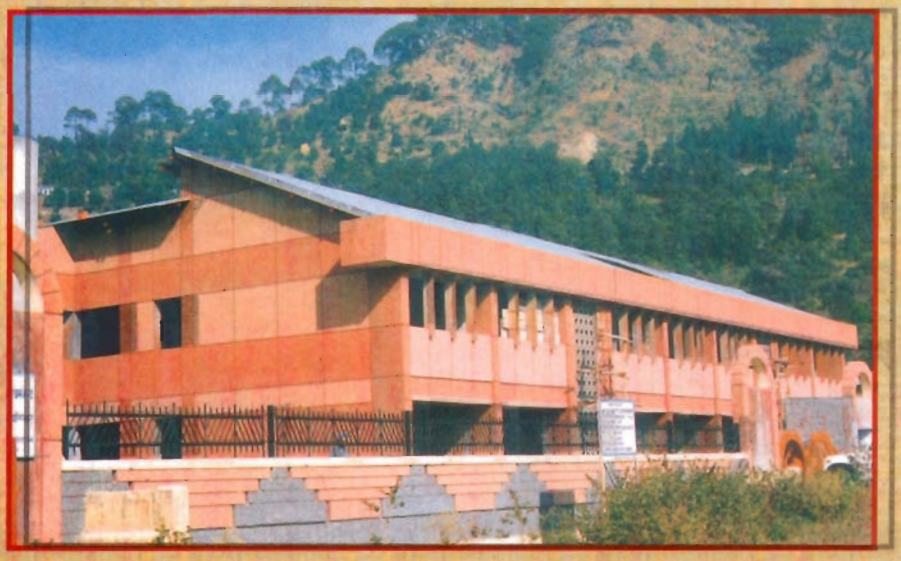
वार्षिक प्रतिवेदन
ANNUAL REPORT
2001-2002



राष्ट्रीय शीतजल मात्स्यिकी अनुसंधान केन्द्र
(भारतीय कृषि अनुसंधान परिषद)
भीमताल-263 136, जिला-नैनीताल (उत्तरांचल)

National Research Centre on Coldwater Fisheries
(Indian Council of Agricultural Research)
Bhimtal-263 136, Distt. Nainital (Uttaranchal)

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भीमताल-263136, जिला-नैनीताल (उत्तरांचल)

NATIONAL RESEARCH CENTRE ON COLDWATER FISHERIES

(Indian Council of Agricultural Research)

BHIMTAL - 263136, District - Nainital (Uttaranchal)

NRCCWF Annual Report 2001 - 2002

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- The activities and achievements reflected in this report covers the period from April 2001 to March 2002.
- The material in this report contains the semi-processed and analysed data of different projects, which will form the basis for the publications of the Centre. Therefore, material may not be used for any publication without written permission of the Centre.
- NRCCWF Annual Report is not a priced publication. Recipients of complimentary copies should use it for scientific purposes only.

CONTENTS

1. PREFACE

The Centre's efforts during the year 2001-2002 in research, transfer of technology and the out-reach received keen attention, along-with emphasis on infrastructure development receiving highest priority.

The Centre has significant achievements to its credit during the year. The most important event was the visit of Uttaranchal State Governor His Excellency Shri Surjit Singh Baranala Ji to our Experimental Fish Farm at Chirapani in Champawat district on June 21, 2001. His Excellency appreciated the Intitute's extension activities in the hill fishery development and creating awareness about aquaculture in hill districts of Uttaranchal. He directed to continue our efforts on trout and mahseer fishery propagation and development. This visit was followed by the inspection of an equally important VIP, the Union Minister for Agriculture & Railways, Shri Nitish Kumar Ji to NRCCWF headquater at Bhimtal on July 7, 2001. He inspected the mahseer hatchery, NRCCWF complex under construction, coldwater fishery exhibition and addressed the members of staff.

The Centre during the year investigated seven project programmes of which six were ongoing and the seventh was initiated in 2001. These projects addressed the issues on fishery management in hill lakes; fishery and ecological diversity in hill streams; nutrition and diets for mahseer and snow-trout; early and induced maturation in Chinese carps at high altitudes; population variability in mahseer from lacustrine and riverine systems; technology demonstration in farmer's ponds and computerized database development on hill fisheries and aquatic resource assessment. Apart from these institute based projects, two externally aided projects were also approved and sanctioned to the centre. The efforts in our farm activities continued with desired mahseer seed production and nursery rearing at Bhimtal; the other significant achievement was good success achieved in rearing rainbow trout at our Chirapani farm. Here our efforts in brood stock raising of trout bore fruits when in February 2002 successful artificial breeding was carried out culminating in trout fry production for the first time.

Extending our out-reach the Centre celebrated the July 10th declared by Govt. of India as the Fish Farmer's Day the main event was organized at Champawat district. A special Workshop-cum-Training in Hindi on Fish Farming Techniques

was organized for the farmers. Apart from these activities the NRCCWF continued its thrust to organize various exhibitions and participated in different "Goshthis" organized by district authorities. Through our extension initiatives the aquaculture is now gaining ground in hill state of Uttaranchal.

The Chairman QRT, Dr. M.Y. Kamal, Vice-Chancellor, Shere-Kashmir University of Agricultural Science & Technology, after completing the review of NRCCWF in collaboration with other members, submitted the final report and recommendations to the Director General ICAR & the Secretary DARE on June 6, 2002.

All the mandatory meetings of Research Advisory Committee, Staff Research Council, Management Committee, Institute Joint Staff Council, Official Languages Committee, were held as per schedule and actions were taken as per their suggestions for the research and institute management. As per the directives of DG, ICAR the centre undertook an exercise to review our VISION-2020 document, it was critically evaluated and discussed in a special meeting in which peers viz., Dr. S.A.H. Abidi, Member ASRB and Dr. S.N. Dwivedi, Chairman of our RAC were present.

The scientist, technical and administrative staff were provided adequate opportunities for professional participation and manpower development programmes. The Centre also up-scaled the infrastructure facilities at the Mahseer hatchery, Bhimtal and also at Chirapani experimental farm, Champawat.

I would like to express my sincere thanks to Dr. Panjab Singh, the Secretary DARE, Govt. of India & Director General, ICAR for his support and encouragement extended to NRCCWF. I am grateful to Dr. K. Gopakumar, DDG (Fisheries) ICAR for his guidance and support in promoting the activities of NRCCWF. Time to time support extended to the research and development activities of this centre from SMD by Dr. B. N. Singh, ADG (I Fy) ; Dr. A. D. Diwan, ADG (M Fy) : Dr. V. R. Chitranshi, Pr. Scientist and Dr. Anil Agarwal, Pr. Scientist is thankfully acknowledged. I wish to put on record the co-operation and help extended by Dr. R. S. Tolia, IAS, Principal Secretary & Commissioner Rural Development, Govt. of Uttaranchal.

I hope that persons and organizations interested in hill aquaculture and aquatic resource management will find the information presented in the report useful and informative. Any suggestions and comments from the readers are most welcome, this will enable the center to improve it in content and presentation.

All members of NRCCWF family worked in the spirit of unity, integrity and commitment to achieve the overall progress highlighted in this report.

I am thankful to Dr. C. B. Joshi, Principal Scientist and Dr. Yasmeen Basade, Scientist (Senior Scale) for their sincere efforts in compiling the basic draft of this report and to all other colleagues who have contributed to this effort. The help rendered by Shri Ashok Nayak, Scientist and Smt. Susheela Tewari, Steno, in computer processing is thankfully acknowledged. Shri Amit Kumar Joshi has helped in Hindi translation of the summary report.

