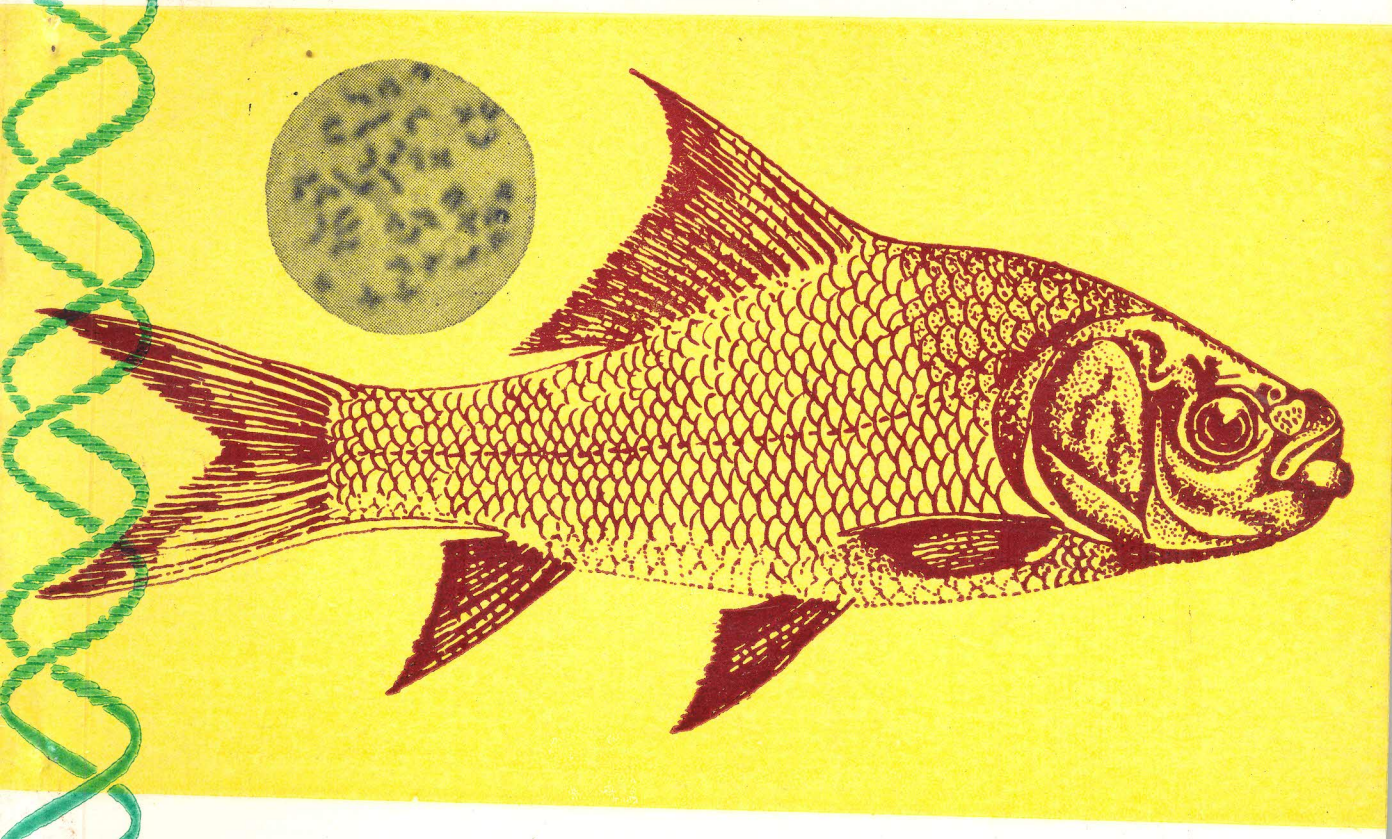
ANNUAL REPORT 1987-88



National Bureau of Fish Genetic Resources, Allahabad

ICAR
भाकृअप

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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 recognized that enhancement of fish production alone is not enough and conservation of the diversity of the natural fish populations is a necessary prerequisites. Appreciating this, the Govt. of India approved establishment of the Bureau during the sixth five year plan.

The National Bureau of Fish Genetic Resources was then sanctioned in December, 1983 under the Indian Council of Agricultural Research with its main centre at Allahabad in U.P.

1.2. MANDATE

The mandate of the Bureau includes collection, classification and evaluation of information on fish genetic resources of the country, cataloguing of genotypes, maintenance and preservation of fish genetic materials, introduction of exotic species in Indian waters and conservation of endangered species.

1.3. ORGANISATION

The organisational set up of the Bureau was structured for meeting the above objectives. Four centres have been approved in order to take up work on different resources. These are (i) Freshwater resource centre, located at the headquarters of

the Bureau at Allahabad, works on freshwater fisheries resources (ii) Brackishwater Resource centre will be located at the headquarters of the new Institute, Central Institute of Brackishwater Aquaculture, and will work on brackishwater fisheries resources. (iii) Marine Resource centre will work on marine fisheries resources and will be located at the Central Marine Fisheries Research Institute at Cochin. (iv) Coldwater Resource centre will work on coldwater fisheries resources and will be located at the headquarters of the new organisation, National Research Centre for Coldwater Fisheries.

The following subject matter Divisions are going to be set up at the headquarters of the Bureau at Allahabad.

(i) Division of Fish Cytogenetics

(ii) Division of Fish Biochemical Genetics

(iii) Division of Fish Biology

(iv) Division of Fish Quantitative Genetics

Staff Position During The Period Under Report

Sl. No.	Category of posts	Posts sanctioned (No.)	Posts creadte (No.)	Staff in position	Posts vacant
1	2	3	4	5	6
1.	Scientific	27	16	5	11
2.	Technical	35	18	2	16
3.	Administrative	15	9	8	1
4.	Auxiliary	2	1	1	—
5.	Supporting	29	13	6	7
	TOTAL	108	57	22	35

2. RESEARCH ACHIEVEMENTS

2.1. PROJECT GS. 1

Survey for identification and genetic evaluation of fish resources of the Ganga System and preparation of an annotated catalogue of genotypes.

There is an obvious lack of knowledge on the genetic differentiation within most of the naturally occurring species and the quantitative estimates of the magnitude and relative importance at various levels of organization *viz.*, between and within rivers, between lakes, within drainages, and between ecological and taxonomic forms. This is a shortcoming from the point of view of conservation of resources and efficient utilisation of existing variations. The studies on population structure of species of socioeconomic significance will help in effective management and conservation of the resources.

Survey of fish genotypes of Ganga river system and genetic information through cytogenetic and biochemical genetic studies of some important species were undertaken as below during the year under report.

