

The Inland Fisheries News

Newsletter of the Central Inland Capture Fisheries Research Institute

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River Damodar heading towards ecological destabilization

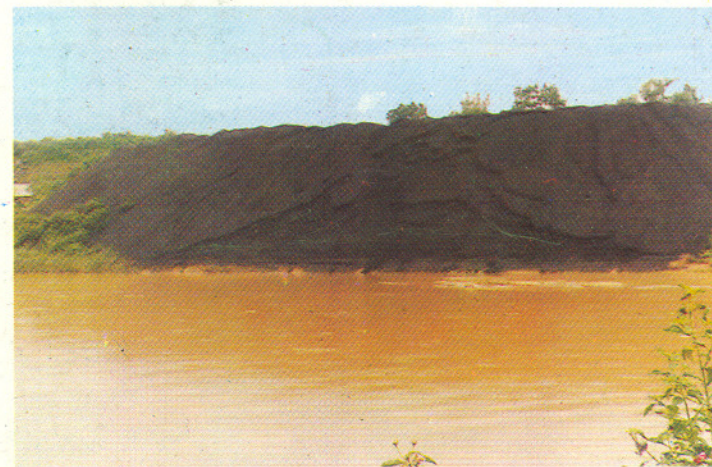
Studies conducted by CIFRI scientists on the ecology and fisheries of river Damodar during the years 1991-1995 revealed the ecosystem to be severely stressed by environmental perturbation affecting the fish fauna.

The river Damodar in the process of sharing its water with the industries and adjoining areas engulf enormous volume of effluxion produced. CIFRI study revealed that the

Though the river discharges 5-6 lakh cusecs of water in monsoon it becomes a narrow stream in summer with a flow of less than 300 cusecs. Thus, the monsoon run off dilutes the concentration of the consumed toxicants to the non-toxic level but the malignant effects of some of the toxicants persist in the river system.

During the last 40 years, a conspicuous change has occurred in the fisheries composition of the river. From the upper and middle reaches of the river, hill stream forms (*Barilius* sp., *Nemacheilus* sp., *Clupisoma* sp., *Glyptothorax* sp., *Chela* sp., *Ambasis* sp.) and sub-mountain carp and catfishes (*L. boggut*, *L. dyocheilus*, *L. calbasu*, *M. seenghala*, *M. aor*, *M. cavasius*, *O. bimaculatus*) were recorded. From Tenughat dam upto Burdwan fishes available were *C. mrigala*, *L. rohita*, *P. sarana*, *C. catla*, *L. bata*, *C. reba*). Presently 56 species belonging to 21 families are registered of which 16 species representing 6 families are commercially important. Since 1957, the reservoirs were stocked with Indian major carps by Damodar Valley Corporation but the fishes failed to establish themselves in the eco-system. The following fish species viz., *N. chitala*, *R. rita*, *B. bagarius*, *P. pangasius*, *S. silondia*, *L. boga* and *L. dero* are endangered.

The native fishes examined showed gill damages. The cellular deformities recorded cause asphyxia, disproportionate growth and finally resulting in mortality. This is confirmed by *in situ* bioassay experiment conducted in river Damodar at four representative sites viz. Rajarappa, Kargali, Durgapur and Burdwan with Indian major carp fingerlings in monsoon. The fishes could not survive beyond 96 hours but 50% mortality occurred after 26 hrs., 32 hrs., 27 hrs., and 72 hrs., respectively.



Solid waste (coal powder) at Bhurkunda Giddi washery encroaching river Damodar

quantum of major pollutants discharged into the river approximately amounts to 1,11,700 MLD industrial effluents, 80,000 litres domestic wastes and 10,000 tonnes of fly-ash per day. The other toxicants released per day were phenol (17 tonnes), heavy metals (Fe - 329.4 kg; Cu - 141.2 kg; Zn - 243.2 kg; Pb - 369.1 kg and Cd -166 kg), ammonia (17 tonnes) and oil and grease (6 tonnes). The indiscriminate dumping of solid wastes along the periphery of the river, physically deforming its course at a faster rate and endangering its existence, is very alarming.



**Nalkari river loaded with effluent
draining River Damodar**

From the foregoing account it is evident that a gradual destabilization of the ecosystem of river Damodar is occurring. Immediate remedial measures need to be taken by planners, administrators and environmentalists to rectify the ecological imbalances caused.