Bhimtal (Nainital)
November 1, 2002

K. K. Vass
Director

2. EXECUTIVE SUMMARY

The National Research Centre on Coldwater Fisheries (NRCCWF) was established in September 1987 by Indian Council of Agricultural Research (ICAR) entrusting the responsibilities of conducting and promoting research on coldwater fisheries, aquaculture and aquatic resource management in the hill regions of the country. The Centre is located at Bhimtal, district Nainital in the State of Uttaranchal. The Centre at present has ten scientists, eleven technicians, nine administrative and fifteen supporting personnel. The Institute had a total budget of Rs. 296.4 Lakh for the year 2001-2002.

The Institute veered its research priorities as per the guidelines of the high level Research Advisory Committee (RAC) comprising mostly of eminent professionals from the field of fisheries keeping in view Vision 2020 and recommendations of QRT. The Centre also has a Management Committee and a number of internal committees such as Staff Research Council, Institute Joint Staff Council, Official Language Committee, Consultancy Processing Cell, etc. for management.

Since its inception, NRCCWF, inspite of limited scientific and technical manpower and meager facilities has made significant contribution for proper appraisal of coldwater fishery resources and evolved suitable technologies to propagate important coldwater fish species in hills. Continuing its efforts, the Institute during the year focussed its attention on overall performance, which involved research, transfer of technology, human resource development, and public awareness programmes, establishment of linkages and institutional building activities.

The research programmes were designed with major thrust on Openwater Fisheries, Aquaculture and Transfer of Technology. During the year the Institute worked on seven research programmes apart from a NATP project for which this institute is a nodal centre.

Openwater Fisheries :

Himalayan Wetlands

In hill regions, the lakes are important resource and their fishery enhancement through ecological management was one of the thrust areas during the period.

Accordingly in Kumaon and Garhwal Himalayas a rapid survey of these lakes was undertaken for ecological management to develop strategies to increase fish yield and to conserve local mahseer fishery in particular. In this effort Nainital, Bhimtal, Naukuchiatal, Sattal, Garurtal and Shymlatal located in Nainital and Champawat Districts of Kumaon at an altitudinal range of 1300-1800 m asl covering water spread area of 385 ha approx. were surveyed. Deoriatal in Chamoli District located at an altitude of 2410 m asl in Garhwal was also surveyed.

The average water temperature of Kumaon lakes varied between 11.0-26.5°C except in Nainital where it drops down to 5.0°C in severe winters. Overall thermal status of these lakes is categorized as warm-monomictic. Majority of lakes stratify during spring and mix freely in winter. The temperature profiles in Nainital lake (25m deep) revealed a difference of 10.0°C during early summer months while in winter there was hardly any difference from bottom to surface layers. The water of these lakes is generally alkaline in nature except for a brief period during summer months when bottom water reflect slightly acidic pH values. The gross primary production of these lakes ranged between 10.0-35.0 mg Cm^{-3} hr^{-1} in deeper euphotic zone and 37.0-90.0 mg Cm^{-3} hr^{-1} in the surface.

Golden mahseer, *Tor putitora* was the main dominant indigenous species in all the lakes. However, the introduced Chinese carps and Indian major carps were also recorded in lakes and contributed to the overall fish production in these systems. There is no commercial or organized fishing in these lakes except angling carried out by the local residents around the lakes.

Based on the present investigations on Kumaon lakes, it is concluded that amongst all, the Nainital lake has an intense biotic pressure and consequently high nutrient loading to the system. Highly anoxic conditions were recorded and only 7-21% dissolved oxygen saturation in the entire column of the lake even during un-stratified/ isothermal period (January) indicates system to be stressed. This causes winter fish-kill in this lake.

In Garhwal region of Uttaranchal five high altitude lakes situated in two districts were investigated viz., Deorital (3255 m asl), Gandhisarover (3970 m asl), Daityatal (4275 m asl) and Vasukital (4300 m asl) in Rudraprayag district and Hemkhud Sahib (4329 m asl) in Chamoli district. These lakes are typical high mountain oligotrophic ecosystems. Biologically the lakes are not very rich and have moderate levels of phytoplankton and zooplankton populations. There is no record of indigenous fishes in these systems except Deorital lake which has

recently been stocked with golden mahseer and common carp fishes. These stocked species are thriving well in this lake.

Biodiversity and hill stream ecology :

The resource assessment and aquatic biodiversity of the major hill riverine systems was another important area to be addressed. During the year the Alaknanda, the Bhagirathi, the Yamuna and the Song located at different elevations in Garhwal region were investigated. These rivers were found to be devoid of any major nutrient influx or industrial wastes except for catchment inputs. The water is well oxygenated (>8.5mg/l) and other water quality parameters are congenial for the sustenance of coldwater fish fauna. Among phytoplankton, Bacillariophyceae was the dominant group followed by Chlorophyceae, Cyanophyceae and Desmidiaceae. The zooplankton population in these rivers was very insignificant. The benthic population both qualitatively and quantitatively reflects high productive potential in terms of its diversity and average wet biomass production. A total of 27 fish species were recorded from the rivers. The main fishery comprised *Schizothorax richardsonii* followed by *Tor putitora*. The other fish species were of the genus *Labeo, Garra, Barilius, Glyptothorax, Pseudecheneis and Noemacheilus* and very rarely brown trout was recorded.

Mahseer population characteristics :

There is no systematic study on the trait and gender of the endangered upland mahseer, *Tor putitora* inhabiting the riverine and lacustrine environments. Keeping in view the future reproductive management and stock improvement programmes of this mighty fish, the various stages of the fish under different environment were characterized. The size of mature brooders from rivers/tributaries of Garhwal region were generally bigger (398-796 mm in total length with corresponding weight of 550-2920 g) in comparison to the brooders caught from Kumaon lakes (339-517 mm in total length with corresponding weight of 302-1280 g). Similarly, the fecundity was also higher in fish inhibiting riverine habitat being 7076 to 18525 eggs per individual of 339-517 mm in total length compared to fish inhabiting lacustrine habitat in which the fecundity was 6000 to 6100 eggs per individual of 360-450 mm in total length with corresponding weight of 365-800g. The sex ratio was 1:5 female : male in lacustrine environment and 1:3 female : male in riverine environment.

Aquaculture :

Nutrition and feed development :

The three test diets viz., NRCCWF–II, NRCCWF–III and trout feed were fed to *Schizothorax richardsonii* juveniles @ 5% of body weight per day for a period of 12 weeks. Although the crude protein percentage of the three diets was almost similar being 45.35% in NRCCWF–II, 43.52% in NRCCWF–III and 47.47% in trout feed, but the fish fed with trout feed exhibited significantly higher net weight gain, percent weight gain, specific growth rate and feed conversion efficiency compared to fish fed with NRCCWF–II and NRCCWF–III feeds. Whereas, the net weight gain, percent weight gain, specific growth rate and feed conversion ratio were not significantly different among fish fed with NRCCWF–II and NRCCWF–III feeds. The percentage survival was better in fish fed with NRCCWF–III diet and trout feed to the order of 90% compared to NRCCWF–II fed fish in which it was 83%.

Maturation and induced breeding :

The brood stocks of grass carp and silver carp in the age group of 3, 4 and 5 years developed at the experimental fish farm of the Institute at Chirapani in district Champawat situated at an altitude of 1620 m asl were selected for breeding. They were segregated age wise and stocked in cement raceways at a density of 5120-8800 kg/ha and fed on formulated diets. For induced ovarian development and maturation, a group of six fishes of 6 + year age were administered pituitary gland extract and ovaprime in the ratio 2:1 @ 0.2-0.3 ml/kg of body weight at 20 days interval for three months. While for spawning only ovaprime was injected @ 13 and 18 ml/kg body weight of fish in three doses to female silver carp and grass carp. The males were injected with half the dose of the above in single injection. The treated fishes responded and bred successfully on July 10 and 12, 2001.

