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Central Inland Fisheries Research Institute

# RESEARCH BRIEF

## FACETS AND CONSEQUENCES OF RIVER WATER DIVERSION ON ESTUARINE ECOLOGY

The irrigation facilities, so vital to the agrarian economy in India evidently result in increasing pressures on surface water resources. The dams, barrages, weirs etc. on rivers at several vantage points serve to divert water on a massive scale into the command area for irrigation, while the rivers remain chronically denuded of adequate water flows. A major fallout of this is that the rivers lose the characteristic fluvial conditions, causing irreversible damage to the ecosystem functions. This impacts the fisheries including production potential of the entire riverine system. The estuaries, being at the tail end of rivers, are the worst hit due to imbalance in the natural dynamics of tides, related abiotic and biotic exchanges between the fresh and saline waters, which is so critical to maintain estuarine characteristics.

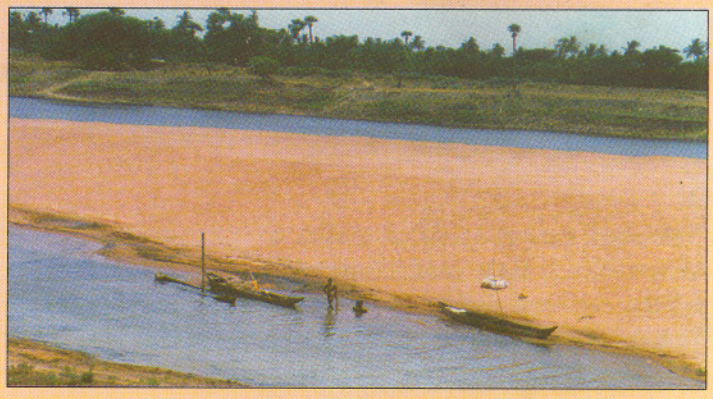
The changing scenario and consequences of river water diversion on the ecology and fisheries of some of the important estuarine systems bear testimony to this, some of the case studies carried out at CIFRI are highlighted as under :

### *Hooghly Estuary*

Besides the Gangetic inputs the Hooghly estuarine system is supported by several tributaries confluencing in the 295 km intertidal zone. Institution of dams on them has resulted in a faster rate of siltation and geomorphometric modifications downstream, like extensive sand-bar formations and elevation of the river bed. In the estuarine part, the impact on the amplitude of tidal ingress and the consequent decline in salinity is clearly visible. The cumulative effect on the eco-habitat conditions of rivers is exacerbated by a decline in the intensity of upstream migration of Indian shad, *T. ilisha*, shrunken fisheries of giant freshwater prawn, *M. rosenbergii* for want of favourable salinity conditions, the loss of natural feeding grounds and preferred fish food organisms.

### *Mahanadi Estuary*

A major dam and a number of downstream weirs and barrages on the Mahanadi has a well marked negative effect on the estuary in terms of lower seasonal flow and diminutive salinity gradient, lower flushing time and a spurge in sand formations choking the estuary mouth. The enriched biological habitats, considered to be the real lifeline to aquatic productivity is



vanishing rapidly. The loss of marshy intertidal zones has left little of potential nursery grounds for the juveniles of resident and migrant species of fin and shell fishes. Short of algal food, the eleophagus species like mullets, milk fish and pearl spots are the worst affected. A reduction in mullet fisheries of Mahanadi occurred close to 40% over a period of 3-4 decades. Low breeding success following altering magnitude and frequency in flood pulse is another reason for the scarcity of forage fish and prawns and the consequent decline in the fisheries of predatory migrant carnivores, which incidently contributed to the bulk of fishery turnover from the Mahanadi estuarine system.

### *Krishna Estuary*

Several major dams and reservoirs along the river course for water abstraction and almost complete withdrawal of freshwater discharge into the estuary is seen as the reason for transformation of Krishna estuary into a tide-fed one with a moderately high salinity gradient all round the year. Thus, the Krishna estuary stands shrunken to about ¾th of its natural dimension mostly polyhaline in character. Constrained by high salinity and tidally supported predominance of marine food web, it sustains fin and shell fishes of resident and

immigrant population only in a limited way. Mullets form the bulk of estuarine catch comprising *Mugil cephalus*, *Liza parsia* and some other species of the group. The occurrence of freshwater species is almost negligible.