Rapid survey of River Ganga

Exploratory survey was carried out by the Central Inland Capture Fisheries Research Institute during 1995 to 1996 to assess soil and water quality pertaining to hydrology, primary production as well as biological parameters viz., density and diversity of phytoplankton, zooplankton, benthos and fish yield at 43 selected centres of the river Ganga, Bhagirathi and Hooghly estuarine system from Tehri to Gangetic deltaic Sunderbans.

The study revealed the entire river bed from Tehri to Patna to be affected by textural deformity and the entire stretch is blanketed by sand drifted through a number of tributaries such as Gomti, Ghagra and Gandak. The denuded

catchment washings are also responsible for the deformation of the river bed. The bed texture from Tehri to Patna has been transformed into sandy soil with 79 to 99% sand and on an average 1 to 12% clay instead of being silty loam. Moreover, the stretch upto Farakka is already under threat where the sand percentage is 48 to 54%. The entire river bed soil has been found to have slightly alkaline to alkaline pH. Appreciable improvement in dissolved oxygen content of water was noticed in the middle and lower stretches of the river system as compared to earlier period. It is definitely a positive result of Ganga Action Plan. Considerable increased value of dissolved oxygen (6.0 to 8.2 mg/l) was also observed in the estuarine system. This may be due to increased influx of freshwater into the estuary after commission of Farakka barrage. The present low values of nitrate (tr. to 0.22 mg/l) in the river water as compared to earlier values indicate the improved condition of water quality as well as lower degree of pollution. High primary productivity values inspite of sandy alkaline soil in the river may be attributed to presence of nutrients received through allochthonous sources.

The density of plankton has decreased particularly in the upper, middle and lower stretches of the Ganga as compared to earlier record, but the abundance of pollution indicator species such as *Ankistrodesmus*, *Coelastrum*,



Sampling at Moipeeth centre of Thakuran estuary

Pediastrum, *Scenedesmus*, *Actinastrum* under Chlorophyceae : *Cymbella*, *Cyclotella*, *Fragilaria* under Bacillariophyceae and *Anabaena*, *Lyngbya*, *Merismopodia*, *Spirulina* under



Cyanophyceae were less encountered in the lotic waters of river Ganga during the present study which indicates the presence of more numbers of clean water indicator species in the phyto-plankton community. Similarly, the occurrence of pollution indicator groups of macro-zoobenthos such as Oligochaeta, members of Ephemeroptera and Trichoptera were very negligible in the present study which also indirectly infers the improved water quality of the river system. The fisheries scenario shows the contribution of Indian Major carps, has gone down miserably. *Catla catla* was totally absent in the middle Ganga. The absence of certain commercially important species such as *Notopterus chitala*, *Labeo fimbriatus*, *Ompok pabo*, *O. bimaculatus*, *Pangasius pangasius* and *Mystus vittatus* were very less in middle and lower stretches of the river. Proportionately, the contribution of catfish has increased in the total fish production in both middle and lower Ganga. Considerable reduction in spawning grounds as well as lower degree of recruitment of IMC have also been observed in the middle and lower Ganga due to changes in river morphology, hydrography in terms of flow and flow rate, water abstraction for canal projects, etc. and wanton destruction of commercially important juvenile as



**Fish species available from Hooghly district
at Nabadwip centre**

well as adult fishes. Drastic decline in hilsa fisheries in middle and lower stretches of the Ganga after commissioning of Farakka barrage is also one of the main reasons for depletion of overall fisheries in the area. On the contrary,