NATP activity :

The NATP programme with three co-operating centres located at Srinagar (Jammu and Kashmir), Palampur (Himachal Pradesh) and Pantnagar (Uttaranchal) is functioning as per schedule and has generated information on resources of Himalayan mahseer in different river systems and trial tested, already NRCCWF developed technology, for its culture under different agro-climatic conditions.

Information technology :

Database formats were designed in Microsoft Visual Basic 6.0 for developing the computerized database for coldwater fisheries resource and management. A web page of the institute was designed incorporating all the relevant information of the Institute.

Transfer of Technology :

Mid-hill aquaculture :

The exotic fish culture technology developed by the Institute is being demonstrated in the ponds of 39 fish farmers in three districts of Kumaon hills located at the altitude range of 800-1740 m asl. Out of the 43 trials, 24 have been completed. Fish growth and production were correlated to the stocking density, water temperature, quality and quantity of feed and husbandry practices being followed by the farmers. In all the cases, fishes attained marketable size (400-960 g) in one season 8-9 months. Fish production ranged from 1534-6330 kg/ha/8-9 months with an average of 3698 kg/ha/8-9 months. The cost of rearing was about Rs. 17=00/ kg against the prevailing selling price of Rs. 70=00 to 90=00/ kg. Kitchen/ cattle yard wastes and combination of local feeds have been utilized to produce fish. In such cases production ranged from 2170-3280 kg/ha/8-9 months. More and more farmers are now adopting exotic carps based aquaculture in the region.

Extension activities :

The Institute celebrated Fish Farmer's Day on July 10, 2001 and organized a training programme during the period upto July 14 at Chirapani experimental fish farm, Champawat with a focus on "Learning by doing". The theme of the training programme was "Parvatiya kshetron mein vigyanik vidhi dwara adhik matsya utpadan". The programme was designed to meet the needs of many farmers who are now practicing fish cultivation in hill regions and are ready to expand the culture technologies evolved by the Institute. On the eve of the World Food Day institute organized a Hindi workshop at its experimental fish farm, Chirapani in district Champawat. Continuing our extension efforts, fish harvest and sale from a demonstration pond was organized at District headquarter on December 1, 2001.

HRD activities :

Under human resource development activities, scientists and other staff members of the institute were deputed for various training programmes to upgrade

their knowledge on various aspects of fisheries research and management. Many of the scientists of the Institute participated in seminars, symposia, workshops and conferences organized by different scientific agencies and presented their findings. The Institute also imparted training to the officials from Uttaranchal State Fisheries Department on various aspects of coldwater fish breeding, culture and management.

Other activities :

The scheduled meetings of all committees viz., Research Advisory, Staff Research Council, Official Language, Institute Joint Staff Council and Management Committee were held and various decisions were taken for proper management of the centre and research activities.

The Institute's QRT report for the period between 1994-1998 was finalized by the Chairman and Members after discussing the draft report with the members of Management Committee at a specially convened meeting. The final report with recommendations was submitted by the Chairman Dr. M. Y. Kamal, Vice-Chancellor, SUKAST, Srinagar to the Director General ICAR on June 6, 2001.

One of the memorable events during the year was the visit of His Excellency, Governor of Uttaranchal, Shri Surjeet Singh Barnala Ji on June 21, 2001 to our experimental fish farm at Chirapani, Champawat. Hon'ble Governor was briefed about the research carried out at NRCCWF. He evinced keen interest and appreciated the efforts of scientists.

Similarly the visit of Hon'ble Union Agriculture Minister, Shri Nitish Kumar Ji to Bhimtal on July 7, 2001 was equally an important occasion for the NRCCWF. On this inspection visit to NRCCWF the Hon'ble Minister was accompanied by Dr. K. Gopakumar DDG (Fisheries), Dr. Kiran Singh DDG (Animal Science) and Dr. M. P. Yadav, Director IVRI and other officials from the Ministry.

The NRCCWF family is representative of the diverse culture of the country and each member participated in celebration of various national days, events with genuine spirit of communal and cultural harmony.

3. INTRODUCTION

Establishment and growth

Indian Council of Agricultural Research (ICAR) established the National Research Centre on Coldwater Fisheries (NRCCWF) on September 24, 1987 after carving it out from the then Central Inland Fisheries Research Institute (CIFRI). The main objective of its establishment was to strengthen fishery research in Coldwater sector, encompassing the Himalayan and Peninsular parts of the country. At present the Centre is operating from rented buildings in Bhimtal, located in the state of Uttaranchal. The institute has a field centre located in Chirapani in the district Champawat of Uttaranchal state which is operating since January, 1992.

Mandate

- Evaluate and assess the coldwater fishery resources in upland regions
- Develop strategies for their conservation & management
- Conduct research leading to development of suitable technology for farming of indigenous and exotic fish species in uplands
- Study the impact of environmental changes on the aquatic bio-diversity in upland openwaters
- Undertake transfer of technology through training, education and extension programmes
- Consultancy services in different areas like coldwater fisheries development, aquatic ecology and environmental impact assessment

Location

The headquarters of NRCCWF is located at Bhimtal at an altitude of 1470 m asl in the district of Nainital of Uttaranchal state. It is about 25 km away from the famous tourist place of Nainital. The nearest railway station is Kathgodam, which is about 280 km from Delhi. The nearest airport is Indira Gandhi International Airport, New Delhi. The experimental field station of the Institute at Chirapani in Champawat district of Uttaranchal State is about 150 km from Bhimtal.

Faculty

The institute has eleven scientists including the Director. There are five Principal Scientists (two as per sanctioned cadre and three from career advancement scheme), one Senior Scientist and four Scientists. Nearly 50% of the sanctioned scientist's posts are vacant.

Management

A high-powered Research Advisory Committee (RAC) guides the Centre on research planning, thrust areas identification and new initiatives. The RAC also evaluates and monitors the progress of research activities.

The Management Committee (MC) constituted and mandated by the Indian Council of Agricultural Research under the chairmanship of the Director supervises the Centre. A number of internal committees, such as Staff Research Council, Official Language Committee, Institute Joint Staff Council are in place for decentralized management.