## *SICAMUGIL CASCASIA* INDICATIVE OF FRESHWATER SPECIES–RECORDED IN THE HOOGHLY ESTUARY

*Sicamugil cascasia* a small mullet, characterized by a large yellow blotch at the caudal base and a yellow dot at the base of the pectoral was collected from set-barriers in the Nababgunj-Barrackpore stretch in the freshwater zone of the Hooghly estuary. This fish is reported to be purely a freshwater

*Sicamugil cascasia*

one and has not been reported from this zone of the Hooghly estuary earlier. More importantly, the occurrence of different sizes of *Sicamugil cascasia* (36mm–46mm) is indicative of a purely freshwater condition in this stretch of the Hooghly estuary. The water salinity levels in the Barrackpore-Nababgunj stretch, when these small mullets were collected, were 0.0367 and 0.057% (the annual mean of water salinity during 2005-06 in this stretch was 0.06%). Thus demonstrating a persistent freshwater condition. The lowest point on the Ganga river system where the species is said to be available is Patna though it was recorded from about 20km above Barauni (Bihar) down to Manikchawk in the district of Malda, West Bengal during an extensive investigation on the environment and fishery of the river Ganga by the Central Inland Fisheries Research Institute between 1994-96.

## INVASION OF EXOTICS IN OPENWATER ECOSYSTEMS

Existence of exotics like trouts and carps mainly common carp in riverine resources of India has been established by now, but occurrence of exotic catfish, *C. gariepinus* within Indian rivers is a recent phenomena. The invasion of the Thai magur within Yamuna, Sutlej and Beas is a cause of concern and a very disturbing trend.

The species was observed to have invaded these rivers since the year 2002 when stray one or two specimens contributed to the total catch, but since 2004 the species is regularly representing the fish catch, especially of river Yamuna at Faridabad and Panipat landing centres.

*Clarias gariepinus* showed tremendous increase from 0.135–1.333t/month representing 2.14 to 9.38% of total catch during 2004-05 to 2.247–10.307t/month representing 17.73 to 38.27% of fish catch during 2005-06 at Faridabad centre and from nil to 0.062–1.050t/month representing 2.08 to 47.58% of total catch at Panipat. The species has established within Yamuna river system is obvious by the fact that it is present regularly in fish landing at Faridabad and between September to December at Panipat, when water level within Yamuna is low.

Within Indus tributaries it is mainly present at Harike, 4 specimens having average length range of 470–780mm and average weight range 0.950–2.900 kg were observed within Sutlej and 2 specimens of 740–800mm length and 2.7–2.8 kg weight from Beas were recorded by the team from CIFRI Centre, Karnal between 2002-2004.

Establishment of alien fish species in open waters especially riverine resources may lead to critical situation regarding availability of endemic germplasm. Already indigenous fishery of reservoirs like Gobindsagar (H.P.), Jaisamand (Rajasthan) has collapsed due to entry of *Hypopthalmichthys molitrix* in the former; *O. mossambicus*, in latter and that of world famous Dal Lake due to introduction of *C. carpio*.

Entry of common carp into Ganga system has pushed the prized IMC fishery to the brink. Now entry of *C. gariepinus* a carnivore fish may prove fatal for the system as it will not only effect commercial fishery like IMC and indigenous prized catfishes but also the small fishery forming its food and the repository of indigenous germ plasm within our riverine resources.

Therefore stringent measures by the concerned agencies are needed to curb the culture/seed production at various levels especially strict vigil is to be maintained at Kolkata Fish market, the main supplier of the seed.

