाले सभी विषयों के लिए उपयोगी होगा।

मैं बधानाधीन तीव्र उपनगरासा आशा करता हूँ कि वे इस कार्य के सुझाव दें ताकि आगामी वर्षों में इसे और अधिक उपयोगी बनाया जा सके।

इस प्रस्ताव में हण्डि 2007 एवं मानव अनुसंधान किया जाएगा। कृपया यहाँ संस्थान की भारतीय अनुसंधान प्राप्ति एवं मानव प्रदा स्वीकारिता के संदर्भ में सम्मानित साहित्यिक समारूह में अंकन प्राप्ति करें।

इस प्रस्ताव के लिए यह संस्थान की भारतीय अनुसंधान विभाग एवं महानगराधीन भारतीय अनुसंधान किया जाएगा। कृपया यहाँ संस्थान की भारतीय अनुसंधान प्राप्ति एवं मानव प्रदा स्वीकारिता के संदर्भ में सम्मानित साहित्यिक समारूह में अंकन प्राप्ति करें।
सहायक महानिदेशक (अ.मा.), डॉ. ए.डी.दिवान, सहायक महानिदेशक (स.मा.), डॉ. वी. आर. शिवांगी एवं श्री अनिल अग्रवाल, प्रधान वैज्ञानिक तथा श्री ए. एस. महेन्द्रिया, अद्वर सचिव को भी धन्यवाद देता हूँ जिन्होंने समय समय पर संस्थान को सहायता प्रदान की है।

मैं डॉ. मानस कुमार वास, 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 हिंदी खण्ड तैयार करने वाले श्री पी. आर. राब के कार्य की भी सराहना करता हूँ।

कलकत्ता, कोलकाता कुलदीप कुमार वास अगस्त, 2008
विशिष्ट सारांश

संस्थान ने अपने अनुसंधान कार्य को अनुसंधान संलग्नकर समिति के मार्गदर्शन चर्चाविधि सत्रों के अनुसार संचालित किया। संस्थान में एक प्रवचन समिति भी है जो संस्थान की गतिविधियों का मार्गदर्शन करती है। संस्थान में अनेक आंतरिक समितियां भी हैं, जो संस्थान के प्रबन्धन में महत्त्वपूर्ण योगदान प्रदेश हैं जैसे - अनुसंधान समिति, संयुक्त कर्मचारी परिषद्, राजमाना कार्यान्वयन समिति आदि।

नदीय पारिस्थितिकी एवं मालिकी

- यमुना नदी के 11 केंद्रों बदलावा (देहरादून) से इलाहाबाद (गंगा नदी के साथ संगम स्थल) तक के क्षेत्र में अनुवहन कार्य किया गया। इस अध्ययन से ज्ञात होता है कि क्षेत्र में भारी प्रधानता है, विल्ली-इटावा क्षेत्र में आर्थिक की कमी है। इटावा की स्थिति काफी भारी प्रदर्शन घटना 1.2 मि.ग्र/ली. है। उस स्थान की स्थिति बेहतर (7.2 मि. ग्र/ली.) है जहां उपनदियों में निकलती है।

- सदियापुर एवं कालांग नदी अनुवहन केंद्रों से नदी अनुवहन क्षेत्र: 115.96 तथा 44.02 टन आंका गया। सदियापुर केंद्रों में छोटी प्रावधिकता की प्रमुखता देखी गई जो लगभग 34.6% प्रतिशत है। इसके बाद का स्थान है, विल्ली प्रावधिकता का विशेषज्ञ कांग्रेस प्रावधिकता का 34 प्रतिशत है। वे प्रावधिकताओं पिछले वर्षों की तुलना में 79 प्रतिशत अधिक पाई गई है।

