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वार्षिक रिपोर्ट

Annual Report 1991-92

NATIONAL BUREAU OF FISH GENETIC RESOURCES

भाकृअनुप
ICAR

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Cover Photo

Sophisticated electrophoretic systems for biochemical genetic studies-Ultrathin isoelectric focussing (IEF), profiles of eye-lens proteins of Indian major carps in the background.

Contents

1. INTRODUCTION

1.1 Brief History

In view of the national programmes for improvement and expansion of both inland and marine fisheries of the country, it has been recognised that enhancement of fish production alone is not enough and conservation of the diversity of the natural fish populations is a necessary prerequisite. Appreciating this, the Government of India approved establishment of the Bureau at the end of the Sixth Five Year Plan.

The National Bureau of Fish Genetic Resources was thus sanctioned in December 1983 under the Indian Council of Agricultural Research.

1.2. Mandate

* Collection, classification and evaluation of information on fish genetic resources of the country;

* Cataloguing of genotypes;

* Maintenance and preservation of fish genetic material in co-ordination with other agencies and conservation of endangered fish species; and

* Monitoring the introduction of exotic fish species in Indian waters.

1.3 Organisation

The organisational set up of the Bureau was structured for meeting the objectives. Four centres have been approved in order to take up work on different resources. These are: (i) Freshwater fish genetic resource centre, located at the headquarters of the Bureau (ii) Brackishwater fish genetic resource centre to be located at the headquarters of the Central Institute of Brackishwater Aquaculture (iii) Marine fish genetic resource centre will be located at the Central Marine Fisheries Research Institute at Cochin (iv) Coldwater fish genetic resource centre will be located at the headquarters of the National Research Centre for Coldwater Fisheries.

The following subject matter sections have been set up at the headquarters of the Bureau at Allahabad:

i) Cytogenetics
ii) Biochemical Genetics
iii) Biology and
iv) Conservation and Management.

These sections would be elevated to the status of divisions during the VIII Plan period.

1.4 Staff Position

The overall staff position as on 31 March 1992 is given below :

Sl. No.	Category of Posts	Posts sanctioned (No.)	Posts created (No.)	Staff in position	Posts vacant (out of created posts)
1	2	3	4	5	6
1.	Research Management (Director)	01	01	01	—
2.	Scientific	30	30	09*	21
3.	Technical	35	18	18	—
4.	Administrative	15	09	09	—
5.	Auxiliary	02	02	02	—
6.	Supporting	29	13	13	—
	Total	112	73	52	21

* Includes one scientist on deputation to DBT, New Delhi.

1.5 Finance

Allocation of fund and expenditure incurred during the year 1991-92.

Plan/Non-Plan	Allocation (Rs. in lakhs)	Expenditure (Rs. in lakhs)
Plan	71.00	31.17
Non-Plan	19.00	19.00
Total	90.00	50.17

2. RESEARCH ACHIEVEMENTS

2.1 FB.1 Cataloguing of Fish Genetic Resources of India

P.C. Mahanta, D. Kapoor, S.P. Singh, A.K. Singh, R. Dayal, S.M. Srivastava, R.S. Patiyal, K.D. Joshi, Ajay Kumar Singh and S.K. Paul.

India is fortunate to be endowed with plentiful bounty of nature which also holds good in regard to fish germplasm resources. Many taxonomists have described fishes of different ecosystems/ stretches/states at different times. Yet, there exists no single compendium of fishes of India in the form of Checklist and Catalogue. In addition a list of threatened species of India as a result of anthropogenic stresses is also another requirement for formulating the required conservation strategies.

(i) A Checklist of Fishes of India—A checklist of the fin fish genetic resources of India was prepared through compilation of available records. The information included in the checklist are: name of the species, systematic position, habitat and distribution. A total of 2200 fin fish species were recorded as below in different ecosystems and included in the checklist.

Ecosystem	No. of fin fish species	Percentage
Coldwater	73	3.32
Freshwater	544	24.73
Brackish-water	143	6.50
Marinewater	1440	65.45

Catalogue—A catalogue of fishes of India is under preparation. Detailed information on identity, taxonomy, distribution, bionomics, life history, fishery aquaculture, genetics and conservation of about 300 economically important fish species were collected from published record and were stored in the Computer. The compilation work is in progress.

(ii) List of endangered, threatened and rare species—While the present status of different fish species *vis* a *vis* the anthropogenic stresses affecting the fish genetic resources is known through studies

conducted at the NBFGR, the data about their past abundance is not available. This remained a constraint in preparing a list of such fishes. However, effort was made to prepare a list by compiling available information, sample survey and from personal experiences of the fishermen communities. A preliminary list of endangered threatened and rare species is under finalization.

(iii) Survey of deep pools—Aiming at collecting information on topography, stresses affecting fishes, fish faunal composition, fishing pressure etc. in deep pools for ascertaining whether any conservation measures are required, survey was conducted in certain stretches of river Ganga and Yamuna near Allahabad during the period under report. Detail studies on two deep pools, one each in Ganga and Yamuna were carried out in collaboration with the Riverine Division of the CICFRI.

Kare in river Ganga—The deep pool is located at a distance of 75 km upstream of Allahabad. The dimensions of the pool: length 125m, width 100m and depth 8m. Though the fishing is done in the deep pool round the year, the main fishing period is from October-June. During the period under report the estimated total fish catch in the pool was 2.5t. The catch composition mainly dominated by catfishes (70%) like, *Rita rita, Clupisoma garua, Ailia coila, Bagarius bagarius, Mystus seenghala, M. aor, Wallago attu, Eutropiichthys vacha* followed by miscellaneous fishes (23.5%). Major carp comprising of *Labeo calbasu* and *Cirrhinus mrigala* forms hardly 6.5%.

Baximore in river Yamuna— The deep pool is located at a distance of 15 km upstream of Allahabad. The dimensions of the pool: length 150m, width 100m and depth 18m. The fishing is done round the year. During the period under report the estimated total fish catch was 7.8 t. The catch was dominated by catfishes (59%) comprising of *M. aor, M. Seenghala, W. attu, B. bagarius, E. vacha, C. garua* followed by miscellaneous fishes (28.2%), major carp, *C catla, L. calbasu, C. mrigala* (10.7%), *H. ilisha* 1.9% and rest minor carp, *Labeo bata.*

Three types of fishing gears are mainly being used in both the pools by the fishermen. The gears were gill net, drag net, hook and line.

2.2. FB.2 Conservation of Mahseer in selected upland waters.

D. Kapoor, P.C. Mahanta, S.P. Singh, A.K. Singh, R. Dayal, S.M. Srivastava, R.S. Patiyal, K.D. Joshi, Ajay Kumar Singh & S.K. Paul.

Listing of Mahseer streams in North and North-East regions

With an ultimate aim of formulating *in situ* strategy for conservation of Mahseer which is endangered in North and North east regions of the country, comprehensive list of river/streams harbouring Mahseer in the above regions has been prepared. The mahseer streams in different states are as below:

Uttar Pradesh—Kali, Ramganga, Kosi, Sarju, Panar, Gomti, Ladiya, Dhauli, Alaknanda and Mandakani have Mahseer populations which are mainly *Tor tor* and *Tor putitora.*

Himachal Pradesh—The four major rivers harbouring Mahseer are Ravi, Beas, Satluj and Chenab. The two species *Tor tor* and *Tor putitora* only are available in catches.

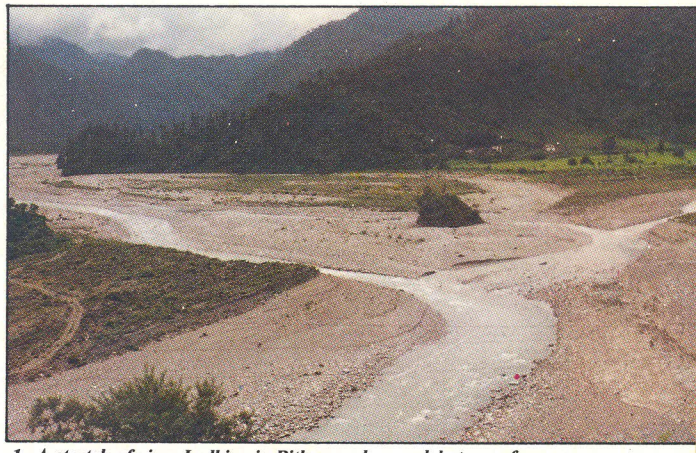
North-East region—The main rivers/ streams having Mahseer are Beki, Manah, Jia Bharoli, Bargaon, Subunsiri, Dihang, Dibang, Lohit, Burhidihing, Dhansiri, Barak river systems, Umiam, Kulsi, Kapili & their tributaries. The Mahseer species are *Tor tor, T. putitora, T. progenius, T. Mosal, Accrossocheilus hexagonolepis.*

Collection and compilation of data on Mahseer

It was reported that individual Mahseer weighing 30-40 kg used to be available in Uttar Pradesh hill streams during 60's which is no more seen these days. Studies reveal that the present biggest individual size does not normally exceed about 2 kg, while the commercial size varies between 0.5 to 2.0 kg.

The survey of the entire stretch indicates an estimated mahseer landing in Ladiya stream to the tune of about 5000 kg per year which corresponds to about 50 kg/km/yr.

In North-East regions also some information were collected on mahseer fishery from the record books of the Assam



1. A stretch of river Ladhiya in Pithoragarh—model stream for formulating conservation strategies for mahseer.

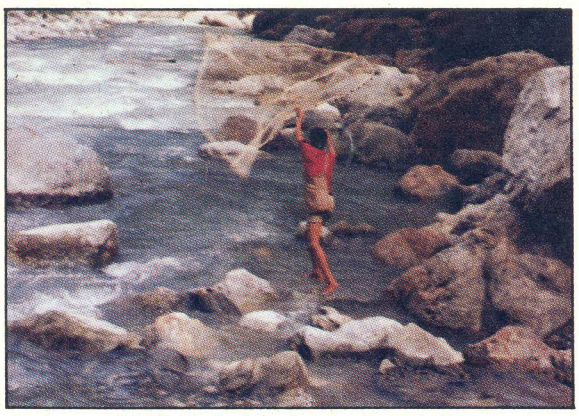
Bhoreli Anglers Association, Tezpur, CICFRI Centre, Guahati, Government of Meghalaya and Arunachal Pradesh. It was reported that in Meghalaya during sixties big sized mahseer weighing 20-30 kg each used to be available. The individual size of such fishes has now come down to 5-10 kg.

As reported by old anglers, the individual weight of Mahseer in Assam and Arunachal Pradesh used to range between 20 and 60 kg during 40's which is presently not more than about 2.0 kg.

The survey reveals the following striking causative factors for decline of Mahseer in North and North east streams.

(1) Dynamiting (2) Poisoning (3) Silting of rivers due to deforestation (4) Over exploitation (5) Killing of Juveniles (6) Capture of brood fishes and (7) Destruction of breeding grounds.

With a view to conducting trials for ultimately developing strategies on conservation of Mahseer in the natural waters, Ladiya stream in U.P. which is a tributary of Kali river was selected. The



2. A scene of fishing in Ladhiya stream using cast net.

stream is about 100 km in length originating from Mornaula in Nainital district and passes through Pithoragarh district and meets the river Kali. Further studies are in progress. (fig. 1 & 2)

2.3 CM.3 Development of Fish spermatozoa Cryopreservation technique for gene banking

L.B. Singh, A.G. Ponniah, P.C. Mahanta, A. Gopalakrishnan, P.K. Sahoo & R. Dayal.

Further sophistication & standardisation of cryopreservation technique would lead to establishment of a gene bank. This would help taking up hybridisation projects in addition to conservation programmes. The experiments during the period under report was mainly confined to endangered Mahseer and Indian major carps.

Endangered Mahseer

With little modification of the technique already developed at the Bureau, experiments on *Tor khudree* milt was successfully taken up in 1990. The milt was collected at the Lonavla fish farm of the Tata Electric Company Ltd. in Maharashtra. Fertility trials were carried out with one year old cryopreserved milt at the same farm in 1991. The genetic viability of cryopreserved milt was confirmed by the production of viable fry. The maximum hatching percentage achieved with cryopreserved milt in different experiments was 13.6 against of control which had been fertilized with normal freshly stripped milt.

Initial trials showed better efficiency of 10% DMSO as a cryoprotectant than 10% glycerol. For confirming this results fresh milt collections were made at the farm and cryopreserved with 10% DMSO, glycerol and methanol using different protocols of cryopreservation. Fertility trials with such cryopreserved milt after 48 hours showed higher hatching percentages with DMSO and methanol than glycerol.

Similarly milt of endangered golden Mahseer *Tor putitora* from Bhimtal lake was cryopreserved using the above three cryoprotectants in September 1991. These cryopreserved sperms were found to be motile on activation and fertile at different months. Field trials for ascertaining genetic viability of such sperms would be carried out in 1992 breeding season.

Indian major carps

Fertility trials were carried out with one year old (1990 collection) cryopreserved milt at the Uttar Pradesh State Fisheries

Meja Fish Farm. The two collections of 1990 were from two different farms, Tendua and Maja of the U.P. State Fisheries Department. The results of both sets of cryopreserved milt indicate that higher percentage of viable offsprings are produced from milt cryopreserved with 10% DMSO than 10% glycerol. The maximum hatching percentage that had been achieved in these trials was 24.8%.

The milt cryopreserved in 1989 also produced viable fry in fertility trials in 1991, even after 2 years of preservation. A hatching percentage of over 12 was observed in such experiments.

All the fertility trials with different sets of cryopreserved milt were repeated in the laboratory. Although lesser hatching percentages were observed with the three females induced to spawn in the laboratory, the results confirmed the field trials as mentioned in preceding paragraphs. The cryopreservation experiments also confirmed that both milt and egg quality significantly influenced the outcome of fertility trials.

Fresh milt collections were made during the year for rohu and mrigal and cryopreserved with 10% DMSO, methanol and glycerol.

In a limited number of samples the physical and chemical characteristics of rohu milt were worked out. Scanning and transmission electron microscopy profiles in normal milt of *Labeo rohita, Cirrhinus mrigala, Tor khudree* and *Tor putitora* were also initiated.

2.4 CM.4 Cryopreservation of Eggs and Embryos of Indian Major Carps

George John, A.G. Ponniah, W.S. Lakra, A. Gopalakrishnan & A. Barat

2.4.1 Experiments on *Labeo rohita*

Elaborate experiments were conducted to test the toxicity of cryoprotectants on *Labeo rohita* embryos. Tail bud stages were exposed to varying concentrations of methanol, DMSO and Methanol + DMSO. Equilibration timings of 45 and 60m minutes were adopted. Embryo tolerance to cryoprotectants was evaluated from hatching percentages in exposed embryos. All combinations showed high hatching rates.

Embryos from each treatment were cryopreserved in liquid nitrogen, thawed and studied. After thawing, however, none showed survival. Possibly graded cryoprotectant exposure and controlled freezing/thawing would provide more information useful in methodology development.