2.1.1. Survey of fish genotypes of Ganga system

2.1.1.1 Survey for identification and genetic evaluation of fish resources of the Ganga system and preparation of an annotated catalogue of the genotypes is one of the essential aspects. A begining in this direction had already been made in the previous year by surveying the fin fish resources around Allahabad in the Ganga river system. 85 species of fin fishes falling under 21 families had been listed. The shell fish resources around Allahabad was surveyed during the period under report which are as below.

SHELL FISH

Hipplolytidae

Macrobrachium choprai
M. lamarrei

2.1.1.2. Fish faunistic survey in Varanasi provides a list of fishes similar to that of Allahabad. Though the availability of species were observed to be similar, the quantity of landing varied considerably. A list of fish fauna around Varanasi is as under.

Anabantidae

Colisa fasciatus
C. chuna
Anabas testudineus

Bagridae

Rita rita
Mystus seenghala
M. aor
M. vittatus
M. cavasius
M. bleekeri

Belonidae

Xenentodon cancila

Centropomidae

Chanda ranga
C. nama

Channidae

Channa punctatus
C striatus
C gachua
C. marulius

Clariidae

Clarias batrachus

Clupeidae

Gadusia chapra
G. godanahiai
Ilisha motius
Hilsa ilisha
Goniolosa manmina

Cobitidae

Lepidocephalichthys guntea
Botia dayi
B. dario
Nemacheilus botia

Cyprinidae

Labeo rohita
L, calbasu
L. pangusia
L. gonius
L. bata
Puntius chola
P. sophore
P. sarana
P. conchonius
P. ticto
Tor tor
Oxygaster gora
O. bacaila
Osteobrama cotio
Garra gotyla
Cirrhinus reba
C. mrigala
Amblypharyngodon mola

Rasbora elanga
R. daniconius
Catla catla
Barilius bendelensis
B. bola
B. barila
Aspidoparia morar
Danio devario
D. rerio
Chagunius chagunia
Esomus danricus
Chela laubuca
C. bacaila
Crossocheilus latia

Engrauilidae

Setipinna phasa

Gobiidae

Glossogobius giuris

Mastacembelidae

Mastacembelus pancalus
M. armatus
Macrognathus aculeatum

Mugilidae

Sicamugil cascasia
Rhinomugil corsula

Nandidae

Nandus nandus

Notopteridae

Notopterus notopterus
N. chitala

Saccobranchidae

Heteropneustes fossilis

Schilbeidae

Pangasius pangasius
Silonia silondia
Eutropiichthys murius
E. vacha
Ailia coila
Pseudotropius anthenonoides

Siluridae

Wallago attu
Ompok pabda
O. bimaculatus

Sisoridae

Gagata ceria
Nangra punctata
Bagarius bagarius
Sisor rabdophorus

Tetradontidae

Tetradon cutcutia

2.1.2. Collection of genetic information

The importance of various sources contributing to the total gene diversity within populations, between populations, within rivers, between lakes, within drainages and between ecological and taxonomic forms are being studied to serve as a nucleus

and as a basis for conservation efforts. The work in these directions includes cytogenetic and biochemical genetic studies, and investigations on biometrics.

2.1.2.1. Cytogenetic studies

The cytogenetic studies, to start with, included the chromosome number and their structures. Somatic chromosomes of eight economically important fishes belonging to six families were studied from the kidney cells during the period under report. The chromosome numbers (2n) varied between 32 and 58. The pattern of chromosomes were either metacentric, sub-metacentric, telocentric, acrocentric or their combinations. Figure 1 shows 52 nos (2n) of chromosomes of *Clarias Batrachus*. A summary of results of the studies is as below :

Results of cytogenetic investigations of some teleostean species commonly found in Allahabad region

Species	No. of chromosome (2n)	Metacentric	Submetacentric	Telocentric	Acrocentric
Cyprinidae					
Cirrhinus reba	50	6	8	14	22
Bagridae					
Rita rita	54	14	24	12	4
Mystus seenghala	50	30	—	16	4
Channidae					
Channa punctatus	32	18	12	—	2
C. striatus	40	18	2	—	20
Schilbeidae					
Eutropiichthys vacha	58	10	20	24	4
Anabantidae					
Anabas testudineus	46	4	—	—	42
Clupeidae					
Gudusia chapra	46	—	—	—	46

Out of three intra-specific populations of *Catla catla* of Rihand reservoir i.e. morphologically identifiable by short, long and medium pectorals, only two morphotypes with long and short pectorals could be collected for chromosomal analysis. The initial karyotypic studies did not indicate any difference. However, more detailed studies, as in progress, would lead to some indication about their status.

2.1.2.2. Biochemical genetic studies

Biochemical genetic studies, for the present, includes identification of genetically distinct populations with the help of biochemical markers. The study of electrophoretic pattern of an enzyne and other proteins, not only reveal the genetic variation and genetic relationship between 2 or more forms, but is also capable of revealing a large portion of allelic variation at a specific locus alongwith frequency of specific alleles in different populations. Esterases and LDH enzymes subjected to electrophoretic analysis provided some information on genetic characteristics of some local fishes.

More elaborate studies to decide on characters *viz.* taxonomic, production, cytological and biochemically polymorphic in nature would be taken up with ultimate aim of identifying such resources which have merits for utilization in fish culture systems.

During the year under report, collection of more genetic information through biochemical studies on some important species around Allahabad were continued. Out of the 85 species available locally, the following 11 species were studied.

CYPRINIDAE

Catla catla
Labeo rohita
L. calbasu
Cirrhinus mrigala
C. reba

BAGRIDAE

Mystus aor
M. seenghala

SCHILBEIDAE

Eutropiichthys vacha

SILURIDAE

Ompok pabo

CLUPEIDAE

Gadusia chapra

SACCOBRANCHIDAE

Heteropneustes fossilis

Polyacrilamide gel electrophoresis were carried out on the major carps like *Catla catla, Labeo rohita* and *Cirrhinus mrigala* of Ganga river system. Different tissues such as eye, muscle, kidney and liver were studied electrophoretically. Comparative studies show significant variations among the species. In Catla, the 2nd and 3rd loci show specific characteristics. The 3rd loci having a somewhat semi-U-shaped band engulfs the 2nd loci. In *Labeo rohita*, the bands showed the similar type of tetrameric pattern but the 3rd loci in muscular tissue is not prominent like catla. While in *C. mrigala* also the 2nd and 3rd loci are not prominent and show variations. Though the tetrameric patterns appears to be similar, their nolecular weight is different in specific tissues. The 3rd loci differentiations in muscular tissue may be due to the physical stronger compositions of catla species than rohu and mrigal. More scanning is in progress to establish more clear resolutions.