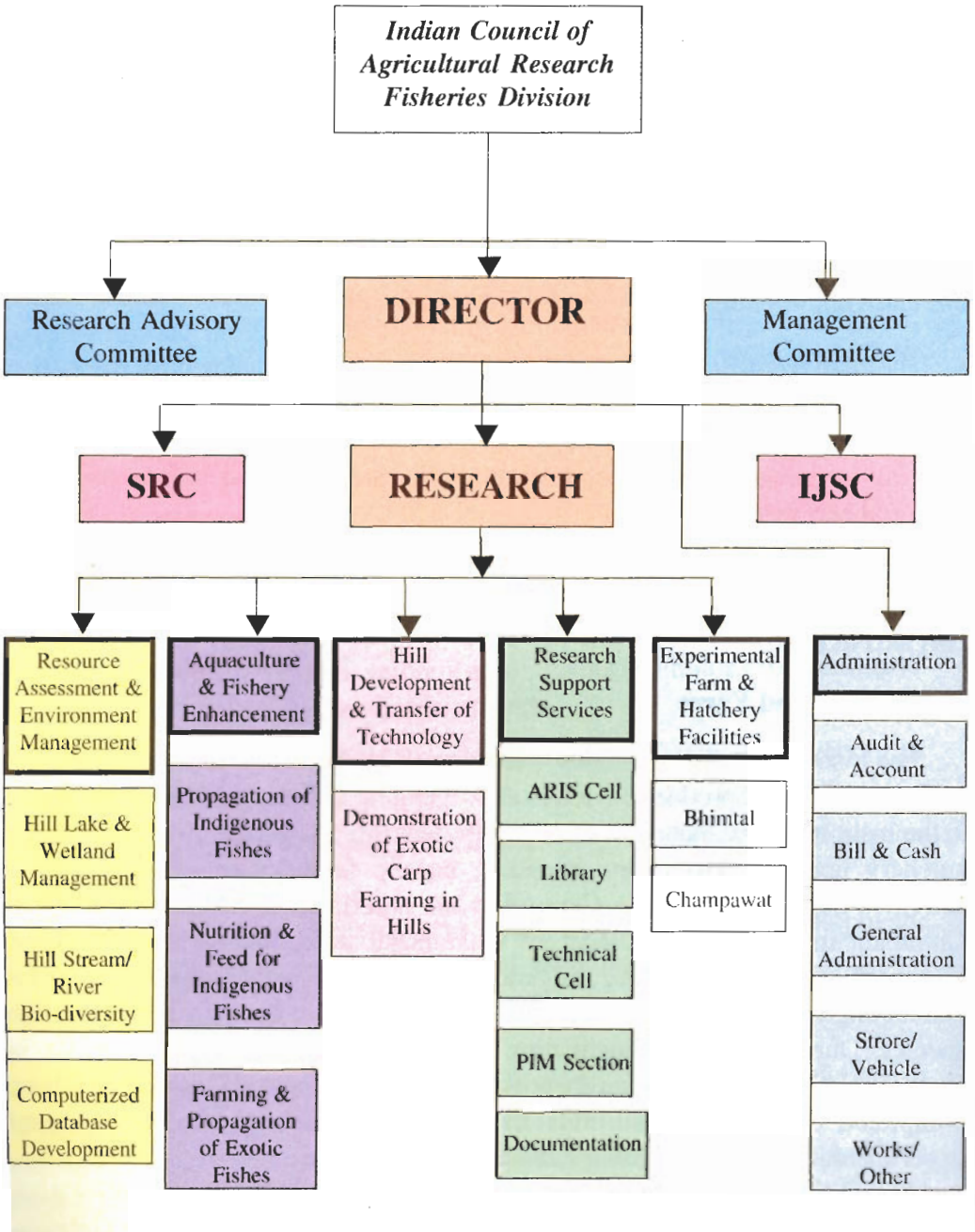
Research Support Facilities

Infrastructure

Building and Farm

The Institute at present is housed in three rented buildings at Bhimtal. A pilot scale mahseer seed production unit is also operating at Bhimtal on the land leased to the Institute by the State Fisheries Department, which in addition to the mahseer hatchery houses a laboratory providing backup facilities to seed production activities of the Centre. The Centre has an experimental fish farm facility at Chirapani in Champawat district of Uttaranchal state, having trout hatchery, cemented raceways for nursery and brood stock rearing, few circular iron tanks for conducting yard trials on various culture aspects of the indigenous and exotic fish species. During the year construction activity of Lab-cum-Office Complex in Phase-I for NRCCWF at Bhimtal has progressed and nearly 50% of work has been completed by CPWD. Additional facilities were also created at Chirapani experimental farm and Mahseer hatchery at Bhimtal.

Organogram



Organogram of National Research Centre on Coldwater Fisheries

Support Services

Project Implementation and Monitoring Cell

A separate cell called the Project Implementation and Monitoring Cell monitors the implementation and progress of research project programmes being conducted by the Centre. This cell annually organizes the meeting of Staff Research Council (SRC) to evaluate the progress made in each research project and accordingly approves the work programmes for the current year. The new proposals are also approved by the SRC after thorough evaluation of the objectives, practical utility, manpower support and financial involvement. The cell is also responsible for maintaining records of project reports through RPF system, besides compilation of annual report and newsletter of the Institute.

Technical Cell

The technical cell is responsible for dealing with all technical matters within and outside the ICAR system. This cell takes care of the training programmes, deputations, participation of scientists in seminars, symposia, workshops, meetings, etc., and organizing of conferences and HRD activities.

Library Section

The library of the Centre during the year subscribed 15 journals both Foreign and Indian and procured 23 scientific books. The current holding of the library includes 1086 books, 1400 foreign journals, 814 Indian journals and 1500 other publications. The library provides services to the scientists and other staff members of the Institute apart from scholars, researchers, students and other persons from local organizations interested in scientific literature on coldwater fisheries and allied subjects. The library section has now added ASFA CD ROM facilities on various and allied subjects. The library section is further continuing its efforts in collection, processing and disseminating scientific/ technical information to the potential users.

Documentation Section

This section is entrusted with the responsibility of publication of scientific bulletins, brochures and pamphlets. During the current year this section published three bulletins and three pamphlets.

ARIS Cell

The computer related facilities are provided to the scientists and other staff members of the Institute by this cell. This cell has made a stride in developing formats to computerize the on-going research project achievements. This cell also shoulders the responsibilities of providing internet facilities, basic and advanced computer training to the staff members of the Institute.

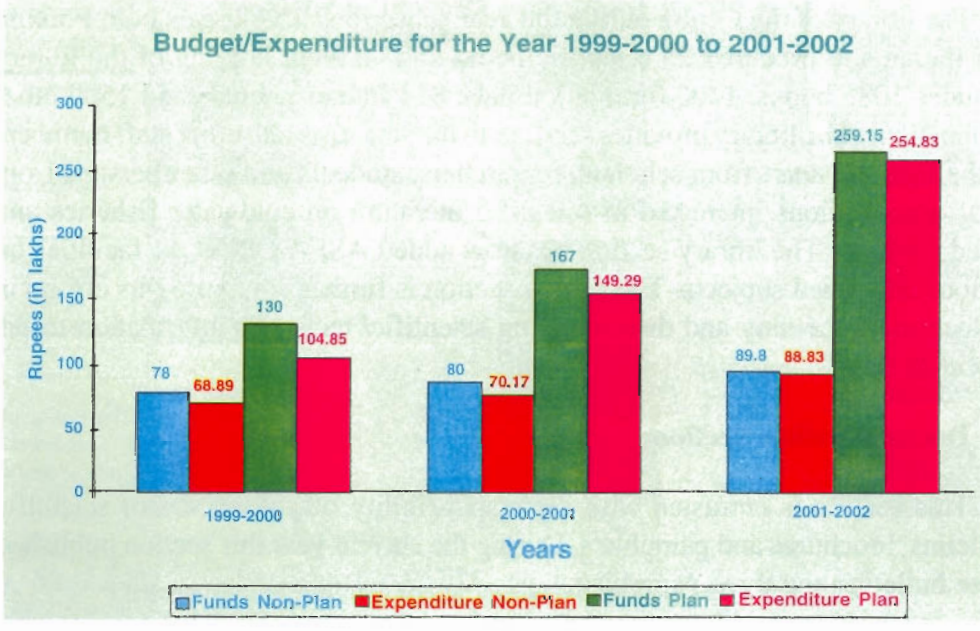
Extension Wing

The Extension wing carries out various extension activities of the Institute such as transfer of technology programmes, organizing the exhibitions, training programmes and other activities for farmers.

National Agricultural Technology Project

A National Agricultural Technology Project on Aquaculture Management in Coldwaters is under operation at the Institute as a lead centre covering the Kumaon Himalayan region for assessing the mahseer fishery potentials and culture possibilities. Implementation of the approved technical programme of the project and monitoring the progress made by the other cooperating centres in different Himalayan regions is the responsibility of the lead centre.