जलाशय पारिस्थितिकी एवं मालिकी

- सुरुवाती जलाशय में मार्च 2007 - फरवरी 2008 के दौरान किए गए अनुवहन से ज्ञात हुआ है कि कुल प्राव उपयोग में 39.5 टन, 95 प्रतिशत उपज भारतीय मंडल कार्य महत्वपूर्ण कि है और इसके बाद का स्थान तलाशिया महत्वपूर कि है। उपज प्रति युनिट प्रायोगिक दर १२.३ कि.ग्राम पाई गई। जलाशय से उपज दर ८०.६ कि.ग्राम. हं. पाए गए। जलाशय की उत्पादकता को बढ़ाने के लिए आवश्यक अंतरिक्ष सुनिश्चित रखा गया।

- कर्नाटक, राजस्थान, महाराष्ट्र, तमिलनाडु, उत्तर प्रदेश, हरियाणा, केरल, हिमाचल प्रदेश, आन्ध्र प्रदेश, उड़ीसा, मध्य प्रदेश और पंजाब राज्यों के जलाशयों से सेक्टरी हैता जैसे-सुरुवाती विशेष, नदी उपज के आंकड़े, उत्पादन क्षमता, प्राथमिक उत्पादकता आदि
रूसियाओं को एकत्रित कर विश्लेषण किया गया ताकि साफ़क्षेत्र बॉल्डर का विकास किया जा सके। क्षेत्रफल के साथ उपज, जीता गई रा और प्राथमिक उत्पादकता व अन्य प्रायोगिक इंजीनियरिंग ज्ञानकोश के लिए डाटा का प्राथमिक सांख्यिकीय विश्लेषण किया गया।

ज्वारानुसंधारण परिप्रेक्ष्यिक एवं मान्यताओं

• पूलीकेट लेक का भौतिक और सरासरी गुण, गूहा की गुणवत्ता और गड़बड़, प्राथमिक उत्पादकता, जैविक उत्पादन आदि का गहन अध्ययन किया गया। पूलीकेट की मान्यता विशेषकर पी. इंडियन, मल्लेट (पृ. 150) का उपयोग रूप में है।

• सन् 1970 तथा 1980 के दशकों में प्राप्त किए गए डेटा का प्रयोग किया गया। इसी प्रकार, अन्य वातावरण में अध्ययन किए गए प्रायोगिक ट्रांसफोर्मर जीवन और मॉडलिंग भी अवश्यक घट गई है। अंतः प्राप्त उपज प्रति मुख्यालय प्रति दिन ढीली की बांध कर मात्र 300-500 ग्राम/दिन रह गई है।

• अब तक गोदामों ज्वारानुसंधारण के 68 मल्टी विश्लेषणों दर्ज हुई जो 37 अन्य और 12 अवधि में समस्यात्मक हैं।

आर्द्र क्षेत्र की परिप्रेक्ष्यिक एवं मान्यताओं

• परिचय बंगाल के उत्तर 24 प्रगति, नदियां एवं एकल जलों में स्थित 7 आर्द्र क्षेत्रों की मल्टी उपज तथा अन्य पावरल्यान देशों का अध्ययन किया गया। इन आर्द्र क्षेत्रों में प्राकृतिक आपूर्ति से प्राप्त मल्टी उपज 139-609 जी. ग्राम/दिन है, के बीच रहा। प्राप्त उपज के विश्लेषण से स्पष्ट होता है कि आर्द्र क्षेत्र के उपज में अधिकता जोड़दान एनियम एक्स्टेंशन एस्सीपी बर्ज (6-20%) की है और इसके बाद का स्थान बनास एस्सीपी (7-18%) और जीपी जी (5-12%) है।

• परिचय बंगाल राज्य के बीलों से 55 जंगलों और 30 जंगलों से संबंधित 76 प्रजातियों दर्ज की गई। विविध मल्टी प्रजातियाँ जैसे— बारोनियस गोलियोनियोटिस (पंकटियस गोलियोनियोटिस), गएपिगियाईस डाम हापोफेक्स्ट्रिंगम (पंगासियस सूर्सी), क्लासिस गैरीलिस, खासियोक्विनस निस्सलिक्स, टेलीगोलीक्स क्स्टिक्स एवं वियाफ्रिक्स ब्राकिसोमोस आदि दर्ज हुई।