Different tissues of *C. reba* were tried for LDH isozymic pattern by polyacrilamide electrophoresis where 3-5 bands were resolved. The general isozymic pattern in the bands shows conformity with *C. mrigala*. The different mobility of loci exhibit some differences.

The study of the *H. fossilis* and *C. batrachus* show that these bear usual isozymic pattern. Most of the tissues contain more than one isozymes while the eyelens tissues show similar pattern of bands and the muscular tissues reveal different isozymic patterns. This shows the possible differences among the two species.

Labeo calbasu showed similar type of isozymic patterns as obtained in eyelens tissue of *Labeo rohita*. The liver and muscular tissues show variations. The isozymes exhibit different mobility in case of muscular tissue. Further study is in progress.

Different tissues of *Mystus aor* and M. *seenghala* were put into electrophoretic study to obtain LDH isozyme patterns. The eyelens and liver shows uniform pattern of loci & the skeletal muscle exhibit tetrameric patterns. The 2nd and 3rd loci are more prominent and need more resolutions to establish the relationship.

Gadusia chapra was taken as a test specimen of the family clupeidae. Polyacrilamide gel electrophoresis on eye and muscle tissues of this species

was carried out. Eyelens show uniform pattern of isozyme with other higher groups. Muscular tissues exhibit differences in the isozymic patterns.

Preliminary studies were also carried out to establish the genetical markers in *Eutropiichthys vacha* and *Ompok pabda*. Though different tissues were studied, yet further scanning is required.

2.2. Project GM 1 : GONADAL MANIPULATION-PRODUCTION OF MONOSEX TILAPIA.

Sex is genetically determined in fishes also. Yet, many fish are not clearly differentiated into either sex at hatching itself. If the spawn are fed exclusively with a diet containing sex steroids during the period of their gonad differentiation, they develop as male or female depending on the nature of the hormone used.

Oreochromis mossambicus, an exotic fish, is extensively cultured in India. Owing to its unrestricted prolific breeding habit, their population increases very rapidly. Their omnivorous feeding habits increases struggle for food. The competition for food & space in the pond results in stunted growth of the fish. Monoculture of tilapia is an answer for such problems.

Hence, gonadal sex manipulation for artificial induction of permanent sex reversal or change of the sexual phenotype without changing the genotype was taken up by feeding male steroid (Methyltestosterone) resulting in 84% male production. MT was mixed in feed and fed daily right from the first day of their oral feeding. Such exclusive feeding for a period of 50 days was resorted. Experiments on feeding for longer periods are being pursued, 100% conversion, when achieved, would enable monoculture on commercial scale.

The technique, when perfected, would also be used in other exotic species like common carp to check its pond breeding when cultured under polyculture. It would also be used to convert exotic species for their experimental introduction in nature. The work, however, is in progress.

2.3. Project GS 2 : CATALOGUING OF ENDANGERED, THREATENED AND RARE FISH SPECIES OF INDIA.

Owing to various man induced and natural reasons there has been

decline in some fish fauna in some of the ecosystems. Collection of information regarding rare, threatened and endangered species, as per the mandate, was taken up as an important step. Preliminary list of such fishes had been compiled last year. Further studies in this direction including their status etc. which would help formulating management measures for such species.

The already prepared list of 4 endangered, 21 threatened and 20 rare species is being confirmed through further studies. This will be followed by formulation of management and conservation measures for such species.

Identification of various causative factors for decline of fisheries being a prerequisite, was taken up. The preliminary collection & compilation of information indicate that the important stresses are indiscriminate overfishing, water pollution, destruction of fish habitats by alteration of river systems, increased water obstraction & land development etc. More detailed information is being collected.

2.4. ANCILLARY STUDIES

2.4.1. Study of catla morphotypes of Rihand reservoir

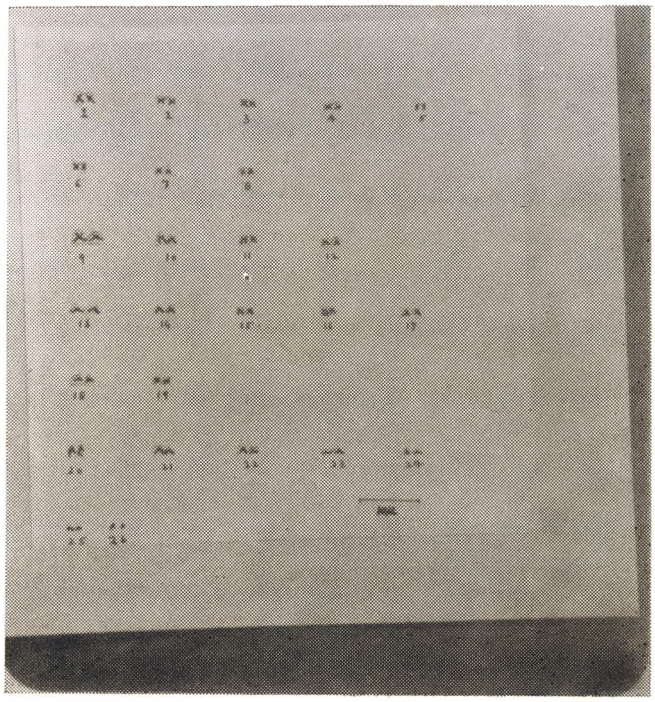
It is morphometrically established by Central Inland Capture Fisheries Research Institute that three types of catla with long, medium and short pectoral fins are available in Rihand reservoir. Some specimens of these morphotypes were collected for cytogenetic and biochemical genetic studies for establishing their genetic status.

Polyacrilamide gel electrophoresis on the eye, kidney, liver and muscular tissue were carried out on short and long pectoral types while the specimen of medium pectoral type was not available. Patterns of isozymes in other tissues except muscle have showed similarity. The mobility of the isozymes in muscular tissue in 2nd and 3rd loci exhibit very minor differences. Further scanning is in progress for ascertaining actual differences, if any.