Financial Statement



Abstract

(Rupees in Lakhs)

Year	Funds Non-Plan	Expenditure Non-Plan	Funds Plan	Expenditure Plan
1999–2000	78.00	68.89	130.00	104.85
2000–2001	80.00	70.17	167.00	149.29
2001–2002	89.80	75.56	259.15	220.83

Budget Statement for the year 2001–2002

(Rupees in Lakhs)

Code	Head of Account	Budget (R.E.)		Expenditure	
		Plan	Non-Plan	Plan	Non-Plan
02	Play & Allowances	5.0	70.0	-	58.70
06	Overtime Allowances/wages	-	0.55	-	0.52
10	T. A.	4.0	1.00	1.78	0.98
15	Other Charges Including Equipments	43.0	9.65	32.58	7.21
20	Works & Land	200.0	8.10	184.23	7.91
25	Other items Fellowship/ Scholarship/ Awards	3.15	0.50	1.31	0.24
	Information Technolgy	4.0	-	0.93	-
	Grand Total	**259.15**	**89.80**	**220.83**	**75.56**

Staff possition as on 31-03-2002

S.No.	Category	Post Sanctioned	In Position
1.	Director (R&M)	01	01
2.	Scientific	20	10
3.	Technical	13	11
4.	Administrative	14	09
5.	Supporting	18	15
	Total	**66**	**46**

4. RESEARCH ACHIEVEMENTS

Research achievements during the year under major programme areas of NRCCWF are given below.

Sustainable fishery development in Kumaon and Garhwal lakes

K.K. Vass, H.S. Raina and C.B. Joshi

Freshwater lakes in Kumaon and Garhwal Himalayas of Uttaranchal region are important source of fishery development, which require ecological management strategies to enhance fish yield and conserve mahseer fishery in them. To achieve the objectives rapid survey of Kumaon and high altitude lakes of Garhwal was undertaken. Nainital, Bhimtal, Naukuchiatal, Sattal, Garurtal and Shymlatal located in Nainital and Champawat districts of Kumaon at an altitudenal range of 1300-1800 m asl covering water spread area of 385 ha approximately, were surveyed. Deoriatal in Chamoli district located at an altitude of 2410 m asl in Garhwal Himalaya was also surveyed. Both ecological and fisheries database have been generated on these lakes which along with available information will help in developing an ecological model to enhance their production. In Kumaon lakes, the main thrust was given to collect baseline information on ecological characteristics to find out the cause of ***winter fish kill,*** particularly in Nainital and Naukuchiatal lakes, where not only the native fauna has drastically dwindled but their overall fishery has also been seriously affected. Various features recorded on each lake are summarized below :

Kumaon lakes

Physico-chemical characteristics

The data generated on various characteristics of Kumaon lakes revealed that amongst all, Naukuchiatal lake is deep with a maximum depth of 38 m while Sattal lake recorded a maximum depth of 8 m. The water of these lakes is generally clear with maximum transparency of 2.5 m in Garurtal followed by 2.0 m in Bhimtal. However, the secchi transparency in other lakes is very low and ranged between 0.42–0.85 m being lowest in Shyamlatal lake in winter periods. The average water temperature of Kumaon lakes varied between 11.0–26.5°C except in Nainital where it drops to 5.0°C in severe winters. Overall thermal status of these lakes is categorized as warm-monomictic. Majority of lakes stratify during spring and mix

freely in winter. The temperature profile in Nainital lake (25 m deep) revealed a difference from bottom to surface layers. A maximum difference of 13.0°C was recorded in Naukuchiatal lake during June. In Bhimtal, the temperature profile was not so marked and minimum difference of 4.0°C was recorded between bottom to surface in April, however, it ranged between 8.0–11.0°C. Similar trends as recorded in Bhimtal were also encountered in other lakes.

The water of these lakes is generally alkaline in nature except for a brief period during summer months when bottom water reflects slightly acidic pH values ranging form 6.4–6.8, particularly in Naukuchiatal lake. However, pH for surface waters in most of the Kumaon lakes remained above 7.0. The dissolved oxygen data indicate that surface water of Kumaon lakes are always well oxygenated throughout the year except for Nainital, especially in winter months its values are very low and ranged between 0.5–4.2 mg/l from bottom to surface. Even these values further decline to 3.0 mg/l in winters. With the onset of warming of the lake the values sharply increase to 9.0 mg/l at surface but remain still below 2.0 mg/l at bottom. In Bhimtal lake a minimum difference of 4.5 mg/l was recorded in November and maximum of 6.0 mg/l in May. In Shyamlatal, the oxygen during winter period ranged between 7.5–9.0 mg/l from bottom to surface layers, while in summer the value at bottom zone was only 4.0 mg/l.

The gross primary production of these lakes ranged between 10.0–35.0 mg Cm^3 hr^{-1} in deeper euphotic zone and 37.0–90.0 mg Cm^3 hr^{-1} at the surface. In Nainital lake its values were 30.0–85.0 mgC/m^3/hr in summer and 10.0–50.0 mgC/m^3/hr in winters. While in Bhimtal maximum, values of 40.0–65.0 mg Cm^3 hr^{-1} were recorded in summer at surface and 35.0–45.0 mg Cm^3 hr^{-1} in winters at bottom. In Shyamalatal it was recorded to the tune of 29.0–40.0 mg Cm^3 hr^{-1} at surface and 18.59 mg Cm^3 hr^{-1} at bottom zone.

Biological profile

Plankton population in Kumaon lakes exhibited a tropical seasonality almost similar to sub-temperate situation, yet the species diversity and particularly limnetic species composition reflected the characteristics of sub-tropical waters. The phytoplankton population was normally dominated by Chlorophyceae followed by Bacillariophyceae, Dinophyceae and Cyanophyceae. In Nainital it was dominated by green algae and in Bhimtal by diatoms throughout the year. The zooplankton of these lakes were mainly dominated by rotifera, copepoda and cladocera. *Mesocyclops leuckarti, Eucyclops serrulatus, Tropocyclops prasinus, Diaphanosoma excisum, Alona affinis* typical sub-tropical species, constitute important components of

zooplankton community in Nainital lake. In total 57 species comprising 46 Rotifera, 06 Copepoda and 05 Cladocera are recorded in this lake. Usual perennial forms represents the Copepods in all the Kumaon lakes, while the population of other groups slightly varied from season to season. However, community coefficient in different months did not reflect any significant changes in zooplankton community structure. The mean annual zooplankton biomass in lake was to the tune of 0.5–5.2 g/m^3 and 0.5–10.5 g/m^3 in Bhimtal and Nainital, respectively, mainly contributed by Copepods (75.0%). The lower values are generally recorded for a brief period coinciding with the stratified state of these lakes. *Daphnia longispina,* which is frequently recorded in other Kumaon lakes, is absent in the Nainital lake. The population in Shymalatal lake was significantly high as compared to other lakes. It was recorded above 250 units/l mainly dominated by *Asplanchna priodonta, Notholca acuminata, Keratella cochlearis, Daphnia longispina* and species of *Mesocyclops* and *Eucyclops.* Among the zoobenthic organisms, larvae of Diptera and nymphs of Ephemerpotera were most dominant in all the lakes. However, in Nainital and Naukuchiatal lakes, low oxygen and pollution tolerant organisms like *Tubifex* and *Chironomus* dominated the macrobenthic fauna.