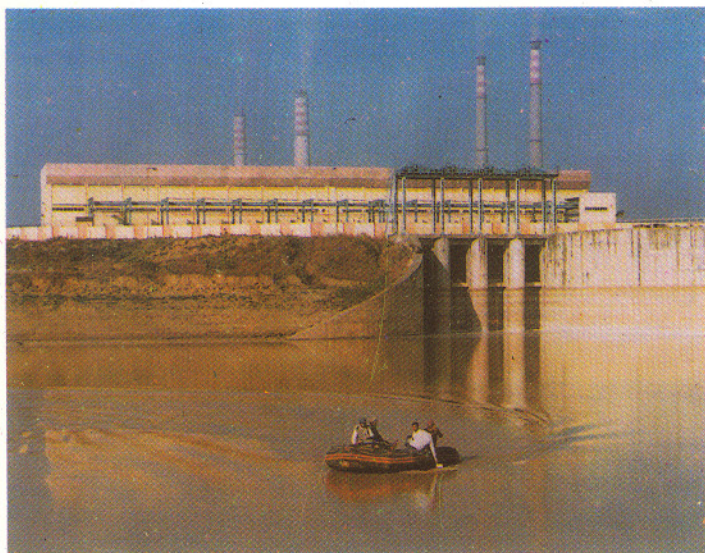
manifold increase in fish yield has been observed in the estuarine zone during post Farakka barrage period. Certain freshwater fish and prawn species viz.; *Eutropiichthys vacha*, *Clupisoma garua*, *Rita rita*, *Wallago attu*, *Mystus seenghala*, *M. aor*, *C. catla*, *L. bata* and *Macrobrachium rosenbergii* have made their appearance in the entire upper estuarine zone



**Fish species available from Bhagirathi river
at Katowa centre**

and these species were not reported prior to pre-Farakka barrage period. The general habitat of hilsa in the estuary has improved for its migration, breeding and growth due to higher flow of freshwater in the estuary after commissioning of Farakka barrage. The average annual landing of the species which remained at 1,500 tons prior to 1975 has increased to 4,000 tons in recent years. The present study infers that though the Ganges has become more conducive for aquatic production but the average annual fish production of the upper, middle and lower stretches of the river has declined due to siltation, increased water abstractions and irrational fishing.

Impact of hotwater discharge on the aquatic life of Rihand Reservoir



Sampling in the Inlet Bay channel of Rihand Reservoir

Hotwater discharge into the natural waters from the thermal power plants has always been a cause of concern for environmentalists and fishery biologists. Recent studies conducted by CIFRI under a consultancy assignment for NTPC, has thrown light on the impact of thermal effluents on the reservoir ecosystem. The salient features of the finding are :

- The thermal difference between the inlet and the discharge water during all the seasons was above the permissible limit of 5°C and the 8 km long discharge channel did not help in lowering the effluent temperature to any desirable level.
- The damage caused to the natural populations of fish larvae other than that of major carps as a result of entrapment in the rotating screens of pump house is comparatively less than the destructive methods of catching small fish employed by contractors in the littoral zone of the reservoir. This has resulted in significant decline in forage fish, which formed the food chain base for carnivorous fish species in the reservoir.

- It has been found that long term exposure of the plankton community to a temperature of 36°C and above, suppressed the rate of primary production at the stressed site in the reservoir. A temperature range of 37-40°C was observed to be above the tolerance limit of most of the planktonic organisms.

- Fry/fingerlings of *Catla catla* and *Labeo rohita* could tolerate a 6°C rise of temperature in receiving water without any adverse effect. The *in situ* experiments with fry/fingerlings of Indian major carps at a temperature above their tolerance limit, caused death due to disintegration in the secondary lamellae of gills.

- However, this thermal impact was restricted to the plume area and did not adversely affect the biotic communities in other parts of the reservoir.

National Consultation on Inland Fisheries

The Central Inland Capture Fisheries Research Institute is entering the **50th year of its service** to the nation. In order to commemorate this occasion in a befitting manner, a **National Consultation on Inland Fisheries** was organised at Barrackpore during 17 to 19 January 1997. The Consultations included : (i) a National Workshop on Reservoir Fisheries; (ii) a National Workshop on Research Thrust and Priorities in Inland Fisheries; and (iii) a Plenary Session.



National Consultation on Inland Fisheries at CIFRI

The Workshop on Reservoir Fisheries was jointly sponsored by the Union Ministry of Agriculture and CIFRI.

The Consultation was inaugurated by Dr. P.V. Dehadrai, Deputy Director General (F), ICAR, New Delhi, at a function chaired by Shri R.K. Tripathi, Secretary (Fisheries), Govt. of West Bengal at Barrackpore on 17 January. Dr. Y.S. Yadava, Fisheries Development Commissioner of India was also present on the occasion. The main objective of the Consultation was to provide a forum for exchange of ideas among cross section of experts, state officials, fishery managers, administrators and planners with a view to enabling them in identifying problem areas in management of inland fisheries in general and reservoir fisheries in particular.