2.4.2 Cryopreservation experiments on *Penaeus monodon* embryos.

Cryopreservation experiments were also carried out on the embryos of *Penaeus monodon*. Two developmental stage of tiger shrimp embryos viz., 'bilateral' and 'setae formation' stages were selected. A range of cryprotectants were tested on these two embryonic stages. These include Propylene glycol (1M, 2M), DMSO (1M, 2M), Methanol (1M, 2M), Propylene glycol with PVP (0.5M, 1M), DMSO with PVP (0.5M, 1M), Methanol with PVP (0.5 & 1.0M), Glycol with PVP (0.5M), Sucrose with PVP (0.5M) and Gelatin 2% in 0.5M

glycerol and PVP.

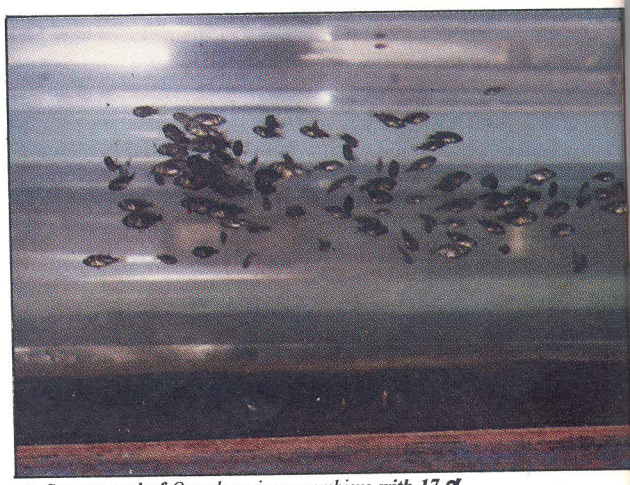
Methanol (1M) appeared to be least toxic to the embryos of *P. monodon* compared to other cryoprotectants (hatching rates 60-70%). For the improvised manual ice-seeding, gradually in a refrigerator and kept in crushed ice were exposed to a steam of liquid nitrogen for 3-4 M minutes. A low percentage of embryos cooled to 0-1^{0}C and those "Manually ice-seeded" survived. From each set some straws were later cryofrozen first by keeping in vapour phase (3 minutes) and finally punging into liquid nitrogen. None of the cryopreserved embryos however survived.

The critical stages of sub-zero cooling and seeding need more investigations. A controlled rate of cooling and thawing can enhance rates of embryos survival and thus the arrangements are being made to procure such an equipment for intensification of the effort.

2.5 CM.5 Standardisation of Techniques for Production of Monosex and Sterile Populations of Exotic Fish Species.

W.S. Lakra & A.K. Singh

Further experiments on all male production of *Oreochromis mossambicus* and induction of sterility in common carp, *Cyprinus carpio* by administration of a steroid hormone 17α methyltestosterone in feed to hatchlings immediately after yolk sac absorption stage larvae were conducted during the period under report. The fishes were bred under controlled conditions in the laboratory. The hatchlings were fed



3. Sex reversal of Oreochromis mossambicus with 17 α methyltestosterone treatment.

with hormone incorporated diets *ad-libitum* for 60 days in case of tilapia (fig. 3) in several trials. The doses of hormone ranged from 5 mg to 40 mg/kg feed. After a treatment period of 60 days, the fry were reared separately in glass aquaria on a standard hormone free diet. The mortality was about 20-30% and 20-25% in the experimental and control groups respectively. Sex of each surviving individual was determined after 90 days based on morphological and gonadal examination. The results have shown upto 100% masculinization in *O. mossambicus* (fig. 3) by feeding *ad-libitum* MT incorporated diet to 7 days old hatchlings for 60 days at the rate of 35 mg/kg feed at a temperature range of 26-29^{0}C.

The hatchlings of common carp, *Cyprinus carpio* Var. *communis* were treated with MT incorporated diet with doses ranging from 300-400 mg/kg feed for 60 days. Since only a few specimens survived in the aquaria, no conclusive observation could be made.

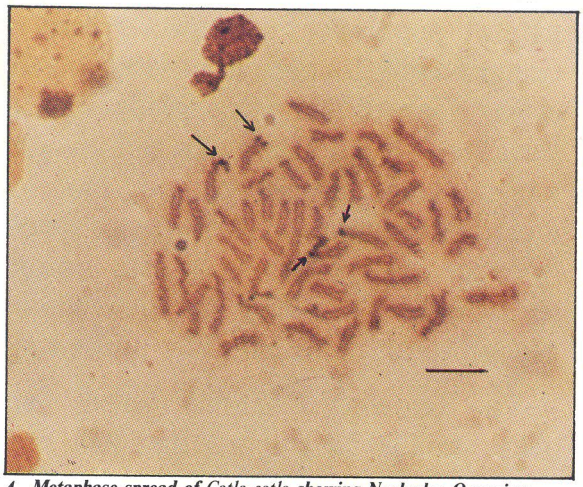
2.6 CG.6 Cytogenetic Variations in Natural Population of Indian Major Carps, Selected Air-breathing Fishes and Endangered Species.

George John. W.S. Lakra & A. Barat

With the conservation view point of natural fishery resources, work on genetic cataloguing of fish germplasm had been initiated. Studies are directed to investigate the variations in natural populations of selected fish species using Nucleolar organizer regions (NOR) banding techniques. The species studied were *Catla catla* and *Labeo calbasu* belonging to family Cyprinidae and *Anabas testudineus* of family Anabantidae. The specimens of *Catla catla* and *Labeo calbasu* were collected from Allahabad, U.P. and *Anabas testudineus* from Barrackpore, W.B. Specimens were injected intraperitoneally with mitogen Lectin (Sigma) 24 hours before sacrifice to enhance mitotic index. As observed in earlier studies also, mitotic index in the present case increased appreciably.

For localization of NOR bands in fishes the technique of Howell & Black (1985) was further modified. After staining with silver nitrate solution the slides were treated with 5% solution of sodium thiosulphate for 3-5 minutes at room temperature for the *longivity* of silver stain.

Both *Catla catla* and *Labeo calbasu* revealed a diploid number of chromosomes of 50 while *Anabas testudineus* showed only 46. In Catla, 4 Chromosomes (one submetacentric pair and one sub-telocentric pair) revealed NOR terminally on the short arm of the chromosomes (fig. 4). In *L. calbasu* and A. testudineus also the terminal ends of the short arm of a submetacentric pair revealed NOR.



4. Metaphase spread of Catla catla showing Nucleolus Organizer Regions (arrow indicated). bar-10 um

It is interesting to note that in all the cyprinids studied so far, the NOR has been observed in one chromosome pair only with an exception in catla which shows NOR in two pairs. This cytogenetic distinction perhaps is a reflection of the taxonomic and genetic identity of the species.

Preliminary studies have also been conducted for determining the diploid number and karyotypic pattern in *Tor putitora* and *Schizothorax richardsoni*. A detailed study on NOR patterns in these and other threatened species is being continued.

2.7 BG.7. Comparative Biochemical Genetic Profile of Major Carps and Other Groups of Fishes.

A.G. Ponniah, A. Gopalakrishnan, P.K. Sahoo and S.K. Srivastava.

Biochemical genetic characterisation of

natural population of *Labeo rohita* of Ganga is being carried out to determine the extent of inter and intra-specific genetic variation in fishes. During the period under report, studies were carried out for identifying more number of enzyme system in major carps, screening genetic markers to differentiate species and determining genetic variation in natural populations.

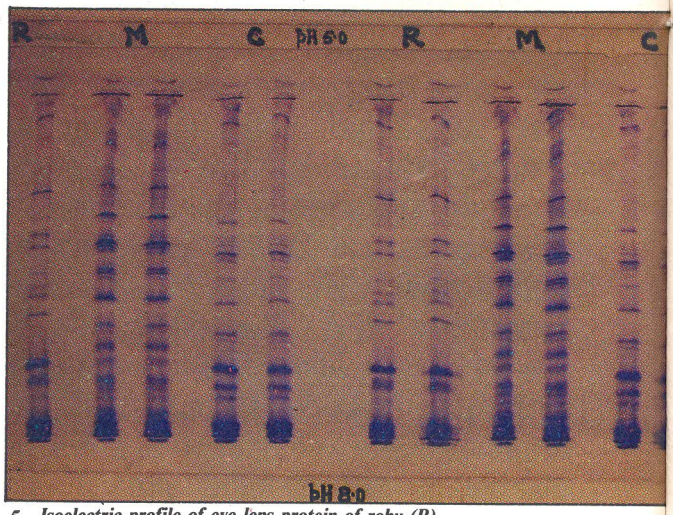
The following 7 enzyme systems were added to the 18 enzymes that had been screened earlier thereby increasing the number of enzyme systems to 25 for detecting polymorphism.

1. Esterase (EST)
2. Acid phosphatase (ACP)
3. Alkaline phosphatase (ALP)
4. Fumarate hydratase (FH)
5. Hexokinase (HK)
6. Aconitate dehydrogenase (AH)
7. Alanine amino transferase (ALAT)

Major carps

For increasing the efficiency of biochemical genetic investigations, large number of enzymes need be screened. In *Labeo rohita* muscle and liver tissues are generally used for the studies. The presence of additional band was checked in 14 enzymes with 7 additional tissues such as spleen, kidney, eye, heart, gills, brain and serum. Only in phosphogluconate dehydragenase (PGDH) the pattern observed was similar in all tissues. In addition to the one band earlier observed in liver, one more band was observed in glycerol-3-phosphate dehydrogenase (G3 PDH), Aldehyde dehydrogenase (AHD), Aspartate amino trans-ferase (AAT), Superoxide dismutase (SOD), Glucose-6-phosphate dehydrogenase (G6PDH) in the new tissues that were screened.

Striking differences could be observed in the gradient sodium dodecyl sulphate acrylamide (SDS-PAGE) electrophoretic profiles of catla and rohu, with the catla having more number of bands. All the protein bands were observed within the range of 14,400-94,000 daltons. In



5. Isoelectric profile of eye lens protein of rohu (R), mrigal (M) and catla (C).

ordinary SDS-PAGE only minor differences could be observed. Trials with isoelectric focussing (IEF) has revealed that eye lens proteins are better resolved than muscle proteins and show distinct species specific differences in relative mobility, intensity and thickness of bands. Comparatively mrigal exhibited more number of bands than catla and rohu. Between the three species only three or four major bands were common. The eye lens proteins IEF profile of rohu, catla and mrigal were strikingly different (Fig. 5).

Samples collected from natural population of rohu from Rapti river were screened for polymorphism in 22 enzyme systems and with IEF. Electrophoretic variants were observed in alcohol dehydrogenase (ADH), anthine dehydrogenase (XDH), G3PDH, SOD, Phosphoglucomutase (PGM), Isocitrate dehydrogenase (IDHP), PGDH, G6PDH, GDH and eye lens IEF. The work is in progress.

Air-breathing fishes:

Along with the earlier detected genetic markers that were different between *Heteropneustes fossilis* and *Clarias batrachus*, four more enzyme systems IDHP, SOD, G3PDH and XDH were found to exhibit species specific difference in the mobility of bands while in SOD and XDH *C. batrachus* exhibited a faster mobility, in G3PDH and IDHP *H. fossilis* exhibited a faster band.

3. COLLABORATION

3.1 National

1. Central Inland Capture Fisheries Research Institute, Barrackpore, West Bengal.
2. Central Institute of Brackishwater Aquaculture, Madras, Tamil Nadu.
3. Central Marine Fisheries Research Institute, Cochin, Kerala.
4. National Research Centre on Coldwater Fisheries, Haldwani, U.P.
5. Department of Fisheries, Government of Uttar Pradesh, Lucknow.
6. Department of Fisheries, Government of Himachal Pradesh, Bilaspur.
7. Zoological Survey of India, Madras, Tamil Nadu.
8. Nature Conservators, Muzaffarnagar, U.P.

3.2 International

1. United States Agency for International Development, Washington. The programme is conservation of Fish Genetic Resources under the main project Agriculture, sub-project 'Animal Genetic Resource Conservation.' The collaborative programme includes training of Indian Scientists to USA, and the American experts' visit to India on consultancy service and provision of scientific equipments and books for the Bureau.

Dr. P. Das, Director of the Bureau had a visit to different laboratories of USA during which he identified laboratories for training of Indian Scientists and concerned US Expert to visit India, from 4-24 March, 1991.

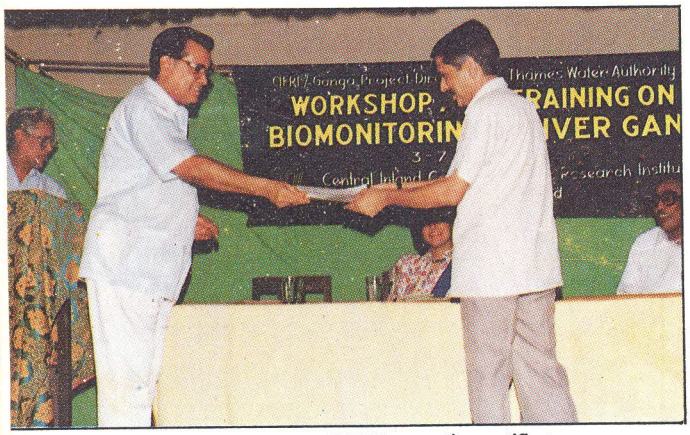
4. MANPOWER DEVELOPMENT

4.1 Scientific and Technical

The following personnel had undertaken study tour/undergone training in their respective fields:

— Shri S.P. Singh, Scientist had undergone training on Computer application, Software use and its development at the Computer Centre of National Bureau of Plant Genetic Resources, New Delhi during 3rd to 12th June, 1991.

— Dr. D. Kapoor, Sr. Scientist, attended the 'Workshop-cum-Training on Biomonitoring in the river Ganga' at



10. Dr. P. Das, Director, NBFGR presenting certificate to the trainees during valedictory function of Workshop cum Training on Biomonitoring of river Ganga.

Central Inland Capture Fisheries Research Institute, Barrackpore, from 3-5 June, 1991 and at Allahabad on 6 and 7 June, 1991.

— Shri S.P. Singh, Scientist had undergone training on Computer application, Software use and its development at the Computer centre of National Bureau of Animal Genetic Resources and National Institute of Animal Genetics, Karnal, during 15th to 24 July, 1991.

— Dr. D. Kapoor, Sr. Scientist, attended, the 'Workshop on Management Information Systems for Agricultural Research at the National Academy of Agricultural Research Management (NAARM), Rajendranagar, Hyderabad during 10-20 June, 1991.

— Dr. P. Das, Director participated at the 'Programme on Administrative and Financial Management for the Senior Executives' at the National Academy of Agricultural Research Management, Rajendranagar, Hyderabad, during 2-6 September, 1991.

— Dr. A.G. Ponniah, Sr. Scientist attended the 'Workshop on Methodology for Monitoring and Evaluation of Agricultural Research Projects' organised by National Academy of Agricultural Research Management, Rajendranagar, Hyderabad, during October 22-24, 1991.