Fish and Fisheries

Based on the experimental fishing with standard gill nets and data collected from the anglers revealed that golden mahseer, *Tor putitora* was the main dominant species in all the lakes. However, the introduced Chinese carps and Indian major carps were also recorded in Bhimtal, Sattal and Naukuchiatal lakes and contributed to the overall fish production in these systems. There is no commercial or organised fishing in these lakes except angling carried out by the local residents around the lakes.

The experimental fishing in Nainital lake conducted on October 20, 2001 revealed that *Cyprinus carpio* dominated the catch contributing above 60% followed by silver crap (26.8%) and *Schizothorax richardsonii* and grass carp (13.2%). Total fish biomass of 193kg/day was netted through operation of six gill nets (50/8 m size and 3-6 inch mesh size). Based on the present investigation on Kumaon lakes, it is concluded that amongst all, the Nainital lake has an intense biotic pressure and consequent high nutrient loading. Highly anoxic conditions were recorded and only 7–12% dissolved oxygen saturation was estimated in the entire column of the lake even during unstratified/isothermal period (January) indicates system to be stressed. This causes winter fish kill in this lake. During winter kill silver carp along with *Puntius conchonius, Gambusia affinis* are the affected species.

The main reasons of winter fish kill are : i) the detritus remains undisturbed and undergoes partial bio-degradation under anaerobic conditions, ii) least flushing of enriched column water even during monsoon rains. May be only surface column is drained with no impact on lower layers and consequently toxic substances such as NH_4 and H_2S are produced and the fish mortality occurs from time to time particularly during winter, when density barrier of lake is broken.

Experimental Fishing in Nainital Lake

Garhwal lakes

Five high altitude lakes situated in two districts of Garhwal region of Uttaranchal were investigated. Deorital (3255 m asl), Gandhisarover (3970 m asl), Daityatal (4275 m asl) and Vasukital (4300 m asl) in Rudraprayag district and Hemkhud Sahib (4329 m asl) in Chamoli district.

These lakes are typical high mountain oligotrophic ecosystems. Average physico-chemical features of these lakes recorded in summer periods are: water

temperature recorded was 7.7–22.5°C, pH 6.2–7.6 and secchi transparency 1.2–2.8 m. The dissolved oxygen recorded at surface zone of the lakes was 7.0–7.4 mg/l. Total alkalinity ranged between 10–20 mg/l; specific conductivity 40.0–165.0 µmhos/25°C, while the gross primary production range in surface water of the lakes on an average was 12.5–32.0 mg Cm^3 hr^{-1}. Biologically the lakes are not very rich and have moderate levels of phytoplankton and zooplankton population. There is no record of fishes indigenous in these systems except the Deorital lake.

Deorital was biologically investigated in winter months. This lake is a high mountain oligotrophic lake. The water temperature recorded was 5.5°C, pH 7.6 and secchi transparency as high as 4.0 m. the dissolved oxygen recorded at surface zones of the lake was 6.82–7.4 mg/l. Total alkalinity ranged between 10–20 mg/l, specific conductivity 24.0–25.0 µmhos at 25°C, while the gross primary production in surface water of the lake was averagely 156.2 mg Cm^3 hr^{-1}. Biologically the lake has moderate levels of phytoplankton and zooplankton population. The lake has been recently stocked with the seed of golden mahseer and common carp. Both species are thriving well.

Riverine resources, ecology and biodiversity characteristics in central Himalayas

H. S. Raina, Shyam Sunder and A. K. Singh

Various important tributaries of major river systems located at different elevations in Garhwal region were investigated for resource assessment and aquatic biodiversity. The major water bodies alongwith their main tributaries encompassed the Alaknanda, the Bhagirathi, the Yamuna and the Song.

Ecological features

In Garhwal Himalaya, various rivers/ streams are glacier-fed or spring-fed in origin. These are mostly devoid of any major nutrient influx or industrial wastes excepting for the habitated areas. The substratum of upper *rithron* zones of these lotic systems comprise large boulders, stones besides lots of shingles, pebbles, gravel and sand devoid of any macro vegetation whereas, the lower *potamon* zones comprise sand and clay though with certain stony areas. In slow moving waters, sparse littoral algal mats can be observed. Water was estimated to be well oxygenated (>8.5 mg/l) and alkaline (pH > 7.0) throughout the study period. The other water quality parameters were congenial for the sustenance of coldwater fish

fauna in these waters though a significant variation in biotic and fish population structure at various elevations and zones could be expected. This primarily depends upon nature of substratum, availability of quantity and quality of food, thermal regime, habitat complexity and other biological interactions. Such factors singly or in combination may limit the production of one species and may not hold good for the other. The substrata of these rivers are either boulders, stones mixed with pebbles, gravel and sand at the upper stretches. While, at lower stretches it is mixed with mud and sand. The rate of water flow of studied streams ranged between 0.9–5.6 m/sec, highest recorded in upper reaches of the rivers. The water temperature recorded was between 9.0–21.5°C. Normally low temperature was recorded in upper reaches of the main rivers that too only in winter periods. Water of these systems normally remained alkaline (> 7.5) throughout the year and highly oxygenated (above 8.5 mg/l). Total alkalinity ranged between 42 mg/l (Nandakini river) to 112 mg/l (Bhagirathi river).

Water quality observations in a hill stream

Biological profile

In the hill streams, epiphytes and phytoplankton represented a large population of primary producers, which serve as food for zoobenthos and herbivore fishes. Bacillariophyceae (about 80%), followed by Chlorophyceae, Cyanophyceae and desmidiceae and their density ranged between 150–550 units/l, mainly dominated the phytoplankton population. The zooplankton population was very insignificant. The benthic population in Garhwal rivers both qualitatively and quantitatively reflects high productive potential in terms of its density and on the overall wet biomass production.

Benthic macro-invertebrates

The benthic fauna in Garhwal fluvial systems mostly comprise macroinvertebrates, small fish and larval stages of amphibians. These groups have attained maximum development and diversity in fast flowing streams. The benthic fauna in Garhwal streams primarily comprised young ones of aquatic insects (> 98%). A total of 42 benthic forms were recorded during the period under report. The faunal density of macro-benthic invertebrates ranged between 10–20 ind/m^2 while their wet biomass varied from 1.070–26.840 g/m^2. The major groups comprised Ephemeroptera (9.4–59.6%), Odonata (nil–7.2%), Plecoptera (0.0–8.3%), Coleoptera (0.6–12.5%), Trichoptera (6.9–37.1%) and Diptera (1.0–7.8%). The predominant forms observed were: *Caenis, Epeorus, Iron, Cinygmula, Isonychia, Rithrogena, Baetis, Heptagenia, Siphlonurus* and *Leptophlebia* among may-flies; *Gomphus, Ophiogomphus, Cordulegaster, Agrion* and *Enallagma* among dragon and damsel flies; *Perla, Chloroperla, Nemoura* and *Capnia* among stone flies; *Hydrophilus, Gyrinus, Dytiscus, Psephenus* and *Elmis* among water beetles; *Cetodes, Mystacids, Hydropsyche, Brachycentrus* and *Glossosoma* among caddies flies; *Atherix, Chironomus, Chaoborus, Tipula, Culicoides* and *Simulium* among Diptera.

Fish diversity

A total of 27 fish species were recorded from the rivers/ streams of Garhwal Himalaya based on the experimental fishing and survey of local markets. Individual fisherman with conventional nets especially cast nets, small gill nets or some local methods, mostly undertake fishing. There is no organised fishing by fisher folk, which could form a commercial venture. The catch per unit effort observed from local fishermen was 470–1840 g/ day whereas through experimental fishing the values ranged between 150–340 g/ man/ hr. The main fishery comprised *Schizothorax*

richardsonii (57–85%) followed by *Tor putitora* (5–15%). The other fish fauna recorded was the species of *Labeo, Garra, Barilius, Glyptothorax, Pseudecheneis* and *Noemacheilus.* Very rarely a few specimens of brown tront were caught in fishermen's baskets.