The meeting was attended by Secretaries and Directors and other Senior Officers of many State Departments of Fisheries. Representatives from NABARD also participated. One of the major outcome of the Consultation was the finalisation of guidelines for reservoir fisheries management in India. The meeting also identified the research thrust and priorities in inland fisheries.

National Seminar on Changing Perspectives of Inland Fisheries

A two-day National Seminar on Changing Perspectives of Inland Fisheries was organised jointly with Inland Fisheries Society of India at CIFRI, Barrackpore, during 16-17 March 1997. It was attended by 200 delegates from various research Institutes, universities, non-governmental organisations and representatives from the State and Central Governments. The Seminar was inaugurated by Shri Kiranmay Nanda, Hon'ble Minister of Fisheries, Government of West Bengal.

There was 4 technical sessions viz., (1) Environmental impact and

management; (2) Fish population and food chain dynamics; (3) Productivity management and eco-friendly aquaculture; (4) Socio-economic issues. 75 research papers were presented by different workers. A special session on the **Young Scientist Award** and **Plenary Session** were also held.

After two-days of interaction and discussions among the various scientists the following major recommendations emerged.

- *The Seminar expresses its concern towards the general lack of expertise in the science of systematics of aquatic organisms. There is a need to encourage young researchers to take up such studies in order to develop a strong data base on aquatic biodiversity.*

- *The vast data base available on environmental aspects on Indian open water ecosystem with a focus on biodiversity should be utilised to initiate a Master level Degree Course on Aquatic Biodiversity and Environmental Management at CIFRI.*

- *Use of extraneous inputs to raise the carrying capacity of waterbodies should be restricted to sustainability limitations for environmental protection and biodiversity conservation.*

- *The Seminar notes the absence of a National protocol on quarantine in fishes. Such procedures need to be developed and standardized.*

- *The Seminar emphasises the need to conserve the Himalayan rivers, especially the small streams in order to protect the prized species of mahseer, snow trout and trout. Ranching and restocking programmes may be seriously examined. The stocking of riverine stretches in the plains of India with major carps should be undertaken with caution. The impact of stocking hatchery bred seed into open waters should be carefully evaluated.*



Inaugural function of the Golden Jubilee Seminar "Changing Perspectives of Inland Fisheries"

● *The Seminar also recommends that apart from chemical monitoring of open water ecosystems, a standard biomonitoring protocol should be developed utilising, the gross biotic communities, indicator species, and biochemical markers.*

CIFRI Research Advisory Committee Meeting

The third meeting of RAC of the Institute was held at Barrackpore on April 29, 1997. Dr. K.V. Devaraj, Ex-VC, Agricultural University, Bangalore, Dr. M. Sinha, Director, CIFRI, Dr. M.Y. Kamal, ADG (Fy), ICAR, Prof. N.C. Dutta, Ex-Head, Dept. Of Zoology, Calcutta University, Dr. Brij Gopal, JNU, New Delhi, Dr. A. Khudabuksh, Kalyani University, all the Heads of Division, Project Leaders and other Scientists of CIFRI attended the meeting.

The Director appraised the RAC of the deliberation of Institute's Staff Research Council meeting which was held on 26 and 27 April. He explained briefly the progress achieved under various divisions. The members were also briefed by the Member Secretary about the action taken by the Institute on various recommendations made by RAC



Research Advisory Committee meeting in progress at CIFRI, Barrackpore

submitted to ICAR. The RAC Chairman and members desired that subsequent meeting may be held at Allahabad and Guwahati spread over for two days. After this brief discussion the action taken report on the last meeting was approved.

Following recommendations were made at the meeting and it was suggested by the members that suitable action may be taken if possible within specific time frame to implement them.