## PROJECT HIGHLIGHTS

- Resource inventory and mapping of water bodies in Jharsuguda, Kalahandi, Kenduajhar, Gajapati Nagar, Ganjam Jajpur, Cuttack, Deoghar, Dhenkanal Barngar, Baudar and Bhadrak districts of Orissa was completed using satellite data for preparation of their GIS database.
- Based on primary productivity, the fish production potential of the Krishna estuary was estimated at 80 kg/ha. Twenty-one fish species were recorded from Krishna estuary during the post monsoon survey updating the total number of fishes recorded to 40.
- Experimental fishing and observation of the fish landing at Bokkhali-Frazerganj and Sagar Island in Hooghly estuary showed that *Harpodon nehereus* and *Setipinna taty* were the dominart species in bag net catch. Experimental fishing in Hooghly estuary revealed the presence of 80 fish species.
- From Sundarban mangroves, 76 species of fishes and 10 species of prawns were recorded.
- Total fish catch from the winter migratory bag net fishery at Hooghly estuary during 2005-06 was estimated at 28394.2t with an average CPUE of 40.2 kg. which was lower by 4.6% in catch and 2% in CPUE from that of the previous year.
- Two *beels* in the Kosi river basin in Khagaria district, Bihar were surveyed for fisheries and ecological status. Preliminary observations on fingerlings of *Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*, *Ctenopharyngodon idella* and *Cyprinus carpio* stocked in pens constructed in three *mauns viz.* Koithkola, Rajoura and Bahura in Begusarai district of Bihar indicated good growth.
- A method for detection of microbes having capacity to degrade Trichloroethylene (TEC), a common contaminant from metal factories has been standardized.
- Major carps stocked in pens in Panchita and Bijpur *beels* of West Bengal attained average growth increment of 266g (*Catla catla*), 131g (*Labeo rohita*), 161g (*Cirrhinus mrigala*), 680g (*Ctenopharyngodon idella*) and 160g (*Cyprinus carpio*) in three months of rearing.
- Role of pens towards enhancement of fish production in floodplain wetlands is gaining popularity in the states like West Bengal, Assam and Bihar. CIFRI has been demonstrating the technology convincingly to the fishermen community. Recently the institute has initiated such demonstration in a Circular Pen in collaboration with Department of Fisheries, Govt. of West Bengal located in a beel under Bijpur Fishermen Cooperative Society, Kanchrapara, North 24 Parganas district stocking with carps at a density of 20,000 nos. per hectare. The experiment is in progress with phenomenal growth of fishes.

## HRD ACTIVITIES

### Training

| Training Programme | Participants | Venue |
|---|---|---|
| Strengthening of database and information networking in fisheries sector (CSS) | Arunachal Pradesh and Assam State Fisheries Officials | Guwahati, Assam, 5-7 January, 2006 |
| Use and Application of Catch Assessment Survey Software | State Govt. officials from Orissa, Bihar and West Bengal | CIFRI, Barrackpore, 5-7 January, 2006 |
| Peripatetic Training on Inland Fisheries Development | 30 Fishermen | Lateher, Jharkhand, 16-25, January, 2006 |
| Strengthening of database and information networking in fisheries sector (CSS) | Manipur State Fisheries Officials | Guwahati, Assam, 17-19 January, 2006 |

| Training Programme | Participants | Venue |
|---|---|---|
| Strengthening of database and information networking in fisheries sector (CSS) | Nagaland and Mizoram State Fisheries Oficials | Guwahati, Assam, 21-23 January, 2006 |
| Floodplain Wetland Management | 15 students and teachers of a college of Barak valley, Assam | NER Centre, Guwahati, Assam 06-11 February, 2006 |
| Reservoir Ecology and Fishery enhancement techniques | State officials | Bangalore, Karnataka, 07-10 February, 2006 |
| Pen culture in floodplain wetlands | 20 Fish farmers | Puthimari, Goalpara, Assam, 17-19 February, 2006 |
| Training on Diversification, Fish Farming in Beel | 47 fishermen and State Government officials | Bijpur, 24 Parganas (N), W.B. 21 February 2006 |
| Training on Jheel Matsyiki Prabandhan | 20 fishermen | Raebareli, U.P., 02-04 March, 2006 |
| Training on Jheel Matsyiki Prabandhan | 20 fishermen | Lakhimpur-Kheri, U.P., 09-11 March, 2006 |
| Conservation of fish stock in different ecosystem | Fish farmers | Markonahalli, Bangalore, 10 March, 2006 |
| Cage Culture | Fish farmers | Bangalore, Karnataka, 17-18 March, 2006 |
| GIS Application in Inland Fisheries | State Govt. officials, University teachers and scholars | CIFRI, Barrackpore, 21-30 March, 2006 |
| Conservation of fish stock in different ecosystems | Fish farmers | Krishnarajasagar, Mysore, 23 March, 2006 |
| Training on Fish Farming in Pen | 60 fishermen | Rajaura, Begusarai, Bihar, 27 March, 2006 |