Feed development for indigenous upland fishes

Madan Mohan and Yasmeen Basade

Preparation of experimental diets

For experimental trials the casein component of NRCCWF-II diet was completely replaced by good quality fishmeal and the feed developed was named as NRCCWF-III. Feeding trials were conducted using three experimental diets viz., NRCCWF-II, NRCCWF-III and Trout feed prepared by Himachal Pradesh State Fisheries Department. The proximate chemical composition of the three experimental diets indicated that crude protein level was almost similar in all diets being 45.35% in NRCCWF–II, 43.52% in NRCCWF–III and 47.47% in trout feed. The proximate composition on dry matter basis revealed crude fat to be 16.00%, 16.17% and 17.89%, respectively. But these diets differed in crude fibre contents being 6.50% in NRCCWF–II, 5.90% in NRCCWF–III and only 1.37% in trout feed.

Feeding trials with snow trout, *Schizothorax richardsonii*

Snow trout, *Schizothorax richardsonii* (Gray) juveniles were collected from Kosi river and acclimatized to the experimental conditions before initiating various trials. The fish were stocked at the density of 65 fish/tank containing 100 litres water having flow through facilities (flow rate 0.50–1.201/min). Feeding trials were conducted with the above mentioned three test diets. Each diet was fed to triplicate group of fish. Feed was given @ 5% of body weight per day for a period of 90 days.

Among the three test diets, fish fed with trout feed showed higher net weight gain, percent weight gain and specific growth rate and better feed conversion ratio which was followed by fish fed with NRCCWF–II and then NRCCWF–III feeds. Survival percentage was higher in fish fed with NRCCWF–III diet and trout feed being about 90% and was 83% in fish fed with NRCCWF–II feed.

The water quality parameters ranged as: temperature 1.5–16°C, pH 7.0–7.2, dissolved oxygen 7.9–8.2 mg/l, free carbondioxide 1.80–1.90 mg/l, total alkalinity 62–62 mg/l.

Table 1: Growth performance of *Schizothorax richardsonii* fed with NRCCWF-II NRCCWF-III and Trout feeds during winter period at Bhimtal.

Parameters	NRCCWF-II	NRCCWF-III	Trout Feed
Duration of study (days)	90	90	90
Initial length (mm)	71.40±2.80	72.80±2.58	74.63±1.07
Final length (mm)	85.2±2.91	85.33±2.61	87.07±2.85
Initial weight (g)	3.03±0.03	3.05±0.09	3.20±0.26
Final weight (g)	3.45±0.05	3.38±0.07	4.08±0.39
Net weight gain (g)	0.42±0.03	0.33±0.02	0.87±0.15
Percent weight gain (%)	13.98±0.99	10.77±0.91	0.26±0.03
Specific growth rate (% day^{-1})	0.15±0.01	0.12±0.01	0.26±0.03
Feed conversion ratio	4.26±0.05	4.30±0.02	3.98±0.07
Feed conversion efficiency (%)	23.49±0.29	23.28±0.12	25.14±0.47
Survival (%)	83.08±10.24	90.77±4.70	90.26±5.78

Table 2 : Water quality parameters in the experimental tanks during the feeding trial.

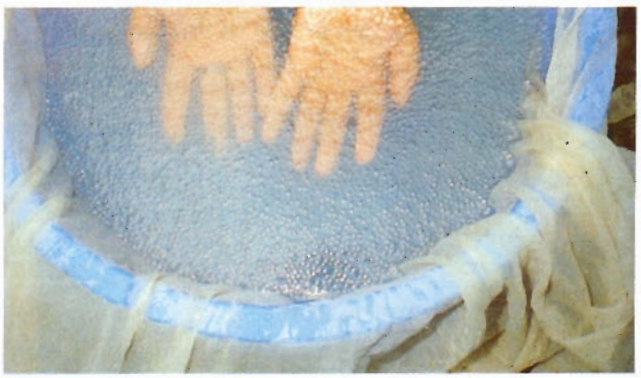
Parameters	Values
Temperature (°C)	1.5 - 16.0
pH	7.0 -7.2
Dissolved oxygen (mg l^{-1})	7.9 - 8.2
Free carbon dioxide (mg l^{-1})	1.8 - 1.9
Total alkalinity (mg l^{-1})	60 - 62
Water flow rate (l / minute)	0.5 - 1.2

Induced ovarian development, maturation and spawning of exotic carps

B. C. Tyagi and K. D. Joshi

The brood stock of grass carp and silver carp developed at high altitude were segregated age wise (5,4 and 3 yr.), reared in cemented raceways (150 m long) at a stocking density of 5120–8800 kg/ha and were fed with formulated diets. A group of six fish of 6 + years age were administered with pituitary gland extract and Ovaprime in 2:1 ratio @ 0.2–0.3 ml/kg body weight at 20 days interval for three months during April to June and for spawning only Ovaprime was injected @ 13 and 18 ml/kg body weight in three doses to female silver carp and grass carp. The males were also injected with Ovaprime but with half the dose of the females, in a single injection at 15.8 – 17.2°C. The treated fishes responded and spawned successfully on July 10th and 12th 2001. Whereas, the untreated group of fishes did not spawn. Higher stocking density of 5120–8800 kg/ha adversely affected the maturation process and absolute fecundity in fishes. Two silver carp weighing 3.5 kg released 3.1 lakh eggs. In case of grass carp low fecundity was recorded with 0.89 lakh/ kg of body weight. Normal spawning was noticed in flowing water at 16.8°C but embryonic development could not take place at 14.8 – 15.2°C, indicating critical temperature as 21.2°C for proper embryonic development.

A silver carp is being injected with ovaprime



Fertilized eggs of silver carp

Trait and gender of upland endangered mahseer, *Tor putitora*

A. K. Singh and K. D. Joshi

There being no systematic study on the trait and gender of the endangered upland mahseer (*Tor putitora*) inhabiting the riverine and lacustrine environment. Keeping in view their future domestication, stock improvement programmes and reproductive management, the different growth stages of the fish under different environments were characterized.

Tor putitora inhabits waters of hill streams, rivers and lakes. It principally breeds in August, extending up to September–October. The Spawning migration occurs from the main rivers to its tributaries and breeding takes place in the flooded waters, whereas, in the lacustrine environments it is only the change in the water level and temperature which triggers spawning. Hence, in both the riverine and lacustrine environments timing of reproduction is triggered by water temperature, water flow regime and the day length.

The size of mature brood stocks of mahseer from rivers and tributaries of Garhwal region at altitudes ranging from 500–1200 m asl and from the lakes Bhimtal and Naukuchiatal of Kumaon region were characterized. The size of mature brooders in rivers was generally bigger than that of the mature brooder caught from the lakes (Table 3).

Table 3 : Morphometric characters of mature *Tor putitora*.

Location	Length (mm)	Weight (g)
Kumaon lakes	339–517	302–1280
Garhwal rivers	398–796	550–2920

Fecundity of mahseer inhabiting lacustrine environment ranged from 6000–6100 ova per individual of size 339–517 mm total length with corresponding total body weight of 302–1280 g (n=47). Whereas, in riverine environment (Garhwal rivers) the fecundity ranged from 7076–18525 eggs in fish of 378–396 mm total length. The ova size at different stage of maturing ovary is given in table 4.