— Dr. George John, Sr. Scientist attended a two day group discussion-cum-National Consultation on the 'Personnel Policies of the ICAR' organised by the National Academy of Agricultural Research Management, Rajendranagar, Hyderabad, during October 24-25, 1991.

— Dr. A. Gopalakrishnan, Scientist had undegone the '8th National Training Programme in Electron Microscopy for Scientific Investigators: Biological and Biomedical Applications' conducted by Sophisticated Instrument Facility (SIF) for Electron Microscopy (Department of Science and Techno-

logy) and Department of Anatomy at All India Institute of Medical Sciences, New Delhi from November 12 to December 3, 1991.

— Shri P.C. Mahanta, Scientist (Sr. Scale) participated at the Workshop on 'Motivation Management and Community Participation in Research and Development,' organised by National Academy of Agricultural Research Management, Rajendranagar, Hyderabad, during January 20 to 30, 1992.

— Mrs. S. Das, Librarian-cum-Technical Officer and Shri P. Chithamparam, Library Assistant (T-II-3) underwent the training course on 'Recent Development in Information Science and Technology', conducted by the Indian National Scientific Documentation Centre (INSDOC), New Delhi, during 3rd to 14th February, 1992.

— Dr. A. Barat, Sr. Lab. Technician (T-4) and Dr. (Mrs.) P.K. Sahoo, Sr. Lab. Technician (T-4) underwent the training course on 'Biotechnology in Aquaculture' which was sponsored by the Department of Biotechnology, Govt. of India, New Delhi and organised by the Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar.

4.2 Honours and Awards

— Dr. P. Das, Director was elected as a Fellow of the Society of Biosciences, Muzaffarnagar.

— Dr. P. Das, Director was elected as the Fellow of the Society of Nature Conservators, Muzaffarnagar.

— Dr. P. Das, Director was appointed as the Chairman of the Committee on Introduction of Exotic Aquatic Species in Indian waters.

— Dr. D. Kapoor, Sr. Scientist was awarded the Ph.D. degree on his thesis entitled "Studies on the effects of insecticides and industrial wastes on the histology of liver, kidney and gills of economically important Indian teleosts" by the University of Kanpur, Kanpur.

— Dr. P. Das, Director was the Chief Guest at Valedictory function of the 'Workshop-cum-Training on Bio-monitoring in the river Ganga' on 7th June, 1991 at Allahabad, delivered the valedictory address, distributed certificates to the participants. (Fig. 10)

5. TRANSFER OF TECHNOLOGY

5.1 Advisory Services

Fish farmers as well as others interested in fisheries visited the Bureau frequently for getting technical know how on aquacultural aspects. Necessary advice on various aspects of both fin and shell fish culture were rendered. Technical advice was also offered to interested persons during the visit of the scientists to villages. The broad aspects included polyculture, induced breeding avoiding genetic constriction,

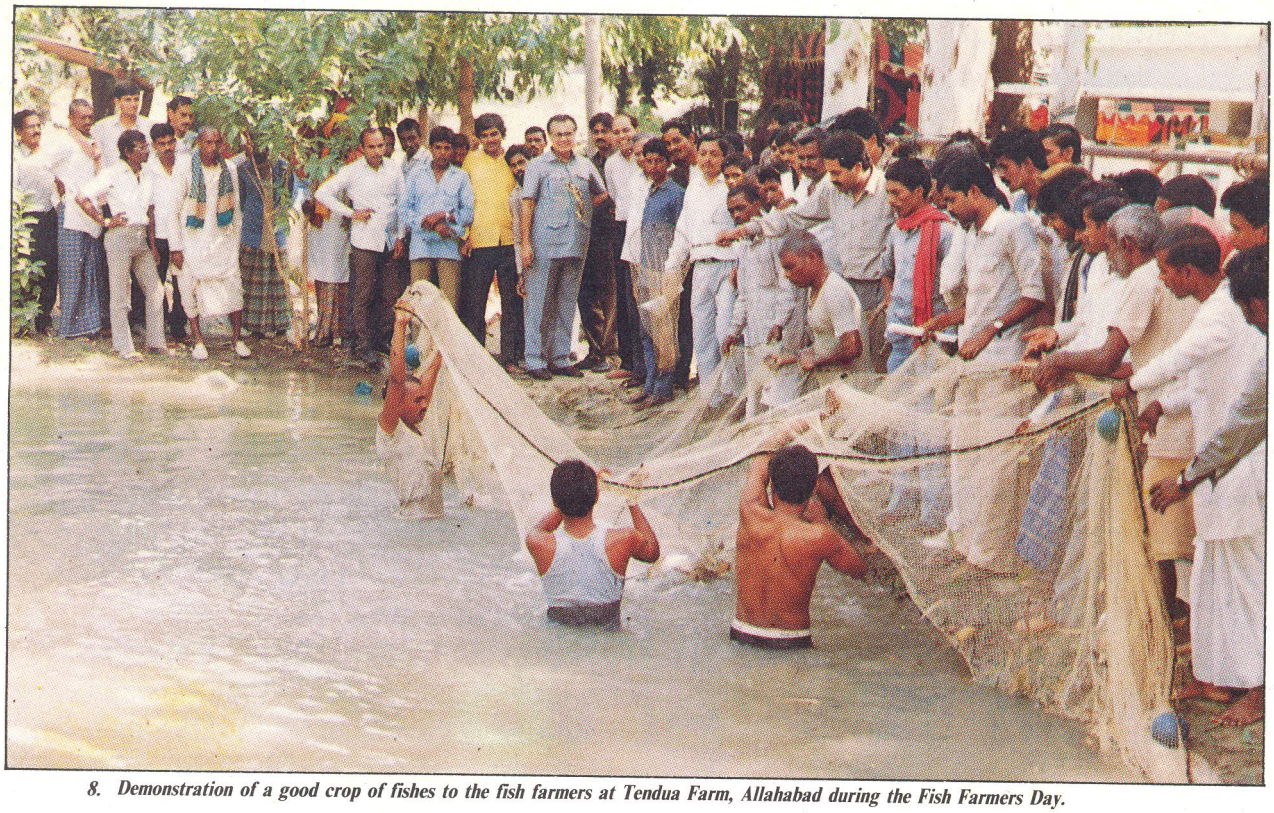
prophylactic measures for fish diseases, renovation of old ponds and construction of fish farm for pisciculture.

5.2 Other activities

— Organised Fish Farmers Day in collaboration with Fish Farmers' Development Agency and Department of Fisheries, U.P. on 30 Oct., 1991 at Tendua Fish Farm, Meja Road, Allahabad (Fig-6, 7 & 8). Shri Biresh Kumar, IAS, Chief Development Officer was the Chief Guest. Scientific lecture followed by discussions were arranged on various fish culture

6. The Director Dr. P. Das, addressing 'Matsya Palak Divas' at Tendua Fish Farm, Allahabad.

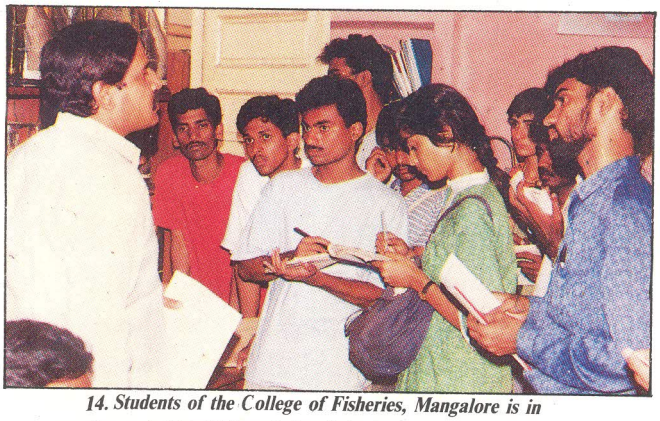
7. Chief Guest of the FFD, Shri Biresh Kumar, Chief Development Officer, Allahabad with Director, NBFGR observing a brood fish at the exhibition at the Tendua fish farm.



8. Demonstration of a good crop of fishes to the fish farmers at Tendua Farm, Allahabad during the Fish Farmers Day.

methods including their economics, financial assistance etc.

— National Science Day was celebrated on 28th February, 1992 at this Bureau and a batch of 20 students including P.G. Research Scholars of the Department of Zoology, University of Allahabad were appraised of the research work at the Bureau through demonstrations and discussions.



14. Students of the College of Fisheries, Mangalore is in Bureau's Fish Biology Laboratory.

5.2.1 Talks delivered

— Dr. P. Das, Director delivered a lecture on 'Matsya Palan-atit aur vartaman' on 19 August, 1991 to the farmers at Motilal Nehru Farmers' Training Institute, Phulpur, Allahabad.

Radio talks on All India Radio, Allahabad in Hindi :

— on 'Machalio me Antah Prajanan'

delivered on 6.3.92 by Dr. P. Das.

— on 'Machalio me Pramukh Bemaria aur Upchar' delivered on 19.2.92 by Dr. D. Kapoor.

— on 'Common carp Aur Major carp Palan' delivered on 09.10.91 by Dr. D. Kapoor.

— on 'Machalio me barh kab aur kaise' delivered on 6.8.91 by Dr. A.K. Singh.

— on 'Machhalio ko Santulit Aahar' delivered on 15.1.92 by Dr. A.K. Singh.

6. LIBRARY AND DOCUMENTATION SERVICE

6.1 Library Holdings

The library acquired 116 copies of latest books, 38 numbers of reprints and 32 photocopies of scientific papers, 131 miscellaneous publications. The library subscribed to 26 International and 30 National Journals. In addition, the library acquired 30 International and 31 National Journals and serials in exchange or as gratis.

With the above acquisition during the year under report, the library, in March 1992, had a total collection of 966 books, 140 reprints, 196 photocopies of scientific papers, 459 miscellaneous publications and 58 maps. The total expenditure incurred by the library during the year was Rs.4,23,079.00.

6.2 Exchange Services

The library maintained exchange relationship with 61 leading National and International Research Institute/Organisations and Information Centres.

The library continued free mailing of the Bureau's last year's Annual Report and Bureau's Brochure to 216 research organisations, universities, State departments, Fish Farmers Development Agencies, Fishery Experts and entrepreneurs. It also extended its services to the fish farmers by distributing extension pamphlets in Hindi and English. Besides, it provided services to the scientific personnel of research institutions, university personnel, research scholars, students and individuals through inter-library loan services and reading room facilities.

6.3 Reprography Services

The section maintained active reprography services by producing departmental publications and supplying photocopies to the scientists of the Bureau as well as to other research institutes and universities free of cost.

The section also provided cyclostyling and comb binding facilities for departmental publications.

6.4 Technical Reports

Technical reports on the progress of research activities of the Bureau were compiled and sent to ICAR. 25 review and research papers of the Director and

scientists were communicated to various national and international journals and symposia/seminars/conferences for presentation and publication.

Technical queries regarding the activities of the Bureau from various quarters of the country and abroad were attended to by the section. And biodata sheets in respect of the scientists were mailed to 10 organisations for inclusion in different year-books and directories.

6.5 Information Services

The section continued the information services by procuring selected literature references loaded in floppy diskette from ASFA CD-ROM search done by National Institute of Oceanography, Panaji. The print out of the references were made available to the scientists and technicians for easy retrieval. The library also procured selected references of online search on cryopreservation of fish embryos from the BIOSIS Data base (1969-90) and 39 references of search on cryopreservation for the use of the scientists from the CCMB, Hyderabad and National Centre for Science Information, IISC, Bangalore.

6.6 General Publications

The following publications were brought out by the Bureau during the year :

—Annual Report 1990-91.

—Base paper for Fifth Meeting of the Committee on Introduction of Exotic Aquatic Species, held on 19th June 1991 at CICFRI, Calcutta.

—Base paper for Meeting of the Management Committee, 30 July, 1991 at NBFGR, Allahabad.

—Proceedings of the Meeting of the Management Committee of NBFGR, held on 30 July 1991.

—Base paper for Third Meeting of the Management Committee held on 11 December 1991 at NBFGR, Allahabad.

—Machalio me epizotic ulcerative syndrome rog (Extension Pamphlet No. 3) (In Hindi).

7. CONFERENCES AND SYMPOSIA

7.1 Participation

The Scientists and Technicians of the Bureau participated in various Conferences/symposia, Meetings etc.

Sl. No.	Conferences/Symposia/Seminar/etc.	Organised by	Title of the paper and author(s)	Name of the participants
1.	Seminar on 'Environmental Degradation', 20-21 April 1991.	Society of Biosciences, Muzaffarnagar and Department of Zoology, Meerut College-held at the University of Meerut, Meerut.	Anthropogenic stresses affecting fish germplasm resources of the Ganga river system—P. Das & K.D. Joshi.	—
2.	National Symposium on Science and Technology in 2000 A.D. and Beyond, Diamond Jubilee Session, 4th and 5th May, 1991.	National Academy of Sciences, India at Allahabad.	India's fish germplasm resources conservation—P. Das & K.D. Joshi.	Dr. P. Das Dr. L.B. Singh Dr. A.G. Ponniah Dr. George John Dr. D. Kapoor Shri P.C. Mahanta Dr. W.S. Lakra Dr. A.K. Singh Dr. A. Barat Dr. (Mrs) P. Sahoo Dr. K.D. Joshi Shri R. Dayal Shri S.M. Srivastava

3.	Workshop on Conservation of Mahseer Resources in India, 9-11 August, 1991.	Tata Electric Company at Lonavla, District Pune.	Mahseer germplasm resource conservation—P. Das (presented by W.S. Lakra)	
			Study on cryopreservation of Mahseer milt—A.G. Ponniah, W.S. Lakra, S.N. Ogale.	Dr. A.G. Ponniah Dr. W.S. Lakra
4.	National Workshop on the performance of FFDA—Programme on Freshwater Aquaculture, 1-2 October, 1991.	Indian Institute of Management, Vastrapur, Ahmedabad.	—	Dr. P. Das
5.	45th Annual Conference and Symposia of the Indian Society of Agricultural Statistics, 27th to 29th November, 1991.	Indian society of Agricultural Statistics, New Delhi held at National Dairy Research Institute, Karnal.	—	Shri S.P. Singh
6.	Seminar on Matsya Vigyan Ke Barte Charan, 18-19 December, 1991.	Central Institute of Fisheries Education (Deemed University), Bombay.	Jal samverdhan evam matsya vigyan me anuvansiki ka anuprayog (In Hindi)—P. Das and W.S. Lakra.	Dr. P. Das Dr. S.K. Srivastava

7.	International Conference on food resources, production and processing technology, 28-30 December, 1991.	Institute for Artemia Research and Training, M.K. University Research Centre at Nagercoil, Tamil Nadu.	Utilization of genetic variation in natural food resources—A.G. Ponniah.	Dr. A.G. Ponniah
8.	Workshop-cum-Seminar on Integrated Farming System, 22 January-4 February, 1992.	Central Agricultural Research Institute, Port Blair, Andaman and Nicobar, Islands.	Integrated aquaculture—a scope for upliftment of rural economy—P. Das.	Dr. P. Das.
9.	Workshop on Fish breeding Technology, 17 February, 1992.	Agrivet Farm Care Division, Glaxo India Ltd., held at Lucknow, U.P.	—	Dr. A.K. Singh
10.	V International Conference on Goats (India), 2-8 March, 1992.	Indian Society for Sheep and Goat Proceeding and Utilization, International Goat Association, Indian Council of Agricul-tural Research and the Govt. of India, held in New Delhi.	—	Dr. L.B. Singh
11.	Workshop on Gamete and Embryo Storage and Cryopreserva-tion in Aquatic Organisms, 30 March to 2 April, 1992.	Institute National de la Jeunesse et de I' Education Populaire, Parc du Val Flory: Marly le Roy, Paris, France.	Fish gamete and embryo cryopreser-vation research in India—W.S. Lakra.	Dr. W.S. Lakra.