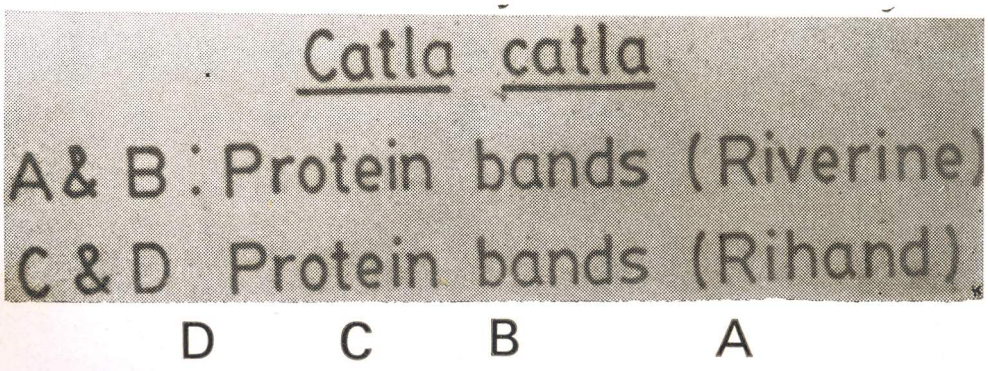
A comparative study on different tissues of Rihand catla with that of riverine (Ganga) catla were also carried out. Patterns of bands of muscular tissue show very minute variations which needs further studies. Figure-2 shows some protein band patterns of *Catla catla*.

2.4.2. Genetic studies of the tiger shrimp

Penaeus monodon, the brackishwater tiger shrimp, was taken up for



1. Karyotype of somatic metaphase plate of *Clarias batrachus* showing 52 nos. of chromosomes.



2. Comparative Electrophoretic protein band patterns of *Catla catla* from Ganga & Rihand reservoir.

cytogenetic and biochemical genetic studies. Polyacrilamide gel electrophoresis on eye and muscular tissues of male and female species were carried out. Some lsozymic patterns were obtained which needs further scanning. The karyotype of the species was also done. More elaborate studies are in progress.

2.4.3. Cryopreservation of gametes

The ability to freeze the fish gametes to store them for long periods without deterioration would be of considerable value in the genetic improvement of aquaculture. It would facilitate the crossing of strains or species which are geographically separated or spawn at different times and it would allow the self fertilization of segmential hermaphrodites.

It would permit preservation of gene pools for initiating gene banks, both for their intrinsic value and in order to monitor the progress of selection.

The work on cryopreservation of carp milt has recently been initiated. Figure-3 shows. Scientists collecting milt form male specimen. Different extender solutions are being tried for successful dilution of seminal fluid of carps.

3. COLLABORATION

NATIONAL :

1. Zoological Survey of India, Calcutta.
2. Central Inland Capture Fisheries Research Institute, Barrackpore, West Bengal.
3. Central Institute of Brackishwater Aquaculture, Madras, Tamil Nadu.
4. Central Marine Fisheries Research Institute, Cochin, Kerala.
5. Department of Zoology, University of Allahabad, Allahabad, U.P.
6. Department of Zoology, University of Calcutta, Calcutta, West Bengal.
7. National Academy of Sciences, Allahabad, U.P.

INTERNATIONAL :

1. Fish & Agriculture Research Station, Agriculture Research Organisation Door, Hof Hacarmal, Israil.
2. Institute of Aquaculture, Stirling, Scotland, U.K.
3. Ministry of Fisheries, Govt. of U.K. Lowestoft, England, U.K.
4. Savannah River Ecology Laboretory, Aiken, South Carolina, University of Georgia, U.S.A.
5. United States Department of Agriculture (Indo-US Subcommission on Agriculture.
6. University College of Swansea Swansea, Wales, U.K.
7. Department of Fish & Game, California, U.S.A.

4. MANPOWER DEVELOPMENT

1. Shri P. C. Mahanta, Scientist S-2 attended a Summer Institute on Modern Quantitative Techniques in fisheries Research from 14.7.87 to 25.7.87 at Central Institute of Fisheries Education, Bombay.

2. Dr. L. B. Singh, Scientist S-3 attended an Administrative Vigilance Training Course organised by the ICAR from 10 to 18 August 1987 at Indian Agricultural Research Institute, New Delhi.

5. TRANSFER OF TECHNOLOGY

5.1. ADVISORY SERVICE :

Technical advice on various aspects of aquaculture were rendered to fish farmers. The broad aspects included construction of pond, induced breeding, composite fish culture, magur farming, remedial measures for fish diseases, & control of algal bloom.

5.2. Fish Farmers Day

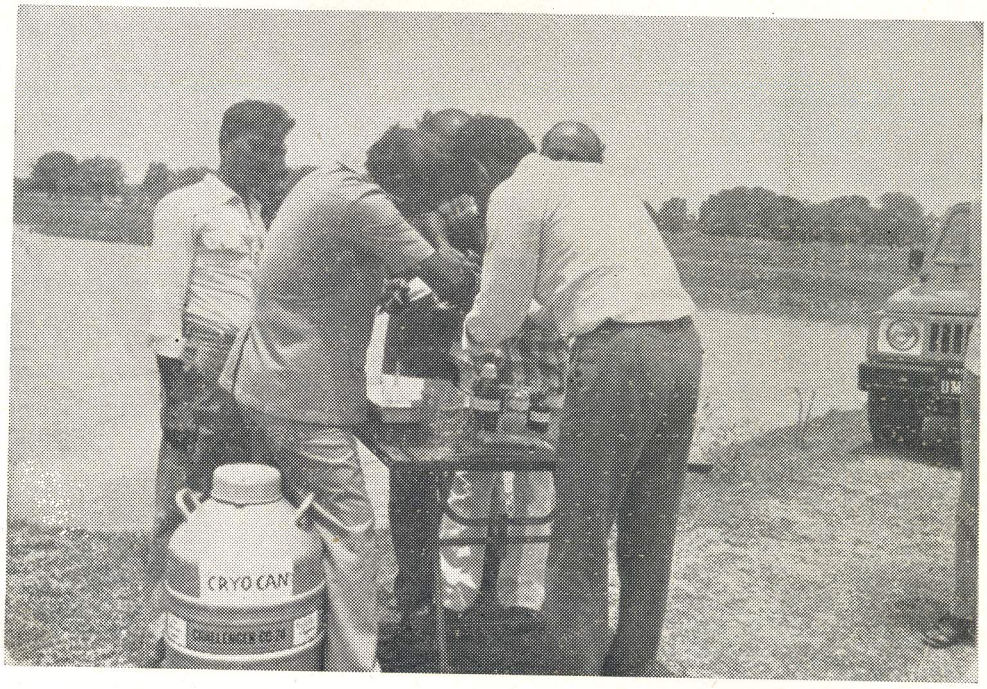
As a part of celebration of the National Science Day on 28th Feb. 1988, a Fish Farmers Day was organised at Dhannikapura in Saidabad block in the district of Allahabad, U.P. (Fig-4). The main theme of the show was to educate & motivate the farmers for adoption of composite fish culture. Over fifty farmers and a couple of Gram Pradhans were among the participants. Main attractions of the Day were film show on Induced Breeding and Composite Fish Culture and the Kisan Gosti. Lectures on economic attractions of scientific fish culture, induced breeding, polyculture, magur culture etc. were delivered by Dr. P. Das, Dr. L. B. Singh, Dr. M. Sinha, S/Shri P. C. Mahanta & D. Kapoor. These were followed by discussion on farmers problems with offering of solutions.