मल्टी स्तरवर्धन एवं पर्यावरण

• दामोदर नदी से एकत्रित जल के नमूनों के विश्लेषण से संकेत दिया गया कि सभी नमूनों में बी.जी.टी. मौजूद है। बास्तव में EPI द्वारा बजीय-जी.जी. के निर्भरित स्तर से और अधिक मात्रा में पाये गए।

• दामोदर नदी क्षेत्र के एक अत्यधिक ओकीनाल एकक के आपके केंद्र में किए गए III BI संयोग के दोरण 22 फेमिडियां से संबंधित 55 मल्टी प्रजातियों दर्ज हई। पहले बार 5 विवेशी प्रजातियाँ पाई गई।

• दामोदर नदी से किनोलोगिक को कम करने वाले 18 प्रकार के वैक्टिमप्याँ जागरूकताओं की पहचान की गई।

• लेखिकाओं मालिक इन्स्टीट्यूट के तीन प्रकार के सांद्रण 1 मिल. ग्राम./ती., 5 मिल. ग्राम./ती. तथा 10 मिल. ग्राम./ती. उद्भासित करने पर मेटालोकोडीनोटीस जीन के केंद्र एक एक्ससाफ्मम में जीन एक्स्ट्रेक्शन प्रयोग पाया गई।

• असम राज्य के बीलों के लिए GIS विकास हेतु ग्राव्य ज्ञानियों में 50 बीलों से शामिल एकत्रित किया गया। इनमें से केवल 11 बीलों में हो 50 प्रतिशत से अधिक मेक्रोफाइट वर्गजन है। 23 बीलों में 25 प्रतिशत से भी कम है। अधिकता बील मूल्य नदी से हाल ही विशेष्य के दोरण बढ़े रहे हैं जिससे इनकी प्राकृतिक परिप्रेक्ष्यिक संचालित होती है।
Exotic fish species recorded from wetlands

Barbonymus gonionotus  Piaractus brachyomus

Oreochromis niloticus niloticus  Pterygoplichthys disjunctivus

Fish catch from Suvannavathy reservoir
संक्षेप संतान (1)

1960 और 1970 के दशक में संतान ने भारत संसद के योजनास्वरूप जालक़पी अनुसंधान एवं विकास पर आर्थिक धारण केंद्रित करना आरंभ किया। इस दौरान मात्रिक की अनुसंधान एवं कृषि पद्धति में महत्वपूर्ण उपलब्धियों के आधार पर भारतीय संसद की समस्याओं का कार्य प्रारंभ किया। ये परिस्थितियाँ थीं – उत्पादन व्यवसाय, न्यूनतम स्तर बीज उत्पादन, जलवायु संस्थान, भारतीय संसद के अधिकतम वृद्धि की जा सकती थी।

वर्ष 1971-73 के दौरान नए और विदेशी उत्पादन संस्थान परिवर्तन को कार्य प्रारंभ किया। ये परिस्थितियाँ थीं – अधिकतम बीज उत्पादन, न्यूनतम स्तर बीज उत्पादन, जलवायु संस्थान, भारतीय संसद के अधिकतम वृद्धि की जा सकती थी।

बदलते परिदृश्य तथा वर्तमान अनुसंधान एवं विकास की आवश्यकताओं को ध्यान में रखते हुए अनुसंधान विविधताओं का पुनःसंरचनार्थ आवश्यक है ताकि मतलब उत्पादन सत्र बना रहे। जैव विविधता का संरक्षण आते ही महत्वपूर्ण है जो किसी भी उत्पादन व्यवस्था का आधार स्तर है।

संसद की अनुसंधान विविधताओं के निम्नलिखित परिवर्तन किये गए हैं–

- उत्पादन में वृद्धि से उत्पादकों को सत्ता बनाए रखने पर ध्यान देना
• केवल मत्स्य लाम से परितंत्र के स्वास्थ्य व लाम की ओर ध्यान देना