9. A view of the meeting of NBFGR Management Committee.

7.2 Important Meetings

The following meetings were organised by the Bureau during April, 1991 to March, 1992 :

—Annual Staff Research Council Meeting was held on 2 May 1991 and discussion made on ongoing research projects and on new projects.

—Fifth Meeting of the Committee on Introduction of Exotic Aquatic Species was held on 19 June 1991 at Central Inland Capture Fisheries Institute in Calcutta jointly organised by NBFGR and CICFRI.

—The Second Meeting of the Management Committee was held on 30 July 1991 at this Bureau.

—The half yearly Staff Research Council Meeting was held on 4 November 1991 and discussion were made on ongoing project and future plans etc.

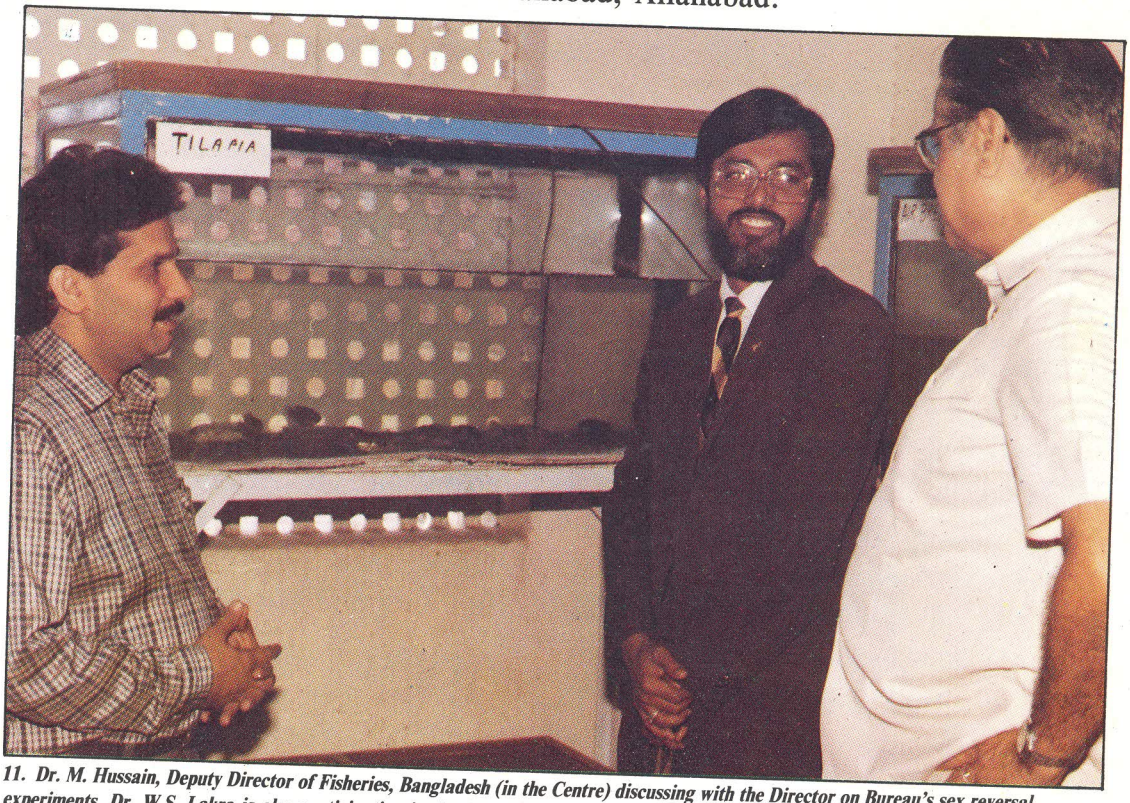
—Third Meeting of the Management Committee was held on 11 December 1991 at this Bureau. Discussion were made on the progress of ongoing scientific work and initiation of the Indo-USAID sub-project on Conservation of Fish Genetic Resources etc.

—A meeting was held for the preparation of action plan regarding the 'National Seminar on Endangered Fishes of India' jointly organised by this Bureau and Nature Conservators, Muzaffarnagar.

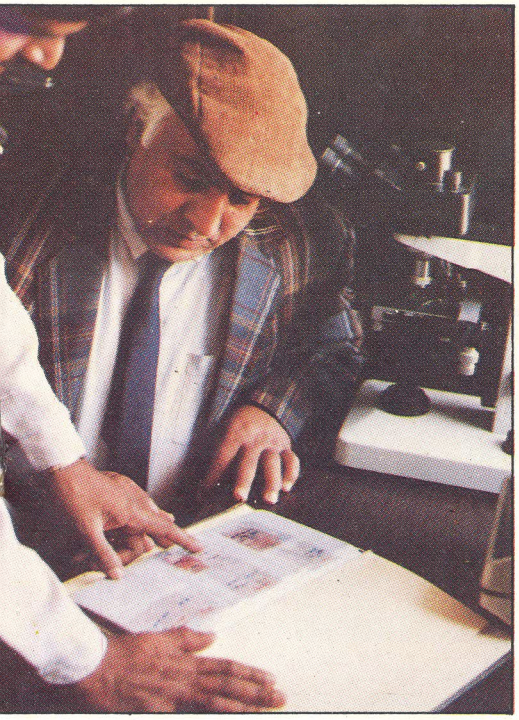
8. VISITORS

A good number of distinguished personalities visited the Bureau during 1991-92.

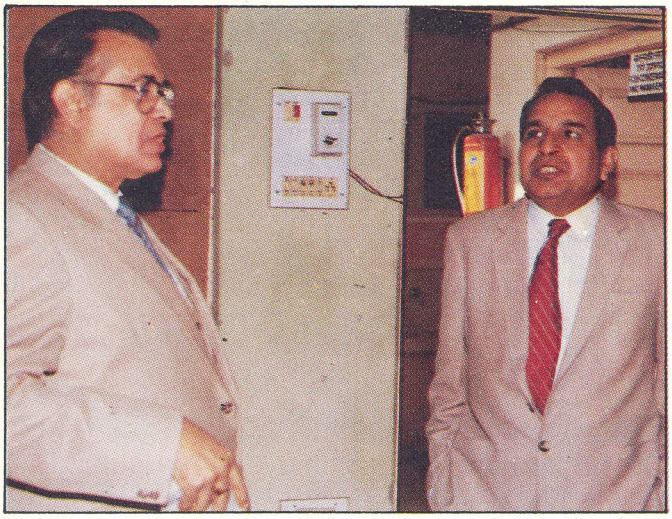
Broadway, A.C. (Dr).	Vice-Principal and Head, Department of Agricultural Education and Rural Sociology, Agricultural Institute, Allahabad.
Dehadrai, P.V. (Dr.)	Deputy Director General (Fisheries), Indian Council of Agricultural Research, New Delhi.
Dwivedi, S.N. (Dr.)	Additional Secretary, Department of Ocean Development, Government of India, New Delhi.
Hussain, M. (Dr.)	Deputy Director, Department of Fisheries, Dhaka, Bangladesh.
Kamal, M.Y. (Dr.)	Assistant Director General (Inland Fisheries), Indian Council of Agricultural Research, New Delhi.
Kaul, D. (Dr. Miss)	Reader, Department of Zoology, University of Allahabad, Allahabad.



11. Dr. M. Hussain, Deputy Director of Fisheries, Bangladesh (in the Centre) discussing with the Director on Bureau's sex reversal experiments. Dr. W.S. Lakra is also participating in the discussion.



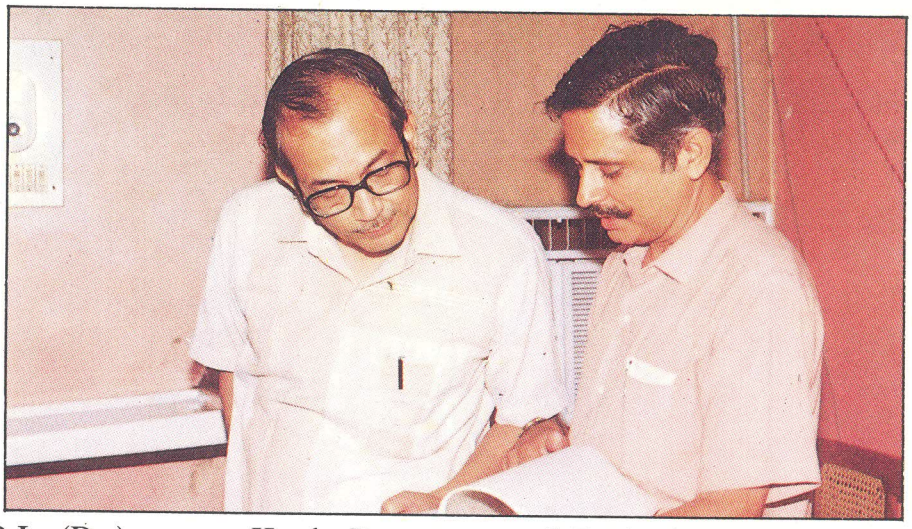
12. Dr. S.R. Verma, Secretary General NATCON looking into the gel in the Bio-chemical genetics Laboratory.



13. Dr. S.C. Pathak, Deputy General Manager (Fisheries), NABARD discussing with the Director in the Conservation and Management Laboratory.

Mahajan, K.K. (Dr.)	Retd. Senior Scientist, Mayur Vihar, Delhi.
Mathur, P.B. (Dr.)	Assistant Director General (UNDP), Indian Council of Agricultural Research, New Delhi.
Pahwa, D.V. (Mr.)	Principal Scientist (Inland Fisheries), Indian Council of Agricultural Research, New Delhi.
Pandey, K.D. (Mr.)	Director of Fisheries, U.P., Lucknow.
Pathak, S.C. (Dr.)	Deputy General Manager (Fisheries), NABARD, Bombay.
Prasad, Om (Dr.)	Reader, Department of Zoology, University of Allahabad, Allahabad.
Rao, Y. Rama (Dr.)	Head, CICFRI Centre, Allahabad.
Saigal, B.N. (Dr.)	Associate Dean, College of Fisheries, Dholi, Bihar.
Sharma, B.C. (Dr.)	Additional Secretary, Ministry of Agriculture, Govt. of India, New Delhi.
Sharma, D.C. (Dr.)	Principal Scientist, Indian Council of Agricultural Research, New Delhi.
Singh, C.S. (Dr.)	Professor and Head, Faculty of Fisheries, G.B. Pant University of Agriculture and Technology, Pantnagar, U.P.

15. Dr. B.C. Sharma, Additional Secretary, Ministry of Agriculture, Government of India is in the Library with the Director.



16. Dr. B.C. Sharma, Additional Secretary, Ministry of Agriculture, Government of India discussing on the Checklist of Fishes at the Fish Biology Laboratory.

Srivastava, C.B.L. (Dr.)	Head, Department of Zoology, University of Allahabad, Allahabad.
Srivastava, U.S. (Prof.)	Emeritus Scientist, National Academy of Sciences, India, Allahabad.
Swarup, K. (Dr.)	Emeritus Scientist, National Academy of Sciences, India, Allahabad.
Verma, S.R. (Prof.)	Secretary General, Nature Conservators and Professor, DAV (PG) College, Department of Zoology, Muzaffarnagar, U.P.

9. SCIENTIFIC PUBLICATIONS, 1991-92

Das, P., 1992.

Mahseer germplasm resource conservation. *Punjab Fish, Bull.*, 16(1) : 49-50

Multidirectional conservation effort for reviving and improving the endangered mahseer fishes has been outlined. There would be no denying of the fact that inspite of all legal actions to check indiscriminate killing of the fish in its habitat destruction, it can only be accomplished through active participation of the people. The involvement of the public can be sought through mass contact methods in general and introducing such chapters in the school and college curriculum in the country.

Das, P., 1991.

Matsya palan-ateet aur vartaman (in Hindi). *Sansthan Samachar*, 9526 : 4-5

A comprehensive account of fish culture by the traditional farmers of the past and present ventures based on scientific techniques have been presented. The composite fish culture using multiple species, brackishwater shrimp and fin fish farming applying modern technologies have enhanced the fish production several folds. The other facets of aquaculture also have been highlighted in the article.

Das, P., 1992

Integrated aquaculture : scope for upliftment of rural economy. Paper presented at the Workshop cum Seminar on Integrated Farming System, 22 January to 4 February 1992, held at Central Agricultural Research Institute, Port Blair, Andamans.

The integration of aquaculture with crop farming and livestock rearing offers greater efficiency in resource utilization, reducing risk by diversifying crops and provides additional food and income. As the land holdings and other natural resources are becoming narrower day-to-day, further sophistication and intensification of culture practices to raise the production, economic return and to increase the employment avenues is indispensible. Integrated farming systems of fish cum poultry, fish cum duck, fish cum pig, fish cum paddy, horticultural crops on pond banks, cash crops on the slope of banks etc. provide such scope very efficiently, thereby providing rural employment and upliftment of rural economy.

Das, P., 1992.

Exotic fish species in India and their effects on indigenous fishes. Accepted for World Fisheries Congress held on 3-8 May, 1992 in Athens, Greece.

Exotic fish species have been occasionally introduced into India for the purposes of ornamentation, production enhancement, sport fishing, and mosquito larvae control. These introductions have met with varying levels of satisfaction and success. While ornamental fishes have not caused any detrimental effect, experiences with larvicidal fishes like *Gambusia affinis* remained discouraging in regions such as Ooty lake. The sport fish trout, *Salmo trutta fario* and *Salmo gairdneri* occupies a somewhat vacant niche in high altitudes and has remained a welcome addition. Additionally, performance of exotic food fishes like (*Hypophthalmichthys molitrix, Ctenopharyngodon idella*) in our aquaculture systems has been quite encouraging. However, in natural waters, some introduced species are causing deleterious effects upon native ichthyofauna. Hence, the paper points out the importance of exercising caution before introducing an exotic fish species.

Das, P., 1992.

Ex-situ conservation of coldwater fish germplasm.—*In* Recent Researches in Coldwater Fisheries: National Workshop on Research and Development Need Coldwater Fisheries, 30-31 January 1989, ed. by K.L. Sehgal. New Delhi, Today and Tomorrows' Print and Pub., pp. 35-43.