### International Training

A 7-day training programme of DARE was organized for Dr. Mohamed Nagib Bakeer, Scientist of Govt. of Egypt on Management of open water system during June 10-16, 2006 at Institute's Headquarters, Barrackpore. He was deputed under a joint cooperation programme between the Indian Council of Agriculture Research (ICAR) and the Egyptian Agriculture Research Centre (EARC).

## OUTREACH

### Fish Farmers' Day

Organised one Fish Farmers' Day at Koithkola, Bihar on 26.03.2006 where about 150 fish farmers participated in the programme. The officials of State Fisheries Department, Government of Bihar and members of the local Government bodies also participated in the programme.

### Mass Awareness Programme

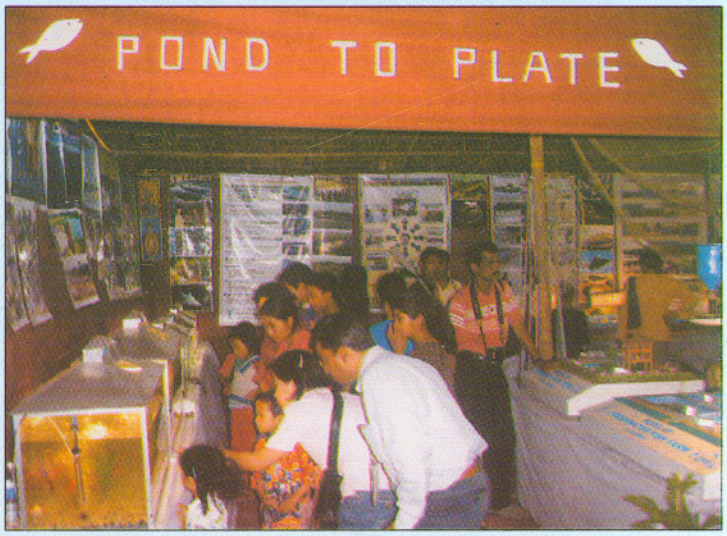
- Organized a Mass Awareness Campaign on fish conservation at Gadiara on 27.02.2006 where 200 numbers of interested fish farmers were present.
- Organized two Mass Awareness Campaign in the coastal belt of Sunderbans, one at 10 mile near Frazergunj where about 120 fishers actively participated in the campaign on May, 2006 and another at Koilaghat near Bokkhali where 90 fisherwomen participated in the awareness campaign on May, 2006.
- Organized one Mass Awareness Campaign in the coastal belt of Digha on June 11, 2006 on fin fish and shell fish seed conservation where about 65 fishers participated.


- The 10th Sundarbans Day celebration was organized on the 3rd June, 2006 at Kolkata office of CIFRI. Nearly sixty participants including Scientists of NBSSLUP (ER), senior officers of Botanical Survey of India, School students and other local people interested on Sundarbans biodiversity participated. The Director, CRIJAF was the guest of honour on the occasion.

### Exhibition

Institute participated in the following exhibitions :

- The Fishery Division of ICAR with CIFRI as the nodal institute jointly with CIFA and CIFT set-up an exhibition stall "Pond to Plate" in ICAR pavilion at Northeast-Agri-Expo, 2006 organized by Govt. of Nagaland, CII and Govt. of India at Dimapur, Nagaland during March 27-31, 2006. The fishery stall displayed a number of technologies in capture fisheries, aquaculture and fish processing including post harvest. It included integrated development of wetland fisheries, traditional fishing crafts and gears, ornamental fishes, carp hatchery systems, quality seed production, integrated aquaculture, product development, fish curing and smoking. All these activities were depicted through models, live materials and live demonstrations. Actual size fiber boats and electric fish drier developed by CIFT were displayed with live demonstration at the Expo. A technology bulletin "Pond to Plate" specially prepared for Expo was released by Hon'ble Union Agriculture Minister at the inaugural function. Activities were also displayed through multimedia. The fishery pavilion attracted a lot of crowd, all visitors evinced keen interest. Prominent visitors to the stall included Shri Sharad Pawarji, Hon'ble Union Agriculture Minister, Mr. Neiphiu Rio, Hon'ble Chief Minister, Nagaland and Dr. Mangala Rai, Director General, ICAR. The fish farmers while visiting the stall were handed over relevant literature/publications besides providing them with related information on fish culture and processing. The scientists from CIFRI, CIFA and CIFT also attended the seminar organized at the exhibition venue.