इन परिपत्तियों के कारण संस्थान का अविश्वसन है—

✓ अंतर्वर्ती विवृत जल क्षेत्रों जैसे—नदी, जलाशय, झील, ज्वारदमुख व संबंध जल क्षेत्रों में मालिक, सामरिक व व्यावहारिक अनुसंधान कार्य।

✓ अधिकतम जल निकायों की उत्पादकता बढ़ाने हेतु परितंत्र विशेष के लिए तकनीकों व प्रणालियों को विकसित करना।

✓ बढ़ते पर्यावरण का अनुमान अन्य मात्रिका पर इसका प्रभाव होता है। इसके समाधान हेतु अन्य संगठनों के सहयोग से योजनाएँ बनाना।

✓ अंतर्वर्ती विवृत जल क्षेत्रों के प्रति जागरूकता पैदा करना, प्रशिक्षण व परामर्शक सेवाओं प्रदान करना आदि।

संगठन

संस्थान द्वारा विज्ञान-2020 में दर्शाए गए प्रभावों का संग्रहन अनुसार विकास अनुबंधी पुर्वांगन की संवृत्ती प्लान होने के तर एवं संस्थान ने अपने अनुसंधान कार्य को 7 प्रभावों के अंतर्गत विभाजित किया और इन प्रभावों की सहयोग हेतु कुछ अनुभागों व सेवा एक एक का भी गठन किया। उत्तर प्रदेश के इलाहाबाद कृषि नदीय प्रभाव देश के नदीय संस्थानों व इनकी मालिकी के अनुसार देश व उपर्युक्त प्रभाव 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 प्रभाव कार्यकाल के बैंगलौर में है और यह प्रभाव बढ़े, मत्स्य तथा छोटे जलाशयों की मत्स्य उपज वृद्धि हेतु पर्यावरण प्रणालियों को विकसित करने पर कार्य कर रहा है। इन प्रभावों का अलावा अन्य प्रभाव वैश्विक स्तर पर है। इसमें ज्वारदमुखी जलाशय ज्वारदमुखी मालिका एवं परिक्षेत्र, नदीय आर्द्र एवं सुधर्य गैरविवर्त्त एवं कार्य कर रहा है। मत्स्य स्वास्थ्य व पर्यावरणीय अनुमान अमन्यान प्रभाव विवृत जल क्षेत्र जैसे—नदीय संसाधन, आर्द्र क्षेत्र, ज्वारदमुखी प्रभाव एवं मत्स्य नियोजन संस्थान समेत विभिन्न पहलुओं को सुलझाने में प्रयत्न कर रहा है। यह प्रभाव पर्यावरणीय अनुमान एवं प्रभाव हेतु जैसे—सारिनिक, सूचना विभिन्न पहलुओं ने ये कार्य कर रहा है। इन परिपत्तियों के पुनरुत्थान योजनाओं के विकास भी इस प्रभाव का दायित्व है। बाड़कृत मैदानी आर्द्र क्षेत्र मालिका प्रभाव आर्द्र क्षेत्रों की उत्पादन प्रक्रिया तथा मत्स्य उत्पादन में वृद्धि हेतु कार्य करता है। इस कार्य के तहत जैव विविधता संसर्ग व परिस्थितिक अनुभव प्रणालियों का विकास करता है। संस्थान मुल्यांकन प्रभाव देश का मत्स्य सम्पदा व जलीय संसाधन का ढाटबंदी संबंधित करने का प्रयास करता है। यह प्रभाव विभिन्न पानीजन कला व वीलीजन सूचना प्रणाली के अनुसार संस्थान प्रबलन ढाटबंदी का विकास कर रहा है इससे अंतर्वर्ती मत्स्य सम्पदा संबंधित नियोजन होती है। संस्थान का मानन नियोजन कार्यकाल एवं प्रोटोटिपरियंकी हस्तांतरण प्रभाव संसस्थान के अवधारियों/कर्मचारियों के अलावा मालिका से जुड़े अन्य संगठनों के कर्मियों को प्रशिक्षित करता है। प्रोटोटिपरियंकी खस्तांतरण के लेन मत्स्यपालिकाओं, महुआयाओं, उदयमियों, वित्त वर्तक कर्मचारियों को प्रशिक्षित करती है। फ़िल्म शो आदि के माध्यम से अंतर्वर्ती मालिका के संस्थाने विभिन्न तकनीकों को हस्तांतरित करता है।