Owing to various man-induced stresses associated with growth of civilization, the earth's biota including fishes is facing an unprecedented crisis leading to decline of abundance and even endangering the very existence of some species at the present point of time. Immediate genetic management requirements include identification of causative factors for decline of fishery, formulating remedial measures, providing protection of fish germplasm resources from stresses, judicious exploitation, conservation of resources and endangered species.

The conservation systems may include management of species in natural habitats, in resource centres and in gene bank. While the responsibility of resource conservation is with the conservationists, active involvement of entire scientific community is desirable with a strong backing of favourable Govt. Policy. Yet, successful conservation would be possible ultimately with the involvement of the people themselves.

Das, P., and A.G. Ponniah, 1991.

Genetics and its application in fisheries. *Fishing Chimes*, 11(1) : 28-33.

Genetics is a rapidly expanding field and a sustainable blue revolution is distinctly feasible through application of genetics in fisheries. A comprehensive account of cytogenetics, molecular and biochemical genetics, quantitative and immunogenetics and chromosome engineering techniques in fishes have been presented. Sex control by feeding sex steroids, Gynogenesis and Androgenesis offer excellent opportunities for monosex culture. Knowledge of genetics help us in producing triploids and tetraploids, bringing about hybridization, cryopreservation and transgenic fish production with brighter prospects in time to come.

Das, P., and G. John, 1991.

Biodiversity and fish improvement.
Biology Education, 8(1) : 47-56.

Indian fishes are known to account for about 2200 species out of more than 20,000 recorded worldwide. They inhabit diverse environments of freshwater, brackishwater and marine systems. A list of commercially important fishes like carps, air-breathing fishes, clupeids, mullets, prawns, sardines, pomfrets, mackerels, tunas, Bombay duck, carangids, seerfishes, elasmobranchs, perches and marine catfishes as well as their chemical composition has been presented. Their enhanced production rates through freshwater and brackishwater aquaculture and mariculture have been highlighted. Improvements of their stock through hybridization, sex control, chromosome and gene manipulations have also been suggested. Conservation of fish germplasm through *in situ* and *ex situ* methods supported by mass awareness programmes have been emphasized.

Das, P., and K.D. Joshi, 1991.

India's fish germplasm resource conservation. *In* The National Academy of Sciences, India, Diamond Jubilee Session, Allahabad, May 3-5, 1991, Section of Biological Sciences, Abstracts of Papers, p.48.

India is known to be bestowed with plentiful fish species inhabiting diversified types of ecosystems of coldwaters with 4.53%, freshwaters 30.43%, estuarine water 9.12% and marine waters 55.92%. Indiscriminate fishing over exploitation, habitat destruction through water pollution, alterations of river courses, increased water abstraction, land development etc. have been causing rapid decline in fish stocks in different water bodies. There is a report to indicate that some fishes are endangered while some are threatened and still another group is rare.

As a result of drastic decline, the population may show genetic bottleneck leading to a genetic drift if proper care is not taken and ultimately showing loss of genetic variability making the species unfit to adopt to the changing environment. A species then is likely to be extinct soon.

The genetic information as basic knowledge for formulation of conservation strategies of germplasm resources include karyotypes of species, lactic dehydrogenase isoenzyme system and haemoglobin. Besides *ex situ* methods including Gene Banking, *in situ* conservation also is being planned. Yet, mass participation would be like MSS of the conservation programmes in a country like ours.

Das, P. and K.D. Joshi, 1991.

Ichthyofaunal diversities of India. Accepted for publication in the Journal of Biosciences and Natural Resources Series.

India is endowed with the vast expanse of aquaresources including many river systems and their tributaries (28,000 Km), canals and irrigation channels (1,13,000 Km), reservoirs (about 3 million ha), estuarine waters (2.6 million ha) and marine continental shelf (2,59,000 Km^2). These ecosystems among various groups harbour rich fish genetic resources. The fishes provide nutritive easily digestible proteinaceous food, medicinal oil, useful bye-products, valuable foreign exchange through export and employment at the rural and urban sectors. Further development of this sector can go a long way in solving the country's animal protein food supply and employment opportunities in the rural sector.

Das, P. and K.D. Joshi, 1991.

Need for conservation of fish germplasm resources in India. *In* Aquatic Environment, by Ashutosh Gautam, New Delhi, Ashish Publishing House, 1992, pp. 106-111.

India is endowed with a vast expanse of open waters. These water resources harbour unique fish species which are pride of the country. As a result of various anthropogenic stresses, the fish germplasm resources are rapidly declining in different ecosystems. Species diversity and genetic variability are necessary for maintenance of both ecosystems and the species. The paper highlights that the various flora and fauna in an ecosystem have coevolved in million of years of organic evolution. This coexistence again has been possible for mutual benefits only. It has been indicated how the whole ecosystem looses its balance when a species gets extinct suddenly. Hence, it was concluded that maintenance of fish biodiversity is an indispensible activity not only in India but in the world as a whole.

Das, P. and W.S. Lakra, 1991.

Jaliya sambardhan avam matsyaki vigyan me anubanshiki ka anuprayag (in Hindi). *In* Matsyaki Vigyan ki Barte Charan, Akhil Bharatiya Hindi Seminar, 18-19 Dec. 1991, held at Central Institute of Fisheries Education, Bombay, Abstracts, pp. 5-6.

The paper in Hindi had shown that specific genetic manipulations offer excellent opportunities for fish stock improvement and production. Gynogenesis, androgenesis, triploidy and tetraploidy help enchance fish production. Sex reversal by steroid hormone feeding gives scope for monosex culture and ultimately enhancing production. Standardization of methods for cryopreservation of milt of rohu, common carp and mahseer for hybridization and conservation has been achieved at the NBFGR and there is a proposal for establishing a "Gene Bank" during the Eighth Five-year Plan at the Bureau.

Das, P. and K.D. Joshi, 1992.

Anthropogenic stresses affecting fish germplasm resources of the Ganga river system. *In Environment and Biodegradation*, by V.P. Agarwal and S.V.S. Rana, Muzaffarnagar (U.P.), Society of Biosciences, pp. 285-292.

The inland fisheries resources in India are vast and varied. Among the various aquaresources, the Ganga river system has considerable importance. The annual flow of the Ganga river system is 468.7 billion cubic metres i.e. 25.2% of India's total water resources. The river traverses over a distance of 2525 Km through snow bound Himalayan region, vast alluvial Indo-Gangetic plains and estuarine reaches. The river system harbours more than 265 fish species distributed in different ecosystems. The piscine germplasm resources of the system are under severe ecological stresses due to various anthropogenic factors like aquatic pollution, thermal pollution, agricultural run-off, habitat destruction, construction of canals, dams etc. These stresses found to influence the primary productivity of the water body and ultimately the fish availability. As a result of these stresses, the total fish yield in different ecosystems has declined to over 50% in some conventional fishing areas during last few decades.

Das, P. and K.D. Joshi, 1992.

Present status of mahseer population in Kumaun Himalayas and its possible conservation strategies. Accepted for publication in *Punjab Fisheries Bulletin.*

The Kumaun Himalayas in U.P. abound vast aquaresources in the form of snow

and rainfed streams, rivers and well-known lakes. These aquaresources harbour more than 31 fish species. Among these two mahseer species-golden mahseer (*Tor putitora*) and deep-bodied mahseer (*Tor tor*) are widely distributed in Sarju, Ramganga (E) and Ramganga (W), Kosi, Gangas, Dhauli, Kali and Gori rivers and Bhimtal, Naukuchiatal, Sattal, Nainital and Baijnath lakes. The famous prized mahseer are rapidly declining from Kumaun Himalayas in their numbers and sizes, due to habitats destruction, wanton killing, pollution and several other reasons. Possible specific conservation measures workable at the particular ecosystem have been suggested in the paper.

Lakra, W.S., 1992.

Fish gamete and embryo cryopreservation research in India. *In* workshop on Gamete and Embryo Storage and Cryopreservation in Aquatic Organisms, Org. by Inst. Nat. De la Jeunesse et de I'Education populatre at Marly le Roy, France, during 30 March-April 2, Programme and Abstracts, p. 16.

A review of fish gamete and embryo conservation research at the National Bureau of Fish Genetic Resources, India is presented. The long-term spermatozoa cryopreservation technologies have been developed and standardised for rohu, *Labeo rohita*, common carp, *Cyprinus carpio* Var *communis* and the endangered mahseer, *Tor khudree*. The cryoprotectant, sodium chloride citrate in rohu, glycerol in common carp and DMSO in mahseer have given the best results. The highest hatching rate was 13.7 percent in rohu with cryopreserved milt against 30.9 percent with normal. It was found to be 12.5 and 48.3 percent in mahseer and 0.66 and 32.4 percent in common carp respectively. There have been no significant difference in the growth rate of fry produced from cryopreserved and normal milt in all the above species. The milt of other important species of Indian aquaculture including *Catla catla, Cirrhinus mrigala, Liza parsia* and the endangered *Tor putitora* and a hybrid of *T. khudree* and *T. tor* has also been cryopreserved.

Most recently, the embryo cryopreservation research has also been initiated in India. In some preliminary experiments on the eggs and embryos of common carp and rohu, the morula survival has been *partially* observed in treatments with methanol, DMSO and both mixed together. The tailbud stage appeared to withstand all treatments well indicating a tolerance to the above cryoprotectants. The establishment of a fish sperm gene bank has been envisaged in the country druing the Eighth Five-year Plan (1992-1997) at the NBFGR.

Ponniah, A.G., 1991.

Utilization of genetic variation in natural feed resources (Abstract). *In*

International Conference on Food Resources, Production and Processing Technology, held at Nagercoil (Tamil Nadu) during 28-30 December, 1991, organised by Institute for Artemia Research and Training, (Madurai Kamaraj University Research Centre), p.1.

The geographic origin of food organisms has known to influence survival and growth rate of fish larvae. Some artemia strains from certain geographic races are a superior food organisms due to difference in their fatty acid composition. Studies have clearly shown that this superiority is due to genetic differences. Therefore, there is an urgent need to quantify the genetic variation present in food organisms.

Ponniah, A.G., W.S. Lakra and S.N. Ogale, 1992.

Study on cryopreservation of mahseer milt. *Punjab Fish. Bull.*, 16(1): 51-53.

Cryopreservation experiments with milt of the mahseer, *Tor khudree* were carried out. Two extenders (I&II) and two cryoprotectants (glycerol and dimethyl sulphoxide) were tested. Based on percentage motility of cryopreserved milt, extender II was selected and the protocol of freezing was changed. Even after more than 11 months of cryopreservation, 80% motility has been observed in these milt.

Singh, A.K., 1992.

Environmental effects on hilsa fishery and its conservation. *In* Environment and Biodegradation, by V.P. Agarwal and S.V.S. Rana, Muzaffarnagar, Society of Bioscience, pp. 275-280.

The anadromous Indian shad, *Tenualosa ilisha* (Hamilton) is reported to occur from Persian Gulf, along the coasts of Pakistan, India, Bangladesh and Burma. In India, the fish exists in and around Gulf of Canbay, in the estuaries, lower reaches and freshwater regions. The fish provided a rich fishery in most of the principal rivers of India. Due to construction of barrages on the Godavary, Krishna and Cauvery, hilsa migration got restricted to the portions of the rivers below the anicuts and the fishery bearing these stocks declined considerably. Farakka barrage on Ganga river has caused havoc to the hilsa fisheries. Other factors responsible for denudation of hilsa fishery are water abstraction, discharge of sewage and industrial effluents. Some efforts started to conserve and revitalize the hilsa fishery have been discussed.

Verma, S.R. (ed.) and P. Das, et al., (Editorial Board), 1991.

Growth development and natural resource conservation. Muzaffarnagar, Nature Conservators, 347 p.

The unplanned growth in different spheres and execution of development projects without considering their environmental implications have posed a serious threat to the non-renewable natural resources and made replenishment of renewable resources difficult, if not impossible. Consequently, from time to time, scientists and technicians have been sounding alarm on the matter. The present edited compilation with 35 papers authored by renowned scientists and specialists in their fields from different parts of the country highlights the impacts of environmental health on the nature and natural resources. The possible conservation measures have also been included.

10. PERSONNEL

10.1 List of Personnel
Dr. P. Das—Director

Scientific

1. Dr. L.B. Singh — Principal Scientist
2. Dr. M. Sinha — Principal Scientist (on deputation to NEC, Shillong).
3. Dr. A.G. Ponniah — Senior Scientist
4. Dr. George John — Senior Scientist
5. Dr. D. Kapoor — Senior Scientist
6. Shri P.C. Mahanta — Scientist (Sr. Scale)
7. Dr. W.S. Lakra — Scientist (Sr. Scale)
8. Shri S.P. Singh — Scientist
9. Dr. A. Gopalakrishnan — Scientist

Technical

1. Dr. A.K. Singh — Asstt. Farm manager (T-6)
2. Smt. Sukla Das — Librarian, T-5
3. Shri A.K. Mishra — Electrical Foreman, T-5
4. Dr. A. Barat — Senior Laboratory Technician (Cytogenetics), T-4
5. Dr. (Mrs) P.K. Sahoo — Senior Laboratory Technician (Biochemical Genetics), T-4
6. Shri Babu Ram — Farm Engineering Asstt., T-4
7. Shri Rajesh Dayal — Field Surveyor, T-4
8. Shri S.M. Srivastava — Field Surveyor, T-4
9. Shri Rabinder Singh Patiyal — Farm Assistant, T-4
10. Dr. K.D. Joshi — Senior Laboratory Technician (Fish Biology), T-4
11. Shri P. Chithamparam — Library Assistant, T-II-3
12. Shri A.K. Singh — Junior Survey Assistant, T-2
13. Shri S.K. Paul — Junior Survey Assistant, T-2
14. Shri B.K. Rao — Sample Sorter, T-1
15. Shri Raj Kumar Shukla — Sample Sorter, T-1
16. Shri Bhola Nath Pathak — Gestetner Operator, T-1

17. Shri Ved Prakash — Library Attendant, T-1
18. Shri Rama Shankar Sah — Dark Room Assistant, T-1

Administrative

1. Shri R.C. Srivastava — Asstt. Finance & Accounts Officer (on deputation from 11.1.1988)
2. Shri A. Sah — Superintendent
3. Shri R.C.P. Sinha — Stenographer
4. Shri K.P. Nath — Assistant
5. Shri A.K. Srivastava — Senior Clerk
6. Shri Panchoo Lal — Senior Clerk
7. Shri Mohan Tiwari — Junior Clerk
8. Smt. Chanda Tiwari — Junior Clerk
9. Shri Navin Kumar — Junior Clerk