The DDG (Fy) and Director, CIFRI participated in specially organized video conferencing from the expo site and answered questions on fisheries raised by farmers assembled at the ICAR Complex, Barapani in Meghalaya. Dr. S. Ayyappan, DDG (Fy) also gave a presentation/talk on potential of fishery development in Northeast at a special seminar organized at the expo venue. The authorities appreciated the fishery stall in ICAR pavilion.

- In an exhibition organized in connection with Indian Science Congress in Hyderabad during January 3-7, 2006.
- In an exhibition organized by Sarada Devi Mahila Mondal, Baruipara, East Medinipore during January 20-30, 2006.
- In an exhibition at BCKV Mohanpur, Kalyani during January 30-February 2, 2006.
- In an exhibition at Science City, Salt Lake during 17-18 March, 2006 organized by Central Calcutta Science & Culture Organisation for Youth.

- In an exhibition on State level Seminar on extension methodology and farmers' meet for sustainable aquaculture at State Fisheries Training Centre Kulia, Kalyani during 27-28 March, 2006.

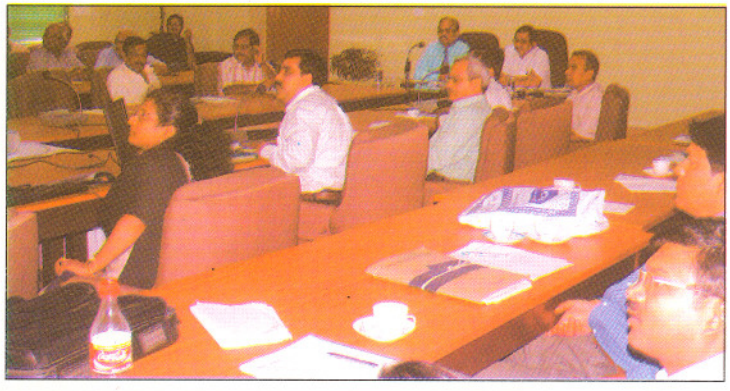
## MEETINGS

### ICAR Regional Committee-II

The midterm appraisal meeting of ICAR Regional Committee-II comprising the States of Assam and West Bengal was held at CIFRI, Barrackpore on 9 June, 2006. Dr. S. Ayyappan, DDG (Fy) and Nodal Officer of ICAR Region-II chaired the meeting. The meeting was attended by a large number of distinguished participants, such as Vice-Chancellors and faculty Members from SAUs located in the region. From ICAR Dr. Nawab Ali, DDG (Engg.) & Dr. R.C. Maheshwari, ADG (TC), ICAR attended the meting. The Vice-Chancellor BCKVV, Director, CRIJAF, Dr. H.S. Sen and other senior officers of ICAR, State officials, Govt. of West Bengal participated in the meeting. Dr. K.K. Vass, Director CIFRI, and Member-Secretary, ICAR Regional Committee-II extended a very warm welcome to the dignitaries and presented ATR. Dr. Ayyappan in his opening remarks explained the purpose of convening this meeting and expressed overall satisfaction on the progress achieved so far towards the implementation of action points of the 17th meeting. At the end the Chairman stressed upon all to complete all raised action points so that at 18th meeting all work is completed.

### SRC Meeting

The Annual Staff Research Council Meeting of the Institute was held at Barrackpore from 16th to 20th May, 2006 under the Chairmanship of Dr. K.K. Vass, Director, CIFRI. Dr. V.R. Chitranshi, ADG (Inland Fisheries), ICAR also atended the meeting. The meeting was attended by all scientists. Twelve on going projects during 2005-06 were discussed. The proposed programmes for XI Plan was also discussed apart from the issues relating to Right to information Act. The ADG, Dr. V.R. Chitranshi expressed his satisfaction over the presentations of project reports in the SRC and congratulated all the scientists for their active participations. The proposed activities for the year 2006-07 were approved.