⇒ *The technology developed at the Institute level will be of no use if it is not transferred to the user properly. In this connection problems of implementation at the user departments was highlighted. To overcome this problem it was proposed that at the highest level in ICAR, a mechanism should be evolved to make the user departments more accountable in such programme.*

⇒ *The proposal of the Director to consolidate the sub-centre base of the Institute, in tune with the perspective plan to provide more facilities in terms of manpower and infrastructure, at regional centres was agreed in principle by the RAC but then expressed the view that consolidation should be done after the current programmes at those centres are completed.*

⇒ *The problem of hilsa ranching was discussed in detail and it emerged that more investigations should be continued before a firm decision can be taken on the matter. However, it was decided to keep the programme of ranching of hilsa suspended for the present.*

⇒ *It was observed that more basic scientific understanding of various interactions within the eco- system should be taken up in order to develop sound management strategy either for biological stocks within the system or conservation of eco-system as such.*

⇒ *It was emphasised that work on ecological modelling should be initiated and analytical content in each project improved further. It was also opined that with the help of modern computer software packages, all data generated should be subjected to rigorous analysis.*

⇒ *Ecologically sensitive and protected wetlands should not be indiscriminately brought under fish culture activities. Biodiversity of our inland aquatic ecosystems need to be conserved.*

during their second meeting held at the Institute on July 29 and 30, 1996. Regarding the recommendation of inclusion of disciplines of Sociology and Environmental Sciences among the subjects for ARS recruitment, the Chairman desired that necessary proposal with justification may be

Extension Scene

Union Agriculture Minister lays foundation stone for Womens' participation in fisheries development of ox-bow lakes in Begusarai, Bihar

CIFRI has started working on a new approach for developing ox-bow lakes (*maun*) through effective participation of women in fish husbandry in the marginal areas of such lakes, under an Ad-hoc Research scheme of ICAR. In its first phase 10 women of fishermen families, from the poorest lot, have been identified in collaboration with the District Administration Begusarai, Bihar for the purpose of fish- husbandry in Bishunpur *maun* near Begusarai. Each woman would be allotted one pen enclosure for doing fish culture under the guidance of CIFRI scientists. Under the scheme all the required inputs in terms of technical knowhow, pen-structure, feed, seed, etc. will be given in order to make them aware of the effectiveness and the suitability of fish- husbandry in the fisheries development of ox-bow lakes through pen culture. The venture would also open a new avenue for generating additional income for fishermen families.



Shri Chaturanan Mishra, Union Minister of Agriculture laying the foundation stone of the Hatchery Complex at Begusarai. Hon'ble M.P. of the area Shri Shatrughan Singh and Dr. R.S. Paroda, D.G., ICAR are also seen

The second phase of the scheme would take care of the production of quality fish seeds by establishing a hatchery complex at Jaimangalagarh, Begusarai to cater to the needs of fish farmers in general and for stocking the ox-bow lakes in particular. The work in this regard is under progress. The foundation stone for the said hatchery complex has been laid in the month of February 1997 by the Hon'ble Minister of Agriculture, Govt. of India, Shri Chaturanan Mishra in presence of Dr. R.S. Paroda, Director General and Dr. P.V. Dehadrai, Dy. Director General (Fy), ICAR. The Hon'ble Minister of Agriculture Shri Ramjeevan Singh, Govt. Of Bihar; Shri Shatrughan Prasad Singh and Shri Ramendra Kumar, Hon'ble Members of Parliament and Shri Vimal Kriti Singh, District Magistrate, Begusarai were the other dignitaries who graced the occasion. The CIFRI side was represented by Dr. B.C. Jha, Principal Investigator and Dr. K. Chandra, Co-Investigator of the said scheme.

Krishi Vigyan Kendra - 'farmers friend'

Krishi Vigyan Kendra of the Institute is located in the Sunderbans, the biggest delta in India. Major inhabitants of this deltaic area, are resource wise poor and subsist on the natural wealth. They live under extreme agro-ecological and socio-economic constraints. They survive on monsoon crops, traditional aquaculture, forest wealth and animal rearing. These farm families are the target group of the Kendra.

The Kendra was established in November 1979 at Kakdwip to cater to the needs of the above farming communities. With a view to disseminating the viable technologies for socio-economic upliftment of the down-trodden population of Sunderbans, the Kendra paid major thrust in imparting training and organising demonstrations on fisheries, crop science, horticulture, animal science and home science.

The Kendra organises regular training courses for the benefit of the farmers, farm women and farm youth/school dropouts. It has been possible to double the productions of various crop and allied item and convert the monocrop areas into multicrop areas through KVK activities. The Kendra introduced oil seeds and pulses which have been found to be widely adopted by the farmers of the area. Surveys are conducted in the villages applying participatory rural appraisal tools.