5.3. Demonstration & training/ talks

(i) Dr. Pillai S-2 and Dr. Lakshmi Narayan, S-2 of Puri & Cochin centres respectively of Central Institute of Brackishwater Aquaculture were trained at the Bureau on methodologies of Biochemical and Cytogenetic studies.

(ii) Dr. Rehana Abidi, Scientist S-1 of Central Institute of Fisheries Education, Bombay also received a short training on Biochemical and Cytogenetic studies at the Bureau.

(iii) A group of final year B. F. Sc. students of the Fisheries College, Mangalore was on tour to this Bureau on 17.3.1988. The



3. Scientists busy in collecting carp milt for cryopreservation trial.

4. Scientists with Gram Pradhans and Fish Farmers in a 'Fish Farmers Day'.

students were taken round the laboratories and demonstrated the ongoing research work. Lectures were delivered by Dr. L.B. Singh, Dr. M. Sinha, S/Shri D. Kapoor & P.C. Mahanta on different aspects of fish genetics including resource conservation.

(iv) The final year D.F.Sc. trainees of the Central Institute of Fisheries Education, Bombay were on tour during which they were taken round the laboratories. Talk on application of genetics in aquaculture was delivered by Dr. P. Das.

6. LIBRARY AND DOCUMENTATION SERVICE

The library, an integral part of a research organisation, has been set up. Keeping in view the subject specialization and research projects of the Bureau, the library has procured 240 books, subscribed 13 foreign & 19 Indian Journals, received 10 foreign & 19 Indian Journals either on exchange basis or on gratis. Also procured 175 nos of useful symposia proceedings, abstracts, bulletins, souvenirs, special publications, annual reports, brochures, pamphlets, maps, reprints etc. during the period.

6.1. Exchange Services.

Exchange relationship with leading national and international Institutes/Organisations for enriching the library collection and information flow have been established. NBFGR publications have been sent to 200 mailing list parties during the year under report.

6.2. Reprography Services.

It maintains the reprography services by supplying photocopies of research papers to the Scientists as well as to the research workers of other Institutes & Universities.

6.3. Technical Queries & Reports.

About 50 technical & non technical queries from different organisations, individuals of India and abroad were attended to.

In addition, 17 reports on progress of research were compiled and sent to ICAR. 10 research papers of the scientists were communicated to different Symposia/Seminars and journals during the year.

6.4. General Publications.

The following publications have been released during the year under report :

1. Annual Report, 1986.
2. Status report for the Meeting of the Committee of Directions on 17th March, 1988.
3. Progress and Achievements.
4. Research Project Programmes, 1988-89.

7. CONFERENCES, SYMPOSIA, SEMINARS, MEETINGS ETC.

7.1. PARTICIPATION

Following Scientists participated at the seminar/symposia organised by different agencies, as mentioned against their names and presented their research findings in the form of papers.

Conferences/Symposia/ Seminars	Organised by	Papers presented	Participant
Symposium on the "Impact of current land use pattern and water resources development on riverine fisheries", held during 25-27 April, 1987.	Central Inland Capture Fisheries Research Institute, Barrackpore.	Fish germplasm conservation and genetic stock improvement - P. Das, P.C. Mahanta & D. Kapoor.	Dr. P. Das
National Symposium on Research and Development in Marine Fisheries, Mandapam Camp, 16-18 September, 1987.	Central Marine Fisheries Research Institute, Cochin.	Marine fish genetic resource conservation - P. Das, P. C. Mahanta & D. Kapoor.	—

National Workshop on Science and Technology for Rural Development, held during 2-4th November 1987.	Organised by National Association for waste land and rural development, New Delhi.	Airbreathing fish culture for rural ponds - P. Das.	—
All India Seminar on Ichthyology, Department of Zoology, held during November, 20-22, 1987.	Department of Zoology, Visva-Bharati University Santiniketan.	Genetic Engineering - a sophisticated tool for fish stock improvement - P. Das, L. B. Singh, D. Kapoor, P. C. Mahanta, M.K. Mukhopadhyaya & K. M. Das.	Dr. P. Das
First Indian Fisheries Forum, held during 4-8 December, 1987.	Asian Fisheries Society, Indian Branch, College of Fisheries, University of Agricultural Sciences, Mangalore.	Some variables contributing to the adoption of composite fish culture innovations - P. Das, U. Bhaumik, P. K. Pandit, B. Roy, B. K. Banerjee and S. K. Mondal.	Dr. P. Das
National Symposium on the Utilization of Living Resources of the Indian Seas, held during 19-21 December, 1987.	National Academy of Sciences, India, Allahabad & Central Institute of Fisheries Education, Bombay.	Transfer of fisheries technologies and their related constraints, - P. Das.	—
Symposium on Tropical Marine Living Resources, held during 12-16 January, 1988.	The Marine Biological Association of India, Ernakulam, Cochin.	Genetic variability and conservation of fish resources - P. Das, L. B. Singh, D. Kapoor, & P. C. Mahanta.	Dr. P. Das

8. VISITORS

The Hon'ble Minister of State (Agricultural Research and Education) visited the Bureau on 24th March, 1988. Dr. P. Das, Project Director initially appraised him of the history of the new organisation, mandate, major activities, research achievements *vis a vis* the facilities presently available and future research plan and perspectives. He then visited the laboratories (Fig. 5-8), saw the ongoing research work and discussed with the scientists on various important research projects.