### Research Advisory Committee

The Research Advisory Committee of the Institute met at Barrackpore on 24-25 February, 2006 under the Chairmanship of Dr. K.V. Devaraj, Former V.C., University of Agricultural Sciences, Bangalore, with Dr. B.N. Singh, Ex-DDG (Fy), CIFRI, Prof. B.B. Jana, Kalyani University and Dr. Amalesh Chowdhury. All Heads of Divisions and Scientists of the Institute participated in the deliberations. The committee expressed the view that future work programmes should emphasize on a) short cut effective strategies so that states can increase fish yield from their reservoirs in a short time b) should initiate more work on various polluted river systems c) CIFRI should develop a strong programme on impact of climate change on inland fisheries d) develop strong data base centre on inland fisheries and ecology.


## WORKSHOP ORGANISED

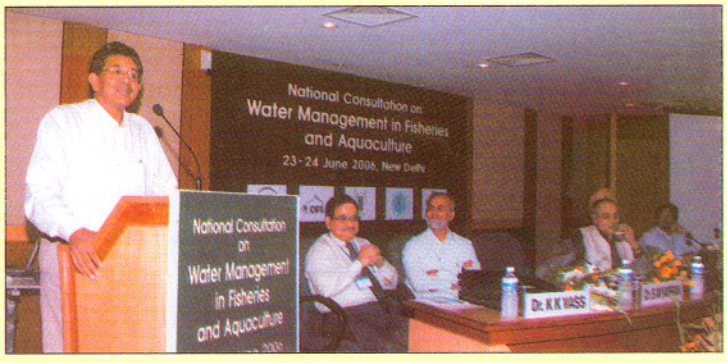
- The thematic workshop on 'Impact, Adaptation and Vulnerability of Fisheries and Livestock to Climate Change' under the ICAR funded project entitled 'Impact Adaptation & Vulnerability of Indian Agriculture to Global Climate Change' was held on 4th March, 2006 at CIFRI. The workshop was chaired by Dr. S. Ayyappan, DDG (Fy) with the presence of Dr. P.K. Aggarwal, (IARI) Coordinator of the project and Dr. K.K. Vass. The principal investigator and co-investigators from participating organizations NDRI, Karnal, CMFRI, Kochi, NDUAT, Faridabad and CIFRI presented their findings.


- The Inland Fisheries Society of India, Barackpore and the Association of Aquaculturists, Bhubaneswar, in collaboration with the Central Inland Fisheries Research Institute, Barrackpore and the Central Institute of Freshwater Aquaculture, Bhubaneswar organized a National Consultation on 'Water Management in Fisheries and Aquaculture' during 23rd-24th June, 2006 at National Academy of Agricultural Sciences, NASC Complex, New Delhi. The objective of the consultation was to plan for judicious management of open water resources for sustainable fisheries; to formulate strategies for optimal utilization of available water resources for aquaculture and integrated farming; to prioritize research needs to work out water demands in inland fisheries sector and to develop guidelines for reuse of waste water using biological elements in managed and open systems.

  Dr. S.Z. Qasim, Former Member, Planning Commission, Government of India presided over the inaugural function. Dr. Mangala Rai, the Secretary, DARE and Director General, ICAR was the chief guest at the inaugural function of the consultation. The DDG (Fy), ICAR, Dr. S. Ayyappan presented a detailed overview.

  A lead paper on 'Water Management Strategies' was presented by Dr. J.S. Samra, DDG (NRM), ICAR.