Auxiliary

1. Shri Samarjit Singh — Driver
2. Shri Om Prakash — Driver

Supporting

1. Shri Sree Ram — Fieldman, SSG-III
2. Shri Madan Lal — Fisherman, SSG-I
3. Shri Raj Bahadur — Laboratory Attendant, SSG-I
4. Shri Swapan Debnath — Laboratory Attendant, SSG-I
5. Shri K.K. Singh — Fieldman, SSG—I
6. Shri Ram Baran — Fisherman, SSG-I
7. Shri Laxchman Prasad — Fisherman, SSG-I
8. Shri Dukhi Shyam Deo — Fisherman, SSG-I
9. Shri Inderjit Singh — Messenger, SSG-I
10. Shri Anil Kumar — Safaiwala, SSG-I
11. Shri Prahlad Kumar — Safaiwala, SSG-I
12. Shri Chhote Lal — Fisherman, SSG-I
13. Shri Vinay Kumar Srivastava — Laboratory Attendant, SSG-I

10.2 Appointments

Sl. No.	Name	Designation	Date of appointment
	Supporting		
1.	Shri Chhote Lal	Fisherman, SSG-I	9.7.1991
2.	Shri Vinay Kr. Srivastava	Laboratory Attendant, SSG-I	20.7.1991

10.3. Promotion

Sl. No.	Name	Posts	Date of Promotion	Posts
1.	Shri A.K. Mishra	Electrical Foreman T-4	1.7.1991	Electrical Foreman, T-5

10.4 Transfer/Deputation

Sl. No.	Name	Posts	Date of Joining	Transfer	
				From	To
1.	Shri A.K. Srivastava	Sr. Clerk	3.6.1991	Zonal Coordinating Unit, Kanpur	NBFGR Allahabad

11. MANAGEMENT COMMITTEE

The Bureau's Management Committee, as below, has been functioning during the year under report:

1. The Director, NBFGR, Allahabad	Chairman
2. The Assistant Director General (Inland Fisheries), ICAR, New Delhi	Member
3. Director of Fisheries Govt. of U.P., Lucknow	Member
4. Dr. C.S. Singh Prof. & Head, College of Fisheries, G.B. Pant University of Agriculture and Technology, Pantnagar, U.P.	Member
5. Shri P.C. Chakraborty, Jt. Director of Fisheries, Govt. of West Bengal, Calcutta.	Member
6. Shri Mohammad Akil, Secretary, Matsya-Jiwi Sehkari Samiti Ltd., Allahabad, U.P.	Member
7. Shri Narendra Kumar Nishad, Lawyer Representative, National Association of Fishermen, Allahabad, U.P.	Member
8. Dr. L.B. Singh, Principal Scientist NBFGR, Allahabad	Member
9. Dr. A.G. Ponniah, Sr. Scientist. NBFGR, Allahabad	Member
10. Dr. G. John, Sr. Scientist NBFGR, Allahabad	Member

11. Dr. W.S. Lakra, Scientist (Sr. Scale) — Member
    NBFGR, Allahabad
12. Shri R.C. Srivastava, A.F. & A.O., — Member
    NBFGR, Allahabad
13. Shri A. Sah, Superintendent — Member Secretary
    NBFGR, Allahabad

During the year under report two meetings were held on 30.7.91 and 11.12.1991.

12. STAFF WELFARE ACTIVITIES

12.1. Institute Joint Staff Council

The Institute Joint Staff Council as below considers matters of common interest concerning the staff. A meeting of the Committee was held on 24.2.1992.

Official Side

1.	Dr. P. Das, Director	Chairman
2.	Dr. L.B. Singh, Principal Scientist	Member
3.	Dr. D. Kapoor, Senior Scientist	Member
4.	Shri P.C. Mahanta, Scientist (Sr. Scale)	Member
5.	Dr. W.S. Lakra, Scientist (Sr. Scale)	Member
6.	Shri R.C. Srivastava, A.F. & A.O.	Member
7.	Shri A. Sah, Superintendent	Secretary

Staff Side

1.	Shri A.K. Mishra, T-5	Secretary
2.	Shri Ved Prakash, T-1	Member
3.	Shri K.P. Nath, Assistant	Member
4.	Shri P. Lal, Sr. Clerk	Member
5.	Shri Ram Baran, Fisherman	Member
6.	Shri K.K. Singh, Fieldman	Member

12.2 Grievance Cell

There exists also a Grievance Cell to look into the staff's grievances concerning official matters. The members of the grievance cell are as below:

Nominees of the Director

1.	Dr. L.B. Singh, Principal Scientist	Chairman
2.	Dr. A.G. Ponniah, Senior Scientist	Member
3.	Shri R.C. Srivastava, A.F. & A.O.	Member
4.	Shri A. Sah, Superintendent	Member Secretary

Elected staff representatives

1.	Shri S.P. Singh, Scientist	Scientific
2.	Shri A.K. Mishra, T-5	Technical
3.	Shri K.P. Nath, Assistant	Administrative
4.	Shri Madan Lal, Fisherman	Supporting

During the period under report a meeting of the cell was held on 10.1.1992.

रिपोर्ट का हिन्दी सारांश

भूमिका :

संक्षिप्त इतिहास :

हमारे देश के अन्तर्स्थलीय एवं समुद्री मत्स्य विकास सम्बंधी राष्ट्रीय कार्यक्रमों के अन्तर्गत यह सुनिश्चित किया गया है कि मछली उत्पादन में केवल वृद्धि ही पर्याप्त नहीं है अपितु प्रकृति प्रदत्त विभिन्न मत्स्य प्रजातियों एवं उनमें पायी जाने वाली विभिन्नता का संरक्षण भी आवश्यक है। भारत सरकार द्वारा इसके महत्व को ध्यान में रखते हुए कुछ समय पूर्व राष्ट्रीय मत्स्य आनुवंशिक संसाधन ब्यूरो की स्थापना का अनुमोदन किया गया। भारतीय कृषि अनुसंधान परिषद् के अन्तर्गत ब्यूरो ने पिछले कुछ वर्षों से अपना कार्य भी आरम्भ कर दिया है।

उद्देश्य :

- राष्ट्र के समस्त मत्स्य आनुवंशिक संसाधनों के विषय में समग्र सूचनाओं तथा ज्ञान का एकत्रीकरण एवं वर्गीकरण (कैटलागिंग)
- मत्स्य आनुवंशिक संसाधनों का संरक्षण
- भारतीय जल संसाधनों के लिए उपयुक्त विदेशी मत्स्य प्रजातियों का चयन एवं अनुमोदन।
- लुप्तप्राय (एन्डेन्जर्ड) प्रजातियों का संरक्षण।

संगठन :

ब्यूरो का मुख्यालय इस समय इलाहाबाद में स्थित है। कार्य के सुचारु रूप से क्रियान्वयन हेतु ब्यूरो के संगठनात्मक ढांचे में निम्नलिखित चार केन्द्रों का प्रस्ताव है।

(१) मृदु जलीय संसाधन केन्द्र
(२) शीत जलीय संसाधन केन्द्र
(३) क्षार जलीय संसाधन केन्द्र
(५) समुद्र जलीय संसाधन केन्द्र

उपरोक्त चारों केन्द्रों पर सम्बंधित मत्स्य प्रजातियों के संरक्षण एवं शोध कार्य होंगे। इसके अतिरिक्त मुख्यालय पर स्थित निम्न चार सम्भाग (सेक्शन) संरक्षण एवं शोध क्षेत्र में कार्यरत हैं।

(१) कोशिकानुवंशिकी
(२) जीव रसायन आनुवंशिकी
(३) जीव विज्ञान
(४) संरक्षण एवं प्रबन्ध

प्रमुख उपलब्धियां :

एफ०बी०-१.भारत के मत्स्य आनुवंशिक संसाधनों का कैटलाग तैयार करना :

इस अध्ययन का मुख्य उद्देश्य भारतवर्ष के समस्त मत्स्य आनुवंशिक संसाधनों सम्बधी सूचना एव ज्ञान को एकत्र करके कैटलाग तैयार करना है। यद्यपि विभिन्न टेक्सोनामिस्ट गण ने विभिन्न इकोसिस्टम एवं जल स्रोतों की मछलियों का वर्गीकरण किया है तथापि किसी भी सूची में सभी मत्स्य प्रजातियों का वर्णन प्रर्याप्त नहीं है। इसके अतिरिक्त मानव जनित कारणों से प्रभावित लुप्तोन्मुख मत्स्य प्रजातियों की सूची एक अपरिहार्य आवश्यकता के रूप में देखी जा रही है। समस्त प्रभावित मत्स्य प्रजातियों के उपयुक्त संरक्षण हेतु समन्वित रणनीति (स्ट्रेटजी) बनाने हेतु कार्य चल रहा है।

१) भारत की मछलियों की सूची :

उपलब्ध सूचनाओं के आधार पर भारतीय परयुक्त मछलियों के आनुवंशिक संसाधनों की सूची तैंयार की गई जिसमें उनकी जाति का नाम, उनके वर्गीकरण के आधार पर स्थान, उनकी प्राकृतिक उपलब्धता का वर्णन है। निम्नवत विभिन्न वातावरण में रहने वाली २२०० परयुक्त मत्स्य प्रजातियों को समाहित किया गया।

वातावरण	मत्स्य प्रजातियों की संख्या	प्रतिशत
शीत जल	७३	३.३२
शुद्ध जल	५४४	२४.७३
खारा जल	१४३	६.५०
समुद्री जल	१४४०	६५.४५

कैटलाग :

समस्त भारतीय मछलियों का एक कैटलाग बनाया जा रहा है जिसमें ३०० मुख्य मछलियों के बारे में जैसे उनकी पहचान, वर्गीकरण, आवासीय वातावरण, उपलब्धता, जैवज्ञान, जीवन चक्र, मत्स्य पैदावार, अनुवांशिकी तथा संरक्षण की जानकारी को एकत्र कर कम्प्यूटरीकृत किया गया है। यह काम सफलतापूर्वक आगे बढ़ रहा है।

२) लुप्तप्राय, लुप्तोन्मुख एवं दुर्लभ मत्स्य जनक तत्वों को सूचीबद्ध करना :

कुछ मछलियों पर मानव जनित दबाव पड़ रहा है। प्रायः इन मत्स्य प्रजातियों की वर्तमान स्थिति के साथ उनके भूतकालीन आंकड़े भी उपलब्ध नहीं हैं फिर भी अन्य उपलब्ध साक्ष्यों, सूचनाओं एवं मछुआरों के व्यक्तिगत अनुभवों के आधार पर सूची बनाने का प्रयत्न किया गया। प्रारम्भिक सूची में करीब १०० प्रजातियों का वर्णन है।

३) डीप पूल्स पर अध्ययन :

संरक्षण के विभिन्न आयामों को ध्यान में रख कर नदियों में कुछ गहन तल (डीप पूल्स) की प्राकृतिक बनावट, उनमें पायी जाने वाली मत्स्य प्रजातियां तथा मत्स्य दोहन आदि सम्बन्धी अध्ययन किया गया। इस प्रकार दो गहन तल क्षेत्र (डीप पूल्स) का विस्तृत अध्ययन केन्द्रीय मत्स्य प्रग्रहण शोध संस्थान, बैरकपुर के इलाहाबाद स्थित नदीय प्रभाग के सहयोग से प्रगति पर है। इनमें से एक गंगा तथा दूसरा यमुना नदी में यहां से कुछ दूरी पर स्थित है।

करे जलाशय :

यह गहरा जलाशय गंगा नदी में जलधारा की विपरीत दिशा में इलाहाबाद से ७५ किलोमीटर की दूरी पर स्थित है। इसकी ल० १२५ मी०, चौ० १०० मी० एवं गहराई ८ मी० है। इस रिपोर्ट की अवधि में अनुमानित मत्स्य उत्पादन २.५ टन था। पूरे उत्पादन में कैट फिश ७० प्रतिशत, अन्य मछलियां २३.५ प्रतिशत और मेजर कार्प ६.५ प्रतिशत रही।

बक्सीमोरा :

यह जल क्षेत्र यमुना नदी में धारा की विपरीत दिशा में इलाहाबाद से १५ कि०मी० की दूरी पर है तथा इसकी ल० १५० मी० चौ० १०० मी० और गहराई १८ मी० है। अध्ययन की अवधि में कुल मत्स्य उत्पादन ७.८ टन रहा। उत्पादन में मुख्यतः कैटफिश जिसकी मात्रा ५९ प्रतिशत, अन्य मछलियां २८.२ प्रतिशत तथा मेजर कार्प १०.७ प्रतिशत थी। इस जल प्रग्रहण क्षेत्रों में मछुआरों द्वारा प्रायः फांसा जाल, खींचा जाल तथा वंशी और कांटे का प्रयोग किया गया।

एफ०बी०-२. ऊपरी जल क्षेत्रों में महाशेर का संरक्षण :

उत्तरी और पूर्वोत्तर क्षेत्रों में महाशेर की उपलब्धता की सूची :

उत्तरी और पूर्वोत्तर क्षेत्रों में उन नदियों एवं धाराओं की एक सूची बनाई गई जहां महाशेर के अस्तित्व को खतरा है। इसका उद्देश्य महाशेर का प्राकृतिक वातावरण में संरक्षण प्रदान करना है ।

महाशेर की उपलब्धता विभिन्न राज्यों में इस प्रकार है :

उत्तर प्रदेश :

काली, राम गंगा, कोसी, सरयू, पनार, गोमती, लदिया, धौली और अलकनंदा नदियों एवं धाराओं में मुख्यतः टार टार और टार प्यूटीटोरा जाति की महाशेर हैं।

हिमाचल प्रदेश :

रावी, व्यास, सतलज और चिनाव इन चार नदियों में टार टार और टार प्यूटीटोरा किस्म के महाशेर हैं।

पूर्वोत्तर क्षेत्र :

टार टार, टार प्यूटीटोरा, टार प्रोजेनियस, टार मोसाल और एक्रोसोकेलस हेक्सागोनोलेपिस प्रजाति के महाशेर पूर्वोत्तर क्षेत्र की मुख्य नदियों, बंकिम, मनाह, जिया वरोली, वारगांव, सुवुनासिरी, दिहांग, लोहित, वरली, दिहिंग, धनसिरी एवं वरक में पायी जाती हैं।

महाशेर के आंकड़े का एकत्रीकरण :

सर्वेक्षण के समय मत्स्य प्रग्रहण में लगे लोगों द्वारा सुना गया कि सन् ६० के दशक में उत्तर प्रदेश के पहाड़ी क्षेत्रों में ३० से ४० कि०ग्रा० तक महाशेर पाये जाते थे। अध्ययन के आंकड़ों के आधार पर अब प्रायः २ कि०ग्रा० तक ही मिल पाते हैं। व्यावसायिक स्तर पर प्रायः ०.२ कि०ग्रा० से ०.५ कि०ग्रा० की मछलियां मिल रही हैं। पूरे उत्तरी क्षेत्र में लधिया नदी के सर्वेक्षण परिणामों से महाशेर का उत्पादन बहुत कम हो गया है।

पूर्वोत्तर राज्यों में किये गये सर्वेक्षणों से एकत्र आंकड़ों का अध्ययन किया गया। मेघालय से प्राप्त सूचनाओं के आधार पर सन् ६० के आसपास २० से ३० कि०ग्रा० तक के महाशेर प्रग्रहण होते रहे हैं जो अब घटकर ५ कि०ग्रा० से १० कि०ग्रा० तक रह गया है।