संस्थान के अनुसार प्रबलन संबंध में निदेशक का पद स्वीकार है तथा संस्थान का समाज प्रबलन कार्य निदेशक का अध्यक्षता में ही
पुस्तकालय व सूचना अनुभाग

संस्थान का पुस्तकालय मुख्यालय व अनुसंधान केंद्रों में कार्यरत वैज्ञानिकों की आवश्यकताओं के अनुसार अन्य संस्थानों के शोधकर्ताओं, अध्ययनकारियों तथा अधिकारियों को भी अपनी सेवाएं पुर्याया करता है। इस अवधि के दौरान पुस्तकालय ने अपने मंडर में 540 पुस्तकें जिनमें 217 हिंदी पुस्तकें हैं तथा 12 अन्य विभिन्न प्रकाशन, जर्नलों के 598 अंक संप्रभुत किया। इस अवधि में 15 विदेशी, 37 भारतीय जर्नलों के अलावा 102 इं-जर्नलों की भी व्यक्तित्व की गई। इस समय पुस्तकालय में कुल 11907 पुस्तकें, 4312 पुरस्कारित लेख, 1252 नानाचित्र और 4342 विभिन्न प्रकाशनों का संग्रह है।

विस्तार वर्ष की तरह इस वर्ष भी पुस्तकालय ने संस्थान के विभिन्न प्रकाशनों को अनेक अनुसंधान संस्थानों, विश्वविद्यालयों, उद्योगों तथा नर्तक पालकों को मेहनत रखा ताकि वर्तमान अनुसंधान से वे अद्यतन रहें। इडियन फिशराइज़ एस्ट्रोट्रक का प्रकाशन जारी रखा गया। पुस्तकालय में अनेक देश-विदेशी संगठन द्वारा पुस्तक वित्तिय व विभिन्न का प्रकाशन किया गया। वर्ष 2007–08 के दौरान पुस्तकालय हेतु 30,66,737/- (रूपये) का बजट प्राप्त किया गया जिसे पूर्णतया पुस्तकालय जर्नलों आदि की खरीद हेतु खर्च किया गया।
परियोजना अनुमान एवं प्रलेखन अनुमान

इस अनुमान द्वारा विभिन्न अनुसंधान परियोजनाओं के वार्षिक प्रगति तथा प्रस्तुत वैज्ञानिक के योगदान सम्बंधी सूचना प्राइमरी प्रोजेक्ट फाइल तथा सॉर्टेड फाइल के माध्यम से रख-रखाव किया गया। अनुसंधान संबंधी प्रगति रिपोर्ट आ. पी. एफ. I,II,III के माध्यम से अनुमान किया गया है। इस अनुमान के दायित्वों में एक्टिविटी माइलर्स, तिमाही व वार्षिक रिपोर्ट महत्वपूर्ण हैं। विभिन्न परियोजनाओं की प्रगति संबंधी तकनीकी विवरणों का संग्रहण 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 अनुमान द्वारा किया जाता है। संस्थान के वैज्ञानिकों द्वारा प्रस्तुत वैज्ञानिक लेखों को विभिन्न जर्नलों तथा संगीती, कार्यशास्त्रालयों में प्रस्तुत करने हेतु प्रेससेस किया जाता है।

इस कव्च के दौरान इस अनुमान द्वारा संस्थान की वार्षिक रिपोर्ट, 2 न्यूजलेटर तथा 4 बुलेटिन प्रकाशित किये गये हैं।