  The inaugural function was followed by Technical Sessions in which experts and resource persons from various water resource management organizations, fisheries and related technical institutions made detailed presentation on multiple uses of water, water budgetting and planning, policy issues, fisheries and aquaculture. A poster session of about 20 displays including institutional activities of CIFRI and CIFA as well as abstracts received from different researchers on the theme of the consultation was also organized. The plenary session was chaired by Dr. S. Ayyappan, Dr. N. Sarangi and Dr. K.K. Vass



## SPORTS

### ICAR Eastern Zonal Sports Meet

The ICAR Eastern Zonal Sports Meet Zone III was organized by CIFRI at Sports Authority of India complex, Kolkata during 15-19 February, 2006. Ten ICAR institutes participated in different events at Sports Meet. The CIFRI contingent put up a sterling performance and Shri M. Roy bagged the Best Athelete Award at the Meet. Mr. Mewalaal Ex-Olympaid gave away the prizes to the winners of different events. Best Institute Trophy was awarded to IVRI, Izatnagar, CIFRI was the runners up.

## VISITORS

The following distinguished persons visited the Institute during this period :.

Dr. M.K. Mondal, Development Commission and Chief Secretary, Govt. of Jharkhand.
Dr. C.R. Hazra, Vice Chancellor, Indira Gandhi Agricultural University, Raipur, Chattisgarh.
Dr. S. Ayyappan, DDG (Fy), ICAR.
Dr. D.K. Bagchi, VC, BCKV.
Dr. M.K. Majumdar, VC, UBKV.
Dr. Nawab Ali, DDG (Ag. Engg.), ICAR.
Dr. R.C. Maheshwari, ADG (TC), ICAR.
Dr. H.S. Sen, Director, CRIJAF.
Dr. S.K. Bhattacharya, Director, NIRJAFT.
Dr. Dipak Sarkar, Head, NBSSLUP.
Prof. A.K. Sarma, AAU, Jorhat, Assam.
Dr. A.K. Das, Dean (Agriculture), BCKV.
Dr. P.K. Kundu, Jt. Director, ARD, Govt. of West Bengal, Kolkata-I
Dr. M.K. Sarkar, Asstt. Director, ARD, Govt. of West Bengal.
Dr. P.K. Biswas, Asstt. Director Research, WBUAFS.
Dr. A. Sarkar, Director, Extn., UBKV.
Prof. S.K. Ghosh, Dean, Horticulture, UBKV.
Dr. P. Bandopadhyay, Dean, Extn., BCKV.
Dr. P.K. Chattopadhyay, Dean Horticulture, BCKV.
Dr. J.P. Gupta, Dean Ag. Engineering, BCKV.
Dr. S.K. Sanyal, Director Research, BCKV.
Dr. S.K. Das, Head, IVRI, Kolkata.
Dr. A.K. Singh, Zonal Coordinator, Zone-II.
Dr. R.K. Chakraborty, CIBA, Kakdwip.
Dr. R.A. Bal, Scientist, CSSRI, Canning.
Dr. A.B. Mandal, Scientist, CSSRI, Canning.

## STAFF NEWS

### Promotion

| **A. Technical** | *To* | *w.e.f* |
|---|---|---|
| Dr. (Mrs.) Kalpana Srivastava | T-6 | 01.01.2005 |
| Shri L.R. Mahaver | T-6 | 01.01.2005 |
| Shri D. Sanfui | T-5 | 01.01.2005 |
| Shri K.K. Dutta | T-5 | 01.01.2005 |
| Shri D. Borgoyari | T-5 | 01.01.2005 |
| Shri R.L. Balmiki | T-5 | 01.01.2005 |
| Shri M.C. Pal | T-5 | 01.01.2005 |
| Shri Ranjit Singh | T-5 | 01.01.2005 |
| Shri Doland Singh | T-5 | 01.01.2005 |
| Shri Swapan Chatterjee | T-4 | 01.01.2005 |
| Shri B.N. Das | T-4 | 01.01.2005 |
| Shri K.P. Singh | T-4 | 03.02.2005 |
| Shri S.G. Biswas | T-3 | 01.01.2005 |
| Shri A.K. Barui | T-3 | 01.01.2005 |

### Transfer

| | *From* | *To* |
|---|---|---|
| Shri R. Ram | Guwahati | Barrackpore |

### Retirement

| | *Date of retirement* |
|---|---|
| Shri B.K. Das, Assistant | 31.01.2006 |
| Shri H.S. Burman, SSG-IV | 31.01.2006 |
| Shri Suraj Bahadur Puri, SSG-IV | 31.03.2006 |
| Shri R.A. Gupta, Pr. Scientist | 30.04.2006 |
| Dr. D.N. Singh, Pr. Scientist | 30.06.2006 |
| Shri Kunj Behari, Senior Clerk | 30.06.2006 |
| Shri H.K. Das, SSG-IV | 30.06.2006 |

## DIRECTOR'S DESK

Dear Reader,

This issue of Newsletter highlights some of the salient research achievements made and other related significant activities performed during the period under report.