कांटे द्वारा मत्स्य प्रग्रहण की पुरानी रिपोर्टों के अनुसार इस विधि द्वारा ४० के दशक में २० से ६० कि०ग्रा० वजन तक की मछलियां पकड़ी जाती थी जो अब प्रायः २ कि०ग्रा० तक ही पायी जाती है।

उत्तर और पूर्वोत्तर जल क्षेत्रों में महाशेर के उत्पादन में हो रही निरन्तर कमी के कारणों का अध्ययन किया गया। प्राप्त परिणामों के अनुसार कमी के प्रमुख कारण निम्नलिखित हैं :—

(१) डायनामाइट, (२) विष का प्रयोग, (३) वनों के विनाश से नदियों में उथलापन, (४) मत्स्य क्षेत्रों का अधिक दोहन, (५) महाशेर के बच्चों को अनायास मारना, (६) प्रजनन योग्य मछलियों को पकड़ना, और (७) प्रजनन क्षेत्रों का विनाश।

महाशेर की प्राकृतिक वातावरण में संरक्षण हेतु लधिया नदी को प्रयोग स्तर पर चुना गया है। यह काली नदी की सहायक नदी है। नैनीताल जिले से निकल कर पिथौरागढ़ क्षेत्र से होती हुई काली नदी में मिलती है। इसकी लम्बाई लगभग १०० किलोमीटर है।

सी०एम०-३.जीन बैंक हेतु मत्स्य शुक्राणु हिम परिरक्षण तकनीक का विकास :

हिम परिरक्षण तकनीकी क्षेत्र में अग्रिम जटिल प्रयोग एवं विकसित तकनीकी मानकीकरण से जीन बैंक की स्थापना में सहायता मिलेगी। इनसे संरक्षण के अतिरिक्त मछलियों की विभिन्न शंकर प्रजाति

प्रजनन परियोजनाओं के अध्ययन में भी सहायता मिलेगी। इस अवधि में लुप्तप्राय (इन्डेन्जर्ड) महाशेर और व्यावसायिक रूप से महत्वपूर्ण भारतीय मुख्य कार्प प्रजातियों पर प्रयोग किये गये।

महाशेर :

ब्यूरो द्वारा विकसित तकनीक में अल्पसुधार करके इन शुक्राणुओं को हिम परिरक्षित किया गया। टाटा इलेक्ट्रिकल कम्पनी के लोनावला स्थित मत्स्य फार्म से टार खुदरी के शुक्राणुओं को १९९० में संग्रहीत किया गया। एक वर्ष बाद सन् १९९१ में इसी फार्म पर हिमपरिरक्षित वीर्य की निषेचन योग्यता का परीक्षण किया। परीक्षण से जीवित जीरा उत्पादन में सफलता मिली। नियंत्रित उपचार (कंट्रोल ट्रीटमेंट) में सामान्य वीर्य प्रयोग किया गया, इसकी तुलना में अधिकतम अंडोद्गमन (हैचिंग) दर १३.६ प्रतिशत रही। प्रारम्भिक प्रयोगों से पता चला है कि १० प्रतिशत डी०एम०एस०ओ० की परिरक्षण क्षमता १० प्रतिशत ग्लिसराल से अच्छी है। परिणाम की यथार्थता परीक्षण हेतु ताजे वीर्य को १० प्रतिशत डीएमएसओ, ग्लीसराल और मीथेनाल की अलग-अलग मात्राओं में पुनः विभिन्न विधियों द्वारा हिमपरिरक्षण किया गया तथा इनकी निषेचन क्षमता ४८ घंटे बाद देखी गयी जिससे ज्ञात हुआ कि डीएमएसओ और मीथेनाल से परिरक्षित वीर्य की निषेचन क्षमता ग्लीसराल द्वारा परिरक्षित वीर्य की अपेक्षा अधिक है।

इसी तरह भीमताल के स्वर्णिम महाशेर टार प्यूटीटोरा के शुक्राणु इन तीनों हिम परिरक्षकों के साथ सितम्बर १९९१ में परिरक्षित किये गये। यह परिरक्षित शुक्राणु अलग-अलग महीनों में जीवित एवं निषेचन योग्य पाये गये। इनकी अनुवांशिक क्षमता १९९२ के प्रजनन काल में देखी जायेगी।

भारतीय मेजर कार्प :

उत्तर प्रदेश मत्स्य विभाग के मेजा फार्म एवं तेंदुआ फार्म से १९९० में एकत्र किये गये शीत परिरक्षित शुक्राणुओं पर निषेचन परीक्षण किये गये। परिणाम स्वरूप दोनों फार्मों के १० प्रतिशत डीएमएसओ परिरक्षित शुक्राणुओं की निषेचन क्षमता अधिक रही। इन प्रयोगों में अधिकतम अंडोद्गमन (हैचिंग) दर २४.८ प्रतिशत थी।

१९८९ में शीत परिरक्षित किये गये मत्स्य शुक्राणुओं से दो साल बाद १९९१ में जीरा उत्पादन किया गया। इन प्रयोगों से अण्डोद्गमन (हैचिंग) दर प्रायः १२ प्रतिशत से अधिक रही। विभिन्न हिमपरिरक्षित शुक्राणु संग्रहों पर ब्यूरो की प्रयोगशाला में अनेक प्रजनन सम्बन्धी प्रयोग किये गये। यद्यपि प्रयोगशाला में किये गये प्रयोगों में अण्डोद्गमन दर कम थी परन्तु इससे प्राकृतिक वातावरण में किये गये प्रयोगों से प्राप्त उपर्युक्त परिणामों की पुष्टि होती है। शुक्राणुओं एवं अण्डों की गुणवत्ता का प्रजनन प्रयोगों के विभिन्न परिणामों पर महत्वपूर्ण प्रभाव पड़ता है।

इस अवधि में मृगल और रोहू के ताजे शुक्राणुओं का संग्रह करके १० प्रतिशत डीएमएसओ मीथेनाल और ग्लिसराल हिमपरिरक्षकों के साथ परिरक्षित किया गया। रोहू के शुक्राणुओं के सीमित नमूनों के भौतिक एवं रासायनिक गुणों का परीक्षण किया गया।

स्केनिंग एवं ट्रांसमिसन इलेक्ट्रान सूक्ष्मदर्शी द्वारा रोहू, नैन, टार खुदरी और टार प्यूटीटोरा के समान्य शुक्राणुओं का भी अध्ययन किया गया।

सी०एम०-४.भारतीय मुख्य कार्प मछलियों के अण्डों एवं भ्रूण का हिम परिरक्षण :

रोहू के भ्रूणों पर हिम परिरक्षकों के प्रभाव के अध्ययन हेतु विस्तृत प्रयोग किये गये। भ्रूणों के टेल बड के रूपों की मीथेनाल, डीएमएसओ और इन दोनों के मिश्रण के विभिन्न सान्द्रता वाले घोल से ४५ एवं ६० मिनट तक उपचारित किया गया। हिमपरिरक्षकों के प्रति भ्रूण के प्रतिरोध मूल्यांकन हेतु उपचारित भ्रूणों से अण्डोद्गमन (हैचिंग) दर देखी गई।

सभी हिमपरिरक्षकों से उपचारित भ्रूणों को द्रव नत्रजन में हिमपरिरक्षित किया गया। हिमद्रवन (थाइंग) के बाद भ्रूण जीवित नहीं रहे। सम्भवतः श्रेणीवद्ध हिमपरिरक्षकों के उपचार एवं नियंत्रित हिमकरण एवं हिमद्रवन प्रयोगों से तकनीकी विकास में महत्वपूर्ण जानकारी मिल सकती है।

पीनियस मोनोडोन (झींगा मछली) के भ्रूणों पर हिमपरिरक्षण का प्रयोग :

इस अध्ययन के लिए टाइगर शिम्प के भ्रूण की दो अवस्थाओं वाइलैटरल और सीटे निर्माण को चुना गया। इन अवस्थाओं पर विभिन्न हिमपरिरक्षकों के प्रभाव का अध्ययन किया गया।

मीथेनाल तुलनात्मक रूप से अधिक उपयुक्त पाया गया और हैचिंग दर ६० से ७० प्रतिशत तक देखी गयी। फ्रीज (रैफ्रीजरेटर) में धीरे-धीरे भ्रूणों को विशेष विधि से ५१ डिग्री तक ठंडा करके द्रव नत्रजन वाष्प से ३-४ मिनट तक उपचारित किया गया। इस स्तर तक भ्रूणों का बहुत कम प्रतिशत ही जीवित रह सका। नियंत्रित दर पर शीतकरण और हिमद्रवन से जीवित भ्रूणों के प्रतिशत को बढ़ाया जा सकता है। अध्ययन प्रगति पर है तथा उपयुक्त उपकरणों को जुटाने का कार्य चल रहा है।

सी०एम०-५.विदेशी मत्स्य प्रजातियों की एर्कलिगी और निर्जीवाणुक (स्टेराइल) समुदाय उत्पादन की तकनीक का प्रमाणीकरण :

तिलापिया की ओरियोक्रोमिस मोसाम्बिकस तथा कामन कार्प की सिप्रिनस कार्पियों प्रजातियों पर सम्यक नर समुदाय उत्पादन सम्बंधी अध्ययन हेतु ब्यूरो की प्रयोगशाला में कई प्रयोग किये गये। तिलापिया पर किये गये अध्ययन से प्राप्त विभिन्न आंकड़ों के विश्लेषण से देखा गया कि २६ से २९ डिग्री सेंटीग्रेड तापक्रम पर ७ दिन के बच्चों को ६० दिन तक १७ मिथाइल टेस्टोस्टरोन ३५ मिग्रा प्रति किग्रा भोजन के मिश्रण को भर पेट देने पर उनमें नर उत्पादन शतप्रतिशत तक हो सकता है। पुनः इस प्रयोग को कामन कार्प प्रजाति के जीरे को १७ मिथाइल टेस्टोस्टरोन के ३००-४०० मिग्रा प्रति किग्रा भोजन के साथ भर पेट ६० दिन तक देकर देखा गया। बहुत ही कम संख्या में बच्चे जीवित रह पाये जिससे प्राप्त आंकड़ों की विवेचना से समुचित निष्कर्ष सम्भव नहीं हो सका।

सी०जी०-६. प्रकृति में पाये जाने वाले लुप्तप्राय (इन्डेन्जर्ड) भारतीय मुख्य कार्प एवं वायुश्वासी मत्स्य प्रजाति समुदायों में कोशिकानुवांशिकीय विभेद सम्बन्धी अध्ययन :

प्रकृति में पायी जाने वाली कुछ मत्स्य प्रजाति समुदायों में कोशिकानुवांशिकीय विभेद :

प्रकृति प्रदत्त विभिन्न मत्स्य प्रजातियों और अनुवांशिकीय विभेद का संरक्षण की दृष्टि से बहुत महत्व है।

ब्यूरो ने कोशिकानुवांशिकीय विभेद अध्ययन हेतु कतला कतला, नैन, लेबियो कालवासु, एनेबस टेस्ट्यूडिनियस, टार प्यूटीटोरा और साइजोथोरेक्स रिचर्डसोनी प्रजातियों को चुना। मत्स्य प्रजाति कतला कतला और लेबियो कालवासु प्रयोग के लिए इलाहाबाद से तथा एनेबस टेस्ट्यूडिनियस पश्चिमी बंगाल के बैरकपुर से एकत्र किया गया। इस अध्ययन में विकसित तकनीक द्वारा माइटोटिक सूचांक को बढ़ाया गया।

एनओआर बैंड की स्थिति जानने हेतु होवेल और ब्लैक (१९८५) द्वारा विकसित तकनीक में और सुधार किया गया।

परिणामों के आधार पर कतला कतला और लेबियो कालवासु में गुणसूत्र की द्विगुणित डिप्लायड संख्या ५० तथा एनेबस टेस्ट्यूडिनियस में ४६ रही। कतला के ४ गुणसूत्रों (एक सबमेटासेन्ट्रिक तथा एक सब टीलोसेन्ट्रिक जोड़े) के छोटी गुणसूत्र भुजा के सिरे पर एनओआर की स्थिति देखी गई। कालवासु

और टेस्ट्यूडिनियस प्रजाति में भी एनओआर की स्थिति गुणसूत्र सब मेटासेंट्रिक जोड़े की छोटी भुजा के सिरे पर पायी गयी।

अब तक के अध्ययनों से कतला के अतिरिक्त सभी साइप्रिनिड प्रजाति में एन०ओ०आर० एक ही गुणसूत्र जोड़े पर देखा गया। सम्भवतः यह अन्तर वर्गीकृत या अनुवांशिकीय हो सकता है।

टोर प्यूटीटोरा और साइजोथोरेक्स रिचर्डसोनी प्रजातियों के कैरियोटाइप द्विगुणित (डिप्लायड) संख्या ज्ञात करने के लिए प्रारंभिक अध्ययन किये गये। इन प्रजातियों के साथ कुछ लुप्तोन्मुख (थ्रीटेन्ड) प्रजातियों में गुणसूत्रों पर एनओआर की स्थिति जानने हेतु विस्तृत अध्ययन चल रहा है।

बी०जी०-७.मुख्य कार्प एवं अन्य मछलियों में तुलनात्मक जैव रासायनिक अनुवांशिकीय अध्ययन :

प्रकृति में पायी जाने वाली मत्स्य समुदायों की विभिन्न प्रजातियों में तथा प्रजाति के भीतर अनुवांशिकीय विभेद निर्धारण हेतु जैव रासायनिक अनुवांशिकीय अध्ययन किये गये। जैव रासायनिक अनुवांशिकीय प्रयोग की फल-ग्राह्यता (क्षमता) बढ़ाने के लिए अधिक जीनस्थली (लोसाई) का परीक्षण किया गया। १४ अतिरिक्त इन्जाइम तथा ७ अतिरिक्त ऊतक (टिसू) जैसे स्प्लीन, गुर्दा, आँख, हृदय, गलफड़, मस्तिष्क और रक्त में अतिरिक्त लोसाई की उपस्थिति देखी गयी। पी०जी०ई०एच० इन्जाइम के अतिरिक्त सभी इन्जाइमों में विभिन्न मात्रा में ऊतक विशिष्ट अन्तर देखा गया। अब तक २५ इन्जाइमों पर अध्ययन किये गये।

मुख्य कार्प :

कतला और रोहू में एसडीएस-पीएजीई वैद्युतकरणं संचलन (इलेक्ट्रोफोरेसिस) विधि द्वारा अध्ययन से स्पष्ट अन्तर देखा गया और बैन्ड की संख्या पहले की अपेक्षा अधिक रही। प्रोटीन बैन्ड १४,४०० से ९४,००० डाल्टन के बीच पाये गये।