कृषि अनुसंधान सूचना प्रणाली

इस कक्ष को वैज्ञानिकों एवं कर्मचारियों को कम्प्यूटर से संग्रहित सूचनाओं प्रदान की जाती है। मुख्यालय में LAN System की व्यवस्था एवं वैज्ञानिकों को इंटरनेट की सुविधा दी गई है।

संस्थान का बजट (वर्ष 2007–2008)

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CIFRI ANNUAL REPORT 2007- 2008

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Achieving Greater Food Security and Eliminating Poverty by Dissemination of Improved carp strains to fish farmers in India (CARP-II) workshop के दौरान उप-महानिदेशक, मात्रिकी ने सभी वैज्ञानिकों को वैज्ञानिक की मात्रिकी की भाषा द्वारा समय शाहीता की आवश्यकता दिया। प्रतिमात्रिकों ने उनको दी गई सामग्री से सहायता तथा संस्थान द्वारा की गई ध्वनि से लिए संस्थान के निदेशक में कूलदीप कुमार वास को ध्वनि दिया। बैठक में निभाई गई पहलूओं का कार्यान्वयन की सिफारिश की गई।

✓ कृषि अनुसंधान संस्थानों के मत्स्य वैज्ञानिकों को निरंतर सहयोग।
✓ इस अनुसंधान संस्थानों में मात्रिकी पौजनाओं के नेटवर्क को सुधार बनाया जाए ताकि NAIP से वित्तीय सहायता प्राप्त किया जा सके।
✓ मात्रिकी क्षेत्र में प्रशिक्षण कार्यक्रमों के लिए NFDB से वित्तीय सहायता प्राप्त करने हेतु प्रस्ताव प्रस्तुत करना।
✓ प्रदेश/क्षेत्र विभेद के लिए तकनीकी प्रणालियों का प्रैक्टिक्स प्रशिक्षण करना।
✓ CIFRA के सहयोग से चावल और मल्ट्स खेतों से निकलने वाले मिश्रण पर आधुनिक अध्ययन करना।
✓ उत्तर पूर्वी पर्वतीय क्षेत्र में मछलियों की महत्ता तथा मल्ट्स पालन की कठिनाइयों का अध्ययन।
✓ जेड़र रेसट्रीगेशन कार्यक्रमों को देश के विभिन्न भागों तथा पहुँचने व अन्य अविकलणों से संबंधों की बनावट।
✓ CMFRI के सहयोग से समुद्री मल्ट्स उपज के आकड़ों का विश्लेषण तथा वैज्ञानिकों को समुद्री मात्रिकी का अध्ययन में प्रशिक्षित करना।
✓ संस्थान के अंतर्गत मसल फार्मिङ का बढावा देना।

भारतीय कृषि अनुसंधान परिषद एवं बर्ड फिश सेंटर के सहयोगकांक परियोजना Achieving Greater Food Security and Eliminating Poverty by Dissemination of Improved carp strains to fish farmers in India (CARP-II) workshop के दौरान उप-महानिदेशक, मात्रिकी ने सभी वैज्ञानिकों को वैज्ञानिक की मात्रिकी की भाषा द्वारा समय शाहीता की आवश्यकता दिया। प्रतिमात्रिकों ने उनको दी गई सामग्री से सहायता तथा संस्थान द्वारा की गई ध्वनि से लिए संस्थान के निदेशक में कूलदीप कुमार वास को ध्वनि दिया। बैठक में निभाई गई पहलूओं का कार्यान्वयन की सिफारिश की गई।

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✓ प्रदेश/क्षेत्र विशेष के लिए तकनीकी प्रणालियों का प्रैक्टिक्स प्रशिक्षण करना।
भीति समिति 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, बलद फिश तथा अन्य सदस्य डा. नी. सी. एस. सिस्मा, संवाहन डी.नी. गृंती, विज्ञान, डा. आर. के. रिचर्ड, प्रोफेसर जनतु विज्ञान, जनतु विज्ञान विभाग, पटना विश्वविद्यालय डा. एस. कौट, सिद्धांतशास्त्र, पर्यावरण एवं वन निदेशक, डा. नी. सी. गोवर्धन, जनतु विज्ञान, गुजरात स्थित विश्वविद्यालय ने भाग लिया। समिति की इस बैठक में संस्थान के विभिन्न भागों के अध्यक्ष के अलावा संस्थान के मुख्य तथा अन्य केंद्रों के वैज्ञानिक भी उपस्थित हुए हैं।