While continuing our efforts to develop the aquatic resource database in the country on GIS format, for scientific planning of fishery development, the institute mapped the water bodies in eleven districts of Orissa on digital format using satellite data. The fish diversity documentation in open waters is one of our major areas of work. In this direction our research on estuaries, an important fishery resource, revealed forty fish species in Krishna estuary while eighty were recorded from Hooghly estuary, which is based on the data generated from experimental fishing. On the other hand in the mangrove regions a total of seventy species of fishes and ten of prawn were recorded. We have been monitoring the environmental changes in Hooghly estuarine system for a long time to understand the trends in biotic communities. The salinity changes in our estuaries have been recorded by this institute in the past but it impact on biodiversity shift, has been noted recently by recording of freshwater mullet, *Sicamugil cascasia* in the Barrackpore-Nawabgunj stretch of Hooghly estuary in significant numbers.

The institute has very strong programme on wetland fisheries and has investigated varied wetlands in eastern states. In this programme area, the wetlands in Kosi basin located in the Begusarai district of Bihar were investigated during the period. The studies revealed that ecosystems to be quite rich for harnessing higher fish yields, the management action plan is being worked out in linkage with state department. The fishery enhancement technology through pen-culture intervention, developed by CIFRI suitable for wetlands, was pilot-scale demonstrated in two beels (wetlands) in West Bengal, a three months trial with three fish species combination achieved good growth of fish stocks.

Our effort in developing human resource in inland fisheries received adequate attention during the period. The institute between January to April 2006 organized seventeen national level training programmes on different aspects of inland fisheries. Under these programmes, about 200 fish farmers / fishers : fishery officials from the states of Arunachal Pradesh, Assam, Orissa, Bihar, West Bengal, Manipur, Nagaland and Mozoram; students and teachers from different universities received training. Similarly a seven day training programme was organized in June on "Management of Open-water Fisheries" for a fishery expert from Egypt under DARE, Govt. of India international programme.

In the last number of NEWSLETTER the issue of emerging freshwater scarcity was highlighted. It was suggested that we need to address the issue across the sectors with the stakeholders of water. Because it was felt that balancing the needs of the aquatic environment and other uses is becoming critical in our open-water in the country, resulting in significant decline in fish population in our rivers and associated ecosystems. Accordingly CIFRI took initiative in association with IFSI and in linkage with CIFA and AoA to organize a national level consultation on "Water Management in Fisheries and aquaculture" during 23-24 June at NASC Complex, New Delhi. Apart from fishery experts all stakeholders of water sector from the Department of Irrigation, Central Water Commission, ICID, IWMI, universities, NGOs, participated and contributed in the deliberations. The consultation was inaugurated by Dr. Mangala Rai, the secretary DARE & DG, ICAR while Dr. S.Z. Qasim, former member planning commission presided over the function. Respective stakeholders identified many researchable, governance and policy issues for multiple use of water for initiating priority action. For the first time requirement of water for fishery and ecosystem was recognized by the concerned departments having control over water resources in the country. The scientists working in inland fisheries and aquatic ecology, will have to develop implementable in-situ and ex-situ technologies to conserve and protect the fish stocks in our river systems by ensuring, natural breeding, habitat restoration, and availability of unstressed food chain for the stocks to sustain on.

The outreach to North-east region is also a strong activity of CIFRI apart from our normal programmes being executed at Guwahati centre. As a special programme sponsored by Govt. of India, Ministry of Agriculture, CII and Govt. of Nagaland, we participated and coordinated in exhibiting the fishery stall entitled "Pond to Plate" in ICAR pavilion at Dimapur in March. During the period the institute also participated in a number of other exhibitions, seminars and workshops.

It is hoped that the contents of this issue would be informative and useful for scientists and others involved in fishery sector. Any suggestions for further improving the contents of the newsletter would be highly appreciated.

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