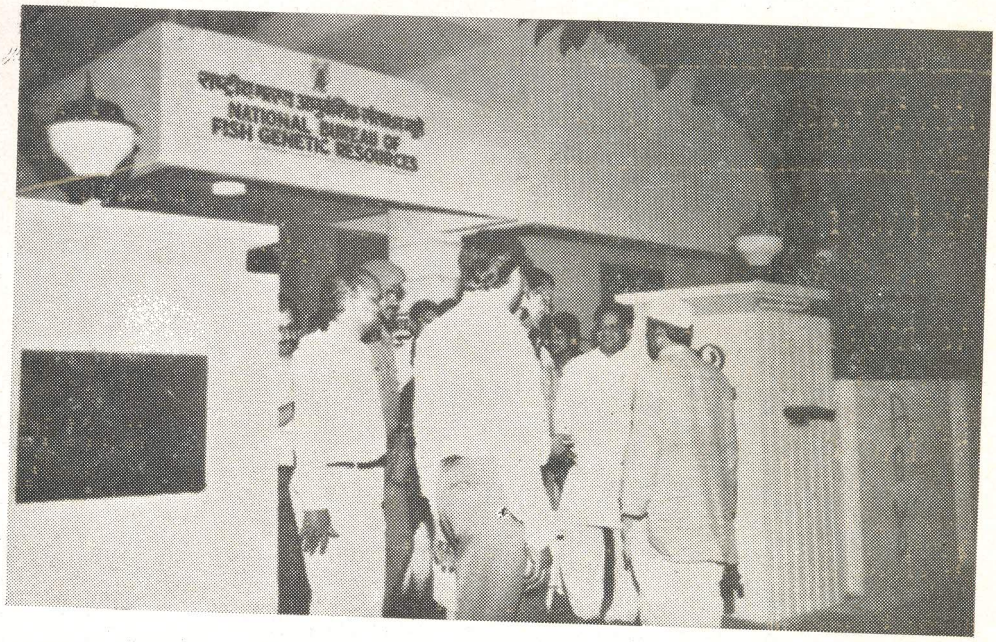
Eminent visitors of the year under report, as below, were taken round the laboratories, explained the ongoing research work and appraised of the salient achievements.

Sl. No.	Name & designation	Address	Date of visit
1.	Shri G. N. Saha Sr. Scientist (Soil Chemistry)	Central Inland Capture Fisheries Research Institute, Barrackpore	20.01.1987
2.	Dr. C. Saha Sr. Scientist (Aquaculture Engineering)	do	do
3.	Dr. S. K. De Reader	Deptt. of Chemistry, University of Allahabad	do
4.	Shri B. S. Singh Manager	State Fisheries Development Corporation. Allahabad	do
5.	Shri S. N. Singh Dy. Director of Fisheries	State Fisheries Department Allahabad	do

Sl No.	Name & designation	Address	Date of visit
6.	Shri Anand Swarup Srivastava Chief Executive Officer	Fish Farmers Development Agency, Allahabad	do
7.	Dr. P. K. Talwar Dy. Director (Fish)	Zoological Survey of India, Calcutta	27.01.1987
8.	Shri Apurba Ghosh Senior Scientist	Central Inland Capture Fisheries Research Institute, Barrackpore	28.01 1987
9.	Dr. S. K. Mukhopadhayay Sr. Scientist	do	do
10.	Shri S. M. Banerjea Sr. Scientist (Retd.)	Central Inland Fisheries Research Institute, Barrackpore	03.02.1987
11.	Shri H. S. Bose Construction Engineer	State Electricity Board, Allahabad	03.02.1987
12.	Dr. U. C. Goswami Reader, Dept. of Zoology	Gauhati University, Gauhati	09.02.1987
13.	Dr. U. S. Srivastava General Secretary	National Academy of Sciences, Allahabad	13.02.1987
14.	Dr. P. V. Dehadrai Dy. Director General (Fy)	Indian Council of Agricultural Research, New Delhi	19.02.1987
15.	Dr. A. G. Jhingran Director	Central Inland Capture Fisheries Research Institute, Barrackpore	20.02.1987
16.	Dr. G. G. Hiremath Asstt. Prof.	College of Science, Mangalore	04.03.1987
17.	Dr. N. S. Sudhnaran Asstt. Professor	do	do

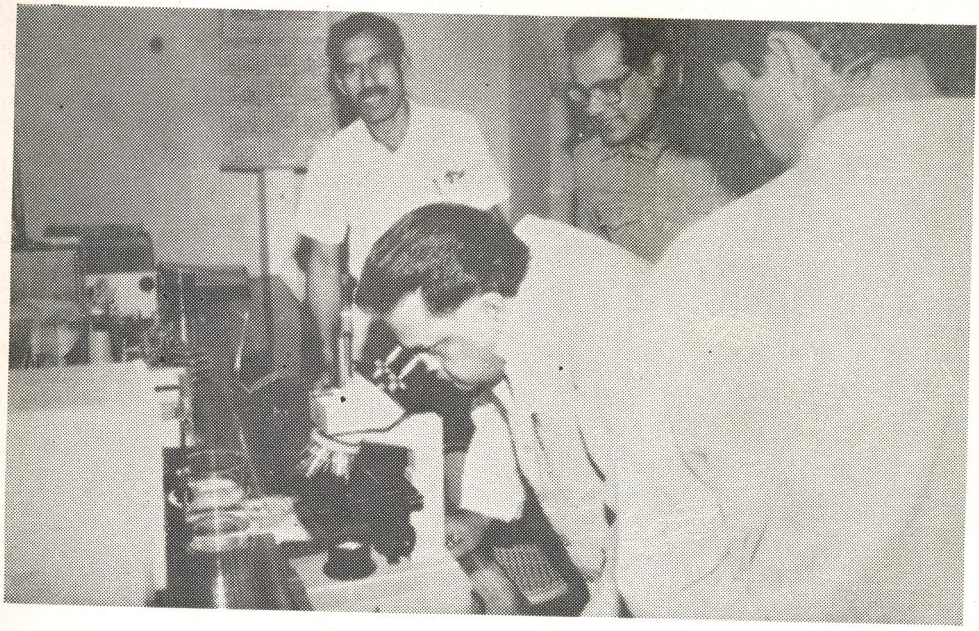
Sl. No.	Name & designation	Address	Date of visit
18.	Mr. A.M.H. Abidi Incharge Caspian Sea Project	Tehran, Iran	15.07.1987
19.	Mrs. P. Gaur	Zoology Dept., University of Allahabad, Allahabad	15.07.1987
20.	Dr. R. P. Kapil Director	Central Lac Research Institute, Ranchi	27.07.1987
21.	Dr. A. Alam Asstt. Director General	Indian Council of Agricultural Research, New Delhi	18.09.1987
22.	Dr. V. Subramanyam Dean	College of Agricultural Engineering, Coimbatore	18.09.1987
23.	Dr. R. K. Mukherjee Head	Indian Institute of Technology Khargpur	18.09.1987
24.	Shri A. S. Nagaraju Director	Film Division, New Delhi	07.11,1987
25.	Dr. Krishna Swaroop Head, Deptt. of Zoology	Gorakhpur University, Gorakhpur	01.12 1987
26.	Dr. M. Y. Kamal Asstt. Director General (Fy)	Indian Council of Agricultural Research, New Delhi	08.01.1988
27.	Shri B. G. Verghese	Centre for Policy Research, New Delhi	16.01.1988
28.	Dr. S. C. Pathak Manager (Technical)	National Bank for Agriculture & Rural Development, Bombay	25 01.1988