विभिन्न भागों के आध्यक्ष तथा इनमें कार्यरत कुछ प्रशासन वैज्ञानिकों ने अपने भाग से संबंधित परियोजनाओं के तहत किए गए कार्य एवं उपलब्धियों को समिति के समक्ष विचारार्थ तथा सुझाव दिया एवं निर्देशों के लिए प्रस्तुत किया। समिति की सहमति से नई परियोजनाओं को उद्देश्य 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 में संबंधित आकर्षकों का सही रेखा-रेखाबंधन।
- प्राकृतिक परियोजनाओं के लिए एक लंग फंस रखना चाहिए ताकि इसके परिणाम तथा अन्य कार्यक्रम एवं दीर्घकालिक उद्देश्य दर्शाया जा सके।
- जलाशय एवं आर्द्र क्षेत्रों से संबंधित परियोजनाओं में समाजिक एवं आर्थिक फल्फ़ूल का समावेश किया जाये ताकि जीविका से संबंधित फ़ूलों पर भी प्रकाश डाला जा सके।
- जलाशय एवं आर्द्र क्षेत्रों से संबंधित कार्य राज्य सरकार एवं राष्ट्रीय मत्स्य विकास बोर्ड के सहयोग से किया जाए ताकि परियोजनाओं का सही उपयोग किया जा सके।
- संस्थान द्वारा बालों जलाशयों पर भी अध्ययन किया जाना चाहिए ताकि संग्रहण तथा आवश्यक सुरक्षा द्वारा प्रवेश व्यवस्थापन का विकास किया जा सके।
- संस्थान द्वारा कई जलाशयों में सहयोग साधन परियोजनाओं कार्य किया गया और उनकी उत्पादकता में वृद्धि की गई।
- हिल्सा मार्केट के पूर्व शोधकर्ताओं ने जो कार्य किया इसका एक समेकित समीक्षा तैयार किया जाए ताकि वर्तमान शोधकर्ताओं इससे संबंध हो सकते।
- विज्ञान मूलभूत साधन भी मॉडल के अनुसार जानकारी प्रदान करें, लाभदायी प्रशिक्षित करने वाले पाठ्य- एजुकेशन के लिए मॉडल विकास।

हिंदी पत्रिका

- संस्थान के मुख्यालय में 14.09.07 से 28.09.07 के दौरान हिंदी पत्रिका का आयोजन किया गया। इस आयोजन का उद्देश्य कलक्टिव विश्वविद्यालय के हिंदी विभाग के प्रो. डा. अमरनाथ शर्मा ने किया। उद्घाटन सत्र
के दौरान प्र. शर्मा ने सभा को समायोजित करते हुए हिंदी भाषा का बहुत एवं सुगठित उपयोग पर जोर दिया एवं कुछ उदाहरण भी प्रस्तुत किए हैं हिंदी पथवाढ़ के दौरान निवृत्त लेखन, दिग्गज्ञ लेखन, हिंदी सब्जा विद्यालय, समाधान झाण, सुनेख, प्रश्नोत्तरी, हिंदी टेक्नू के विद्यार्थियों का आयोजन किया गया। मुख्यलय के अधिकारी एवं कर्मचारी भारी संख्या में इन प्रतियोगिताओं में भाग ले कर नगद साथ पुरस्कार के रूप में प्राप्त किए हैं।