एसडीएस-पीएजीई विधि से सूक्ष्म अन्तर देखा गया। समविद्युत विभव केन्द्रीकरण (आइसोइलेक्ट्रिक फोकसिंग) विधि (आईईएफ) द्वारा किये गये प्रयोगों के आधार पर आंख लेंस प्रोटीन, मसिल्स प्रोटीन की अपेक्षा अधिक उपयुक्त पाये गये। आंख लेंस प्रटीन के द्वारा अध्ययन से बैंड की गति, सघनता और मोटाई में तुलनात्मक रूप से प्रजाति विशिष्ट अधिक अन्तर देखा गया। कतला, रोहू और मृगल पर आंख के लैंस प्रोटीन पर आईएफ विधि अध्ययन द्वारा अन्तर देखा गया।

राप्ती नदी से संग्रहीत रोहू मछली की बहुलता (पौलीमार्फिज्म) अध्ययन २२ इन्जाइम सिस्टम, आईएफ विधि द्वारा किया गया। वैद्युतकरण संचलनता (इलेक्ट्रोफोरेटिक) विभेद ९ इन्जाइम सिस्टम और आंख के लेंस की आईएफ विधि के अन्तर्गत देखा गया। यह अध्ययन प्रगति पर है।

वायु-श्वासी मछलियां :

मांगुर और सिंघी मछलियों के अध्ययन में पहले विकसित जैव रासायनिक अनुवांशिक चिन्हों के अतिरिक्त चार अन्य इन्जाइमसिस्टम आईडीएचपी, एसओडी, जी३पीडीएच और एक्सडीएच में भी प्रजाति विशिष्ट अन्तर पाये गये। शोध कार्य प्रगति पर है।

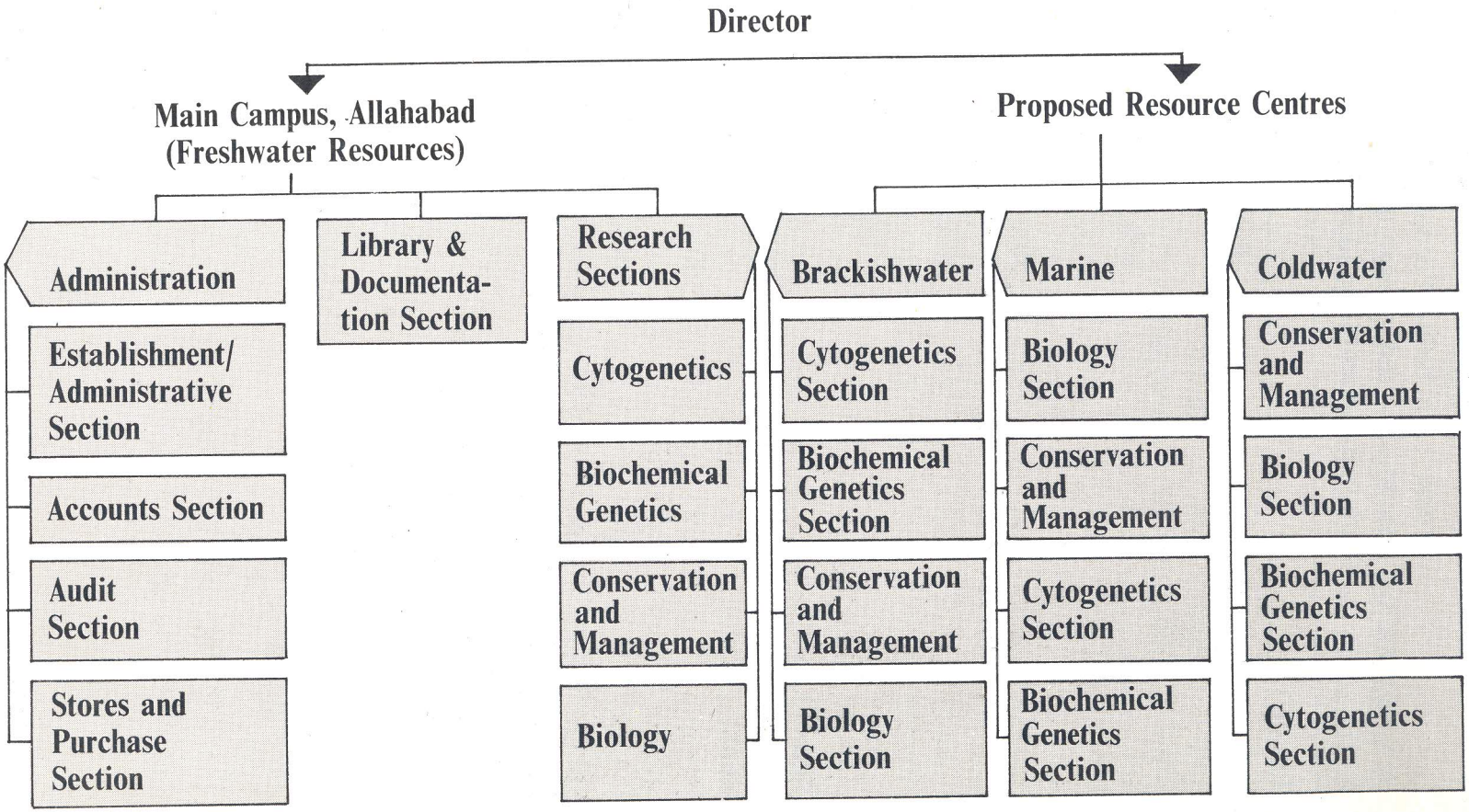
Appendix—I

Statement showing the total number of employees and member of the Scheduled Castes and Scheduled Tribes amongst them as on 31.3.91.

Group/Class	Total No. of Employees	Scheduled Castes	Percentage of S.C.	Scheduled Tribes	Percentage of S.T.
Group 'A' (Class-I)					
1. Director	1	—	—	—	—
2. Principal Scientist	2*	—	—	—	—
3. Senior Scientist	3	—	—	—	—
4. Scientist (Sr. Scale)	2	—	—	—	—
5. Scientist	2	—	—	—	—
6. Asstt. Farm Manager (T-6)	1	—	—	—	—
*One Scientist is on deputation to NEC, Shillong					
Group 'B' (Class-II)					
1. Asstt. Finance Accounts Officer	1	—	—	—	—
2. Technical Officer (T-5)	2	—	—	—	—
3. Superintendent	1	—	—	1	100%

Group/Class	Total No. of Employees	Scheduled Castes	Percentage of S.C.	Scheduled Tribes	Percentage of S.T.
Group 'C' (Class-III)					
1. Technical T-4	7	1	14.2	1	14.2
2. Technical T-II-3	1	—	—	—	—
3. Technical T-2	2	—	—	—	—
4. Technical T-1	5	2	40%	1	20%
5. Stanographer	1	—	—	—	—
6. Assistant	1	—	—	—	—
7. Sr. Clerk	2	1	50%	—	—
8. Jr. Clerk	3	1	33.3/	—	—
9. Driver	2	1	50%	—	—
Group 'D' (Class-IV)					
1. Fisherman	5	1	20%	1	20%
2. Lab. Attendant	3	—	—	—	—
3. Fieldman	2	1	50%	—	—
4. Messenger	1	—	—	—	—
5. Safaiwala	2	2	100%	—	—

Appendix-II Organisational Chart



The Research Sections would be elevated to Research Divisions when adequate number of scientists come in position during the VIII Plan period.

NORTHERN INDIA
PATRIKA
TUESDAY, APRIL 27, 1993 3

HINDUSTAN TIMES DELHI

Fish gene bank at Allahabad

ALLAHABAD, Nov. 2 (UNI).

The national bureau of fish genetic resources here has successfully established a "fish gene bank". Bureau Director P. Das said that apart from some common fishes, it had been able to establish the gene bank of some endangered species of the fishes.

The breakthrough has been achieved through "cryo preservation technique" of fish sperm. The technique preserves sperms under very low temperature and the genetic material could be kept for a long time for multiplication in future, said the director.

The common fishes like "rohu", "common carp" and some of the endangered species like "[illegible]" "golden mah[illegible]"

STATE BRIEFS

NBFGR scientists bag gold medal

ALLAHABAD, April 26: An outstanding research conducted by a team of scientists of the National Bureau of Fish Genetic Resources, Allahabad under the overall guidance and supervision of Dr. P. Das, Director, and direct leadership of Dr. A.G. Ponniah, Senior Scientist bagged the Dr. V.G. Jhingran Memorial Gold Medal for 1992—93.

The medal was awarded by the Society of Nature Conservators, and was presented by the world renowned Geneticist cum Biotechnologist Prof. V.L. Chopra, Director General, Indian Council of Agricultural Research and Secretary to the Government of India at a function of the National Institute of Animal Genetics at [illegible] on April 22.

in the country developed and standardised the technique for long term cryoprevation of fish milt containing sperms. This would soon lead to country's first fish milt bank offering better scope for stock improvement through hybridization and conservation of endangered fish species.

More local news on P.6

दैनिक जागरण इलाहाबाद, २७ अप्रैल १९९३ (४)

मत्स्य आनुवंशिकी वैज्ञानिको को झिंगरन स्वर्ण पदक मिला

इलाहाबाद २६ अप्रैल। इलाहाबाद के राष्ट्रीय मत्स्य आनुवंशिक संसाधन ब्यूरो के निदेशक डा० पी० दास के निर्देशन एवं संस्थान के वरिष्ठ वैज्ञानिक डा० ए० जी० पौन्निया के नेतृत्व में कार्य करने वाले वैज्ञानिक दल को मत्स्य आनुवंशिकी क्षेत्र की दिशा में महत्वपूर्ण शोध कार्य के किये जाने के लिये वर्ष १९९२-९३ का डा० वी० जी० झिंगरन मेमोरियल स्वर्ण पदक प्रदान किया गया। यह पदक सोसाइटी आफ नेचर कन्जरवेटर्स की ओर से विश्व के विख्यात आनुवंशिकी एवं बायोटेक्नोलाजी [illegible] महानिदेशक भारतीय कृषि [illegible] भारत सरकार [illegible] वैज्ञानिक डा० ए० जी० पौन्निया के प्रतिरिक्त श्री पी० सी० मेहता डा० डब्लू० एस० लाक्डा, डा० गोपालकृष्णन, डा० एल० बी० सिंह, डा० पी० के० साहू, डा० ए० बरात, श्री आर० दयाल तथा महाराष्ट्र के पुर्णे में स्थित महाजेर मत्स्य बीज प्रक्षत्र, लानेवाला के श्री एस० डब्लू० आर्ले संम्मिलित है। देश में प्रथम बार नवलेयों के सुझावों के आधार अवांछ का हिम परिरक्षण तकनीक विकसित करने के लिये यह पदक प्रदान किया गया। इस संस्थान से भारतवर्ष में पहलीबार मत्स्य शुक्राणु बैंक की स्थापना होने जा रही है। इस योजना से विकसित हिम परिरक्षण के विशिष्ट कार्य से दूर-दूर स्थित गणित [illegible] प्रजाति समुदाय के संवर्धन [illegible] हो सकेगा।

Breakthrough in fish genetics

By Our Staff Reporter

ALLAHABAD, Nov. 8

THE National Bureau of Fish Genetic Resources (NBFGR) has developed new technique for long [illegible]servation of fish [illegible]sperm and up to the setting [illegible] gene bank in [illegible] term [illegible] conducted by [illegible]Jhingran Memorial Gold Medal for [illegible]

The milt of endangered 'Deccan' and Golden Mahseers have also been similarly cryopreserved. The success proves that the sperm would remain genetically viable for indefinite period thus enabling NBFGR to establish the gene bank during the VIII plan, particularly for the important and endangered species.

The scientists said that this research would permit conservation of gene pools.

This will also have tremendous [illegible]e in the genetic improvement [illegible]aculture stock by facilitat[illegible]ridisation, crossing of species which separated [illegible] times. Viable [illegible] all the [illegible] required [illegible] be generated by [illegible] a network of agricultu[illegible]sortia and giving a fillip [illegible] areas of economic activit[illegible]ke pisciculture (fisheries) [illegible]acquaculture in the Eighth [illegible] was delivering the inaugu[illegible]speech at a two-day national [illegible]inar on "Endangered fishes [illegible]India" which began here on [illegible]turday. The seminar has [illegible]en organised jointly by the [illegible]ational Bureau of Fish Gene[illegible]ics Resources (NBFGR), Allaha[illegible]bad and the Nature Conserva[illegible]tors (NATCON), Muzaffarnagar.

The Planning Commission had laid emphasis on developing agro consortia specially in the field of pisciculture and acquaculture because it had got the maximum potential of providing employment to the youth in rural areas, he added.

Mr Lenka said: "Fish has great economic value and the export target of fish for the year 1992-93 is more than Rs. 1,200 crore. In addition to six thousand kilo metres of coast line, we have 2.9 million hectare of reservoires and lakes, 28,000 kilo metres of rivers, over 1,12,000 kilo metres of canals and channels. Estuarised, brakish water comprise another 2.6 million hectare which makes the country's fisheries, the richest in the world" the minister said.

He said that it was a matter of great concern that several plants and animal species including fish were facing extinction. He added that land development, water pollution due to industrial, domestic and agricultural wastes, destruction of natural feeding and breeding sites due to construction of multipurpose river valley projects were responsible for this. " We are at a stage when even clean air is fast becoming a scarce commodity", Mr Lenka ing emphasis on conse natural genetic reso plants and animals.

Dr Buddy L Jensen of the endangered hatchery at Dexter, that stress should b maintaining the ecolo librium. He also req fishery scientists of t to implement the reco tions of the seminar i ly .

The director gere Indian Council of Ag Research (ICAR) and to the Government Department of Ag Research and Educa V.L. Chopra spoke genetic consequence endangered species that the country nee gene bank urgently.

The deputy direct (fisheries) ICAR Dehadarai in his address highlighted of factors responsib depleting fish popula

PATRIKA ALLAHABAD.

Pearls cultivated in Naini ponds

Patrika News Service

ALLAHABAD, April 8 : Mr. Ajay Kumar, a young entrepreneur from Allahabad has succeeded in mass "Pearl culture" in freshwater ponds in Naini.

Talking to newsmen here today Mr Kumar observed that he derived inspiration for his work from UGC programmes on television and had received active support from scientists of National Bureau of Fish Genetic Resources, Allahabad. out one and a half years ago Naini he had cultivated is in fresh water ponds and effort was intensified after ceived training at the d Institute of Fresh lture, Bhu[illegible]

Mr. Kumar who is a graduate said that a natural pearl was formed when a foreign body such as sand or parasite accidently lodged itself into the soft tissue of the pearl oyster. The oyster protected itself by secreting nacreous substance that deposited on the foreign body in thin microlayers thus forming a pearl. For production of a artificial pearl, a piece of mantle from another mussel (a foreign body) and a nucleus was introduced in the body through a skillfull operation and the pearl formed round it naturally. Dr. P. Das, National B[illegible]

THE PIONEER
ON SUNDAY
Lucknow
April 26, 1
Pages 12+

Seminar on endangered fis

Staff Reporter

Allahabad

ot ER of State for Agricul- Lenka said that by the 20th century over 10 itional job opportuni- be generated by