Staff News

Appointments

| | |
|--------------------------|------------|
| Shri Shyam Sunder Ghosh | 31.03.1997 |
| Shri Chandan Chakraborty | 13.05.1997 |
| Dr. Sandeep Bhatia | 20.05.1997 |

Promotion

| | | |
|-----------------------|---------------------|------------|
| Shri H. Chaklader | T-4 to T-5 | 01.01.1997 |
| Shri A.K. Banerjee | T-4 to T-5 | 01.01.1997 |
| Shri F. Manna | T-4 to T-5 | 01.01.1997 |
| Shri S.K. Kar | Assistant to Supdt. | 03.05.1997 |
| Shri K. Prasad | Assistant to Supdt. | 13.05.1997 |
| Shri T.H. Ghume | SSG I to SSG II | 10.01.1997 |
| Shri Jagdish Balmiki | SSG I to SSG II | 09.01.1997 |
| Shri M.S. Bhoi | SSG I to SSG II | 10.01.1997 |
| Shri G. Lal | SSG I to SSG II | 10.01.1997 |
| Shri M.C. Das | SSG I to SSG II | 13.01.1997 |
| Shri B. Mondal | SSG III to SSG IV | 14.01.1997 |
| Shri Bholanath Mondal | SSG II to SSG III | 08.01.1997 |
| Shri Ram Prasad | SSG II to SSG III | 10.01.1997 |
| Shri Karam Raj | SSG II to SSG III | 10.01.1997 |
| Shri Maha Singh | SSG II to SSG III | 09.01.1997 |
| Smt. Kamala Debi | SSG I to SSG II | 27.01.1997 |
| Shri L.K. Halder | SSG II to SSG III | 29.01.1997 |
| Shri Pasupati Ghosh | SSG I to SSG II | 29.01.1997 |
| Shri Sree Nath | SSG I to SSG II | 03.02.1997 |
| Sk. Munsur Ali | SSG I to SSG II | 04.02.1997 |
| Shri Gour Gharami | SSG I to SSG II | 10.02.1997 |
| Shri M.C. Gharami | SSG I to SSG II | 10.02.1997 |

LIBRARY

New Additions

Books

- *Environmental ecology - 2nd ed : The ecological effects of pollution, disturbance and other stresses* by Freedman, Bill
- *Fisheries Acoustics* by Machennan David and E. John Smmonds
- *Ecological methods with particular reference to the study of insect populations, 2nd ed* : by Southwood, T.R.E.
- *Freshwater biomonitoring and benthic microinvertebrates* by Rosenberg, David M. And Vincent H. Resh
- *Proceedings of the fifth International symposium on the reproductive physiology of fish.* The University of Texas at Austin, Texas, USA 2-8 July, 1995 by Goetz, F.W. and P. Thomas, eds.
- *Water quality management for pond fish culture* (Developments in Aquaculture and Fisheries Science, 9) by Boyd, Claude E.
- *Appropriate use of fertilizers in Asia and the Pacific* : Proceedings of a seminar Taipei, Taiwan ROC, November 6-14, 1995 by Ahmed, Saleem ed.
- *The rivers handbook - hydrological and ecological principles*, Vol.1. by Calow, Peter and Geoffery, E. Petts
- *The rivers handbook - hydrological and ecological principles*, Vol.2. by Calow, Peter and Geoffery, E. Petts
- *Eutrophication of freshwaters - Principles, problems and restoration* by Harper, David
- *Handbook of nutrient requirements of fish* by Wilson, Robert P. Ed.
- *Illustrated MS-Dos 6.22* , by Stultz, Russell A.

From the Editor's desk

The data collection and computation procedure for giving production figures in inland fisheries is an area which requires a lot of improvement. There is a glaring lacuna of uniform and technically sound statistical model for fisheries data collection and processing in the different states. It is relevant to mention that catch data or production figures of most of the commercial fishes in India are not available. Moreover, from the meagre and scattered data available it is difficult to comprehend whether the population of a particular species of fish is increasing or decreasing at a particular region due to the various environmental and biological perturbations in the ecosystem.

In this context the development of an uniform and effective statistical model/methodology for inland fisheries data collection and computation throughout India by CIFRI assumes significance.

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