Sl No.	Name & designation	Address	Date of visit
29.	Shri S. K. Bhatnagar Development Officer (Tech.)	National Bank for Agriculture & Rural Development, Lucknow	25.01.1988
30.	Prof. D. K. Chowdhury Principal	Chinhet Centre of Central Institute of Fisheries Education, Lucknow	05.02.1988
31.	Dr. V. G. Jhingran Padmashree, Ex-Director, CIFRI	132, Indira Nagar Colony Dehradun, Uttar Pradesh	17.03 1988
32.	Dr. Sheshappa Professor	College of Fisheries Mangalore	17.03.1988
33.	Dr. A. G. K. Menon Scientist Emeritus	Zoological Survey of India Madras	17.03.1988
34.	Dr T. Sharma Professor	Deptt. of Zoology, B. H. U., Varanasi	17.03 1988

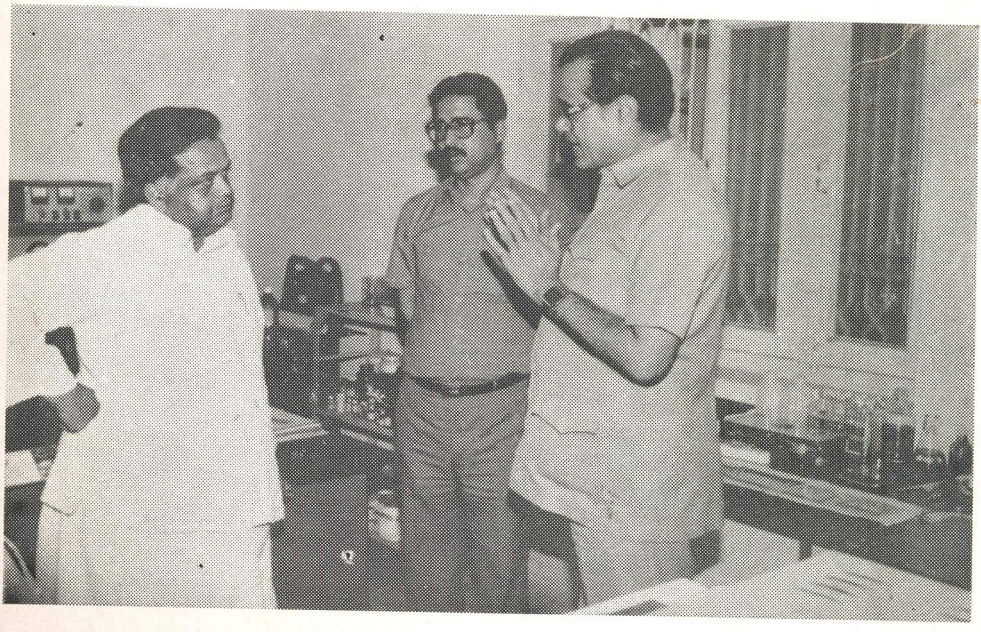


5. The Hon'ble Union Minister of State, Shri Hari Krishna Shastri (2nd from right) is being welcome by the Project Director, Scientists & other staff at the Bureau.

6. The Hon'ble Minister (left) is being appraised of scientific activities & achievements of the Bureau by Dr. P. Das, Project Director.



7. The Hon'ble Minister observing carp chromosomes under microscope in the Cytogenetics laboratory.



8. The Hon'ble MInister (left) in the Biochemical Genetics laboratory.

9. IMPORTANT MEETINGS

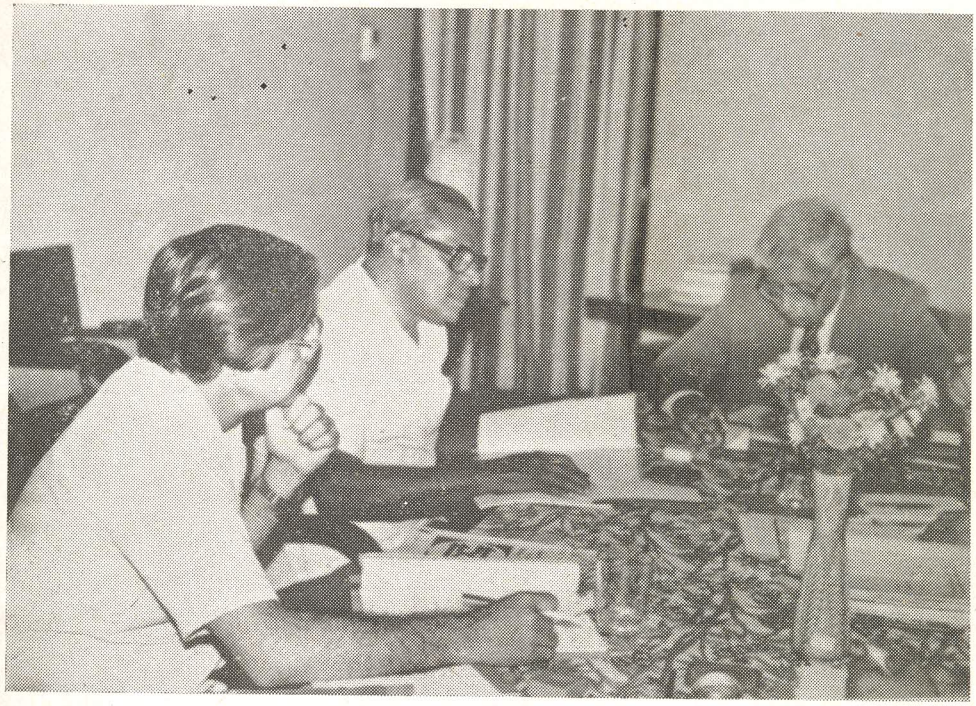
9.1 The Committee of Directions with Dr. V. G. Jhingran, Padmashree, as the Chairman and Dr. A. G. K. Menon, Emeritus Scientist, Dr. T. Sharma, Professor as members & Dr. P. Das, Project Director, members Secretary met at the Bureau on 17 March, 1988 (Fig. 9). The Committee expressed satisfaction on the research achievements and setting up of laboratories etc. It also suggested taking up of some work programmes which are being pursued.

10. FINANCE

Allocation of fund and expenditure incurred during the year 1987-88 are shown below.

	Allocation (Rs. in lakhs)	Expenditure (Rs. in lakhs)
Plan	22.00	10.77*
Non-Plan	3.75	3.74
Total	25.75	14.51

* Since the land for construction of the permanent infrastructure could not be finalised within March 1988, an amount of Rs. 11.23 lakhs remained as saving.