हिंदी पथवाड़ा समापन समारोह में चिन्नया सिंह थिथाट मोहरिया कोलेज के प्र. डा. शिवनाथ पांडेय मुख्य अधिधिति रहे एवं समारोह की अध्यक्षता संस्थान के निदेशक डा. कृषकवी कुमार वास ने किया। महानीति कृषक मंत्री, भारत सरकार श्री सरद पवार जी द्वारा परिषद के अधिकारियों व कर्मचारियों को दिये गए संबंध को इस अवसर पर संयोग के बिखरे प्रशासनिक अधिकारी श्री उमेश चन्द्र प्रसाद ने पढ़कर सुनाया।

पंचवर्षीय समीक्षा दल के बैठक

संस्थान के पंचवर्षीय समीक्षा दल के अध्यक्ष डा. पी. वी. देहादरसाई हैं तथा दल के सदस्य हैं—प्र. अ. पी. जुलूसी, प्र. कौशल कुमार एवं वारा. पी. कुमार। दल ने मुख्यलय बैरबुपुर में 20–21 जुलाई 2007 के दौरान अपनी पहली बैठक की। वैज्ञानिक द्वारा सभी परियोजनाओं से संबंधित उपलब्धियों की समीक्षा की गई। समीक्षा दल के संस्थान के बैरबुपुर केंद्र का दिनांक 3–6 अक्टूबर 2007 के दौरान तथा उत्तर पूर्वी केंद्र, दिसंबर, असम का निरीक्षण 17–19 दिसंबर 2007 के दौरान किया। समीक्षा दल को इन केंड्रों की अनुसंधान कार्य तथा प्रशासनिक कार्यों से अवगत कराया। दल के सदस्यों ने वैज्ञानिकों एवं अन्य कर्मचारियों से चर्चा की।

नेताध्वक

भारतीय कृषि अनुसंधान परिषद के मालिकाकी प्रभाग ने संस्थान के मुख्यलय बैरबुपुर परिसर में कृषि अनुसंधान संस्थाओं के वैज्ञानिकों की चौथी नेताध्वक बैठक दिनांक 2 फरवरी, 2008 को आयोजित किया। इस बैठक में परिसर के साथ कृषि अनुसंधान संस्थाओं में कार्यरत 8 मत्स्य वैज्ञानिकों ने भाग लिया।

केंद्रीय अंतर्वत्तीय मालिकाकी अनुसंधान संस्थान तथा वी. ओ. वी. पी. के सहयोग से परामर्श

हिस्सा मालिकाकी के प्रबन्धन पनान की तैयारी करने हेतु वी. ओ. वी. पी. के सहयोग से संस्थान के मुख्यलय परिसर में दिनांक 14–15 मार्च, 2008 को एक क्षेत्रीय परमर्श का आयोजन किया गया। इस परमर्श में भारत, बांग्लादेश, श्रीलंका तथा भारत सरकार के अनेक प्रतिनिधियों ने भाग लिया।

नोडल अधिकारियों के बैठक

भारतीय कृषि अनुसंधान परिषद के मालिकाकी प्रभाग ने संस्थान के मुख्यलय, बैरबुपुर में 4 फरवरी 2008 एन.ई.एच. कम्प्यूटर इन आई.एच.एस.पी. फिशरी शीर्षस्थ इंस्टीट्यूट के नोडल अधिकारियों की एक बैठक का आयोजन किया। डा. एन. अय्याप्पा, उप-महानत्तेंद्रक, मालिकाकी के प्रतिनिधियों का स्वागत करते हुए इस संस्थान के निदेशक तथा अन्य मालिकाकी संस्थाओं के निदेशकों को एन.ई.एच. कम्प्यूटर कार्यक्रम में उनके सहयोग के लिए धन्यवाद दिया। उप-महानत्तेंद्रक महोदय ने सदस्यों को सुनिश्चित किया कि परिषद ने एन.ई.एच. कम्प्यूटर के लिए 11वीं वीजना के दौरान 400 करोड़ रूपयों की क्षमा बनाई जिसमें से पनडु करोड़ रूपये फिशरी के लिए चिह्नित किया गया।