9. A view of the meeting of the Committee of Directions.

10. Investigation in progress regarding suitability of the Bureau's site for permanent infrastructure.

11. PUBLICATIONS

Research/Scientific Papers

1. Das, P., M. K. Mukhopadhyay, K. M. Das & P. K. Pandit (1987).

   Gonadal sex manipulation of *Oreochromis mossambicus* (Peters). *In* Selection, hybridization and genetic engineering in aquaculture, ed. by K. Tiews. Berlin, Heeneman, 1987, Vol II : 73-78.

2. Das, P., P. C. Mahanta & D. Kapoor (1987).

   Fish germplasm conservation and genetic stock improvement. (Abstract) *In* Symposium on the impact of current land use pattern and water resources development on riverine fisheries, held at CICFRI, Barrackpore, during April 25-27, 1987, p. 75.

3. Das, P., P. C. Mahanta & D. Kapoor (1987).

   Marine fish genetic resource conservation. (Abstract) *In* National Symposium on Research and Development in Marine Fisheries, Mandapam Camp., 16-18 September, 1987. p. 24 CMFRI Special Publication No. 40.

4. Das, P., L. B. Singh, D. Kapoor, P. C. Mahanta, M. K. Mukhopadhyay & K. M. Das (1987).

   Genetic engineering- a sophisticated tool for fish stock improvement. Abstracts, *In* VIIth All India Seminar on Ichthyology, Deptt. of Zoology, Visva-Bharati. November 20-22, 1987, p. 21

5. Das, P., U. Bhaumik, P. K. Pandit, B. Roy, B. K. Banerjee & S. K. Mondal (1987)

Some variables contributing to the adoption of composite fish culture innovations. (Abstracts) *In* First Indian Fisheries Forum held at the College of Fisheries, Mangalore, December 4-8, 1987, p. 337.

6. Das, P. (1987).

Transfer of fisheries technologies and their related constraints. (Abstract) *In* National Symposium on the Utilization of Living Resources of the Indian Seas, org. by National Academy of Sciences, India, Allahabad & Central Institute of Fisheries Education, Bombay, held during 19-21 December, 1987, p. 49.

7. Das, P. (1988).

Genetic variability and conservation of fish resources. (Abstract). *In* Symposium on Tropical Marine Living Resources, Cochin, India, 12-16 January, 1988, p. 99-100.

8. Singh, L. B. (1986).

Development of goat in desert of Rajasthan. *Indian J. Anim. Health. June* 1986 : 73-77.

9. Roy, R., B. U. Khan and L. B. Singh.

Effect of genetic non-genetic factors on growth in Jamunapari goats. Accepted for IV International Conference on Goats, March, 8-13, 1987 in Brazil.

10. Roy, R., B. U. Khan and L. B. Singh.

Factors affecting pre-weaning body weight in Barbari goats. Accepted in IV International Conference on Goats. March 8-13, 1987 in Brazil.

12. PERSONNEL

12.1. LIST OF PERSONNEL :

PROJECT DIRECTOR	Dr. P. Das
SCIENTISTS	Dr. L. B. Singh, S-3 Dr. M. Sinha, S-2 Shri D. Kapoor, S-2 Shri P. C. Mahanta, S-2
TECHNICIANS	Smt. Sukla Das, T-5 (Librarian) Shri A. K. Mishra, T-4 (Electrical Foreman)
ADMINISTRATIVE	Shri R. C. Srivastava, Assistant Accounts Officer
Superintendent	Shri A. Sah
Stenographer	Shri R. C. P. Sinha
Assistant	Shri K. P. Nath
Senior Clerk	Shri A. K. Srivastava

Junior Clerk	Shri Mohan Tiwari Smt. Chanda Tiwari Shri Navin Kumar
DRIVER	Shri Samarjit Singh
SUPPORTING GRADE-I	Shri Shree Ram Shri Madan Lal Shri Raj Bahadur Shri Ram Baran
SUPPORTING GRADE-III	Shri Swapan Debnath Shri Krishna Kr. Singh

12.2. APPOINTMENTS

Name	Designation	Place of Posting	Date of appointment
Shri K. P. Nath	Assistant	Allahabad	3.8.1987
Shri Mohan Tiwari	Junior Clerk	Allahabad	14.7.1987
Smt. Chanda Tiwari	Junior Clerk	Allahabad	14.7.1987
Shri Navin Kumar	Junior Clerk	Allahabad	27.2 1988
Shri Samarjit Singh	Driver	Allahabad	8.9.1987
Shri Swapan Debnath	Laboratory Attendant Grade-III	Allahabad	16.4.1987
Shri K. K. Singh	Fieldman Grade-III	Allahabad	18.4.1987
Shri Ram Baran	Fisherman Grade-I	Allahabad	3.3.1988

12.3. TRANSFERS

Name	Date of joining	Transferred from
Dr. L. B. Singh Scientist S-3	30.05.1987	Central Institute, for Research on Goats, Makhdoom
Dr. M. Sinha Scientist S-2	11.01.1988	Central Inland Capture Fisheries Research Institute, Barrackpore
Smt. Sukla Das Librarian T-5	07.09.1987	do
Shri R. C. Srivastava Asstt. Accounts Officer	11.01.1988	Central Board of Direct Taxes, Department of Income Tax, Lucknow

APPENDIX—I

Statement showing the total number of employees and the number of Scheduled Castes and Scheduled Tribes amongst them as on 31st March, 1988.

Group/Class	Permanent/Temporary		Total No. of employees	Scheduled Castes	Percentage of SC	Scheduled Tribes	Percentage of ST
1	2	3	4	5	6	7	8
Group 'A'							
(Class I)							
1. Project Director	Permanent	—	1	—	—	—	—
2. Scientist, S-3	Permanent	—	1	—	—	—	—
3. Scientist, S-2	Permanent	—	3	—	—	—	—
Group 'B'							
(Class II)							
1. Asstt. Accounts Officer	—	Temporary	1	—	—	—	—
2. T-5 (Librarian)	Permanent	—	1	—	—	—	—
Group 'C'							
(*Class III*)							
1. Superintendent	Permanent	—	1	—	—	1	100%
2. T-4	Permanent	—	1	—	—	—	—
3. Stenographer	Permanent	—	1	—	—	—	—
4. Assistant	Permanent	—	1	—	—	—	—
5. Sr. Clerk	Permanent	—	1	—	—	—	—
6. Jr. Clerk	Permanent	—	3	1	33.3%	—	—
7. Driver	Permanent	—	1	—	—	—	—
Group 'D'							
(Class IV)							
1. Fisherman	Permanent	—	3	1	33.3%	—	—
2. Lab. Attendant	Permanent	—	2	—	—	—	—
3. Fieldman	Permanent	—	1	—	—	—	—

APPENDIX—II

PROPOSED ORGANISATIONAL SET UP