Table 4 : Ova size under different maturity stage in *Tor putitora.*

Maturity stages	Lacustrine environment	Rriverine environment
I–Immature	0.016–0.282	0.018–0.322
II–Maturing	0.242–0.340	0.348–0.486
III–Maturing	0.364–0.624	0.442–0.980
IV–Maturing	0.862–1.380	1.242–1.824
V–Mature	1.624–2.428	1.922–2.824
VI–Ripe	2.820–3.026	2.842–3.228

The eggs and young ones need warmer waters for survival and development. The size of newly hatched fry ranged between 5.4 to 8.5 mm as compared to the size of fertilized eggs (3.0–3.8 mm) in different environments of the lakes and the rivers, respectively.

Population of *Tor putitora* recorded variations in the morphometric and morphomeristic characters under lotic and lentic waters. The variations in total length, standard length, head length, height of head, body depth, distance between snout and vent, diameter of eye, total length/ head length and total length/ depth of body are given in table 5.

Table 5 : Morphomeristic character of newly hatched larvae of *Tor putitora* from upland lotic and lentic waters.

Measurements	Lakes (n=21)	Rivers (n=17)
Total length (mm)	9.02	10.36
Standard length (mm)	8.23	9.31
Head length (mm)	1.52	1.90
Height of the head (mm)	1.06	1.36
Body depth (mm)	1.33	1.43
Distance between snout and vent (mm)	6.27	6.74
Diameter of eye (mm)	0.48	0.48
Total length/head length (mm)	6.0	5.5
Total length/height of head (mm)	8.5	7.6
Total length/ depth of body (mm)	6.7	7.2

The expected sex ratio of mature (1:1) was observed to vary with different environmental factors. The deviations in sex ratio is more in lacustrine environments, which is 1:3 for females versus males. In Garhwal rivers the variation observed has been 1:2.1 female: male (Table 6).

Table 6 : Male/females proportions in catches of *Tor putitora* during spawning period.

Location	Total number of fish caught	Number of mahseer		Percentage population	
		Males	Females	Males	Females
Lakes	82	62	20	75.6	24.4
Rivers	284	194	98	67.9	32.1

Demonstration of exotic carp farming

B. C. Tyagi and K. D. Joshi

During the period under report, the technology 'mixed carp culture' involving the grass carp, silver carp and common carp is being demonstrated in 39 fish ponds of varied size located at different altitudes (800 – 1740 m asl) in the districts of Champawat, Almora and Nainital. Of the total 24 ponds have been restocked with fish seed produced at Chirapani fish farm and procured from hatchery located in tropics. The growth of fish and production were found to correlate with stocking densities, water temperature and husbandry practices adopted by the farmers. The fishes attained weight of 400 – 960g in one season i.e., April to November. Among the stocked species grass carp attained maximum weight of 960g in 8 months followed by common carp. Silver carp performed well in ponds receiving regular and higher doses of organic fertillzers. Higher fish production @ 4243 – 5981 kg ha^{-1} yr^{-1} was recorded in those ponds having regular feeding and fertilization especially feeding weeds to grass carp stocked @ 50% of total density. Low fish production @ 1335 kg ha^{-1} yr^{-1} was recorded in those ponds located at high altitude (1670 m asl, Kapkot Block) and had only 23% grass carp with occasional feeding. The average estimated fish production in all the harvested ponds (24 No.) has been computed at 3698 kg ha^{-1} yr^{-1}. The cost of fish production has also been calculated @ Rs. 17=00 kg^{-1} against the prevailing selling price of Rs. 70=00 kg^{-1} at farm gate.

A village demonstration fish pond

Kitchen and cattle yard wastes in combination with fertilizers tried in few ponds gave encouraging results and fish production of 3470 kg ha^{-1} yr^{-1} was recorded indicating the possibilities to convert the wastes into fish protein.

Demonstration of the technology blended with training has created impact in the area and number of small farmers are joing the programme to augment their income and farm production.

Table 7 : Fish production details of various demonstration ponds in Kumaon hills.

Number of demonstration ponds	39
Number of demonstration ponds harvested	24
Average fish production (kg ha^{-1} yr^{-1})	3698
Highest fish production (kg ha^{-1} yr^{-1})	5981
Average weight of fish species (g)	400 – 960
Maximum growth of grass carp (g per 8 months)	960
Average cost of fish production (Rs. per kg)	17=00
Prevailing selling price (Rs. per kg)	70=00

Computer Application in Coldwater Fisheries Resource Assessment & Management

A. K. Nayak and K. K. Vass

Computerized database for coldwater fisheries resource and management

Formats and menus were designed in Microsoft Visual Basic 6.0 for developing a fully computerized database for coldwater fisheries resource and management. Different forms for entering data on lakes, rivers, reservoir, ponds etc. were developed. This database formates contain different type of data entry fields. The database tables were designed on Microsoft access to link with the table. The primary data is being collected to feed on the form for the databank creation.

Computerization of on–going research projects

Database formats have been developed to computerize the ongoing research projects. The formats were developed in Microsoft Visual Basic 6.0 and now the required tables are to be developed to link them to the main format for making it computer operative.

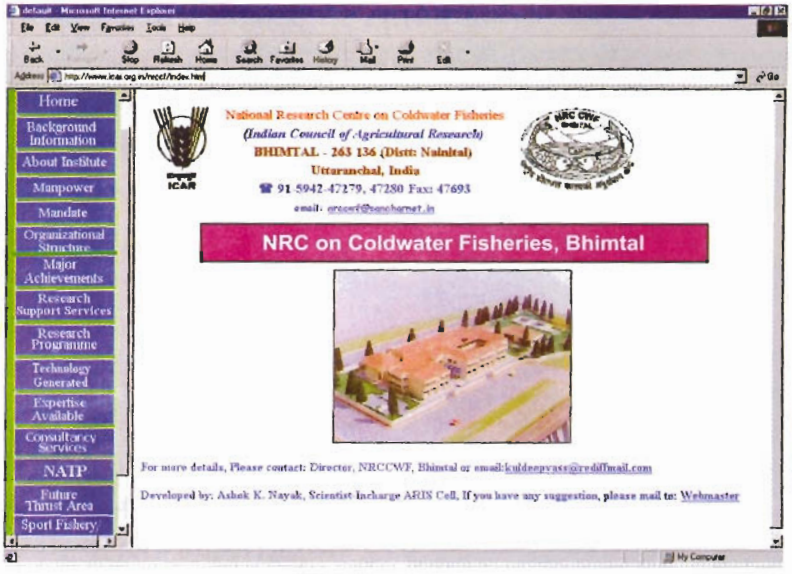
Computer training facility

During the year, in-house training programme on "Microsoft Power Point 2000" and "Advances in Microsoft Word" was organized by ARIS Cell for the staff of the Institute. This in-house training was imparted to Scientific, Technical and Administrative staff of the Institute at Bhimtal and its research Unit at Champawat.

Web page designing

The website of the Institute was developed containing relevant information about the Institute. The site contains information about the institute with photographs of the new complex, experimental fish farm/hatchery of Bhimtal and field station Champawat. The mandate of the institute with organizational structure and manpower is also reflected. The major achievements of the Centre on exotic trout, carps, indigenous snow-trout, golden mahseer and the technology generated by this institute from time to time is being incorporated in the site.

The NRCCWF's website finds place in the Indian Council of Agricultural Research (ICAR) website having the address: http://www.icar.org.in/nrccf/index.htm



(Home page of NRCCWF)

This website is being upgraded by incorporating additional information generated on coldwater fish and fisheries. It will be helpful to persons/organizations involved in fisheries resource management. Also information about angling and sport fishery is being incoporated with more diagrams and photographs.

5. TECHNOLOGY ASSESSED AND TRANSFERRED

FARM ACTIVITIES

Seed production of golden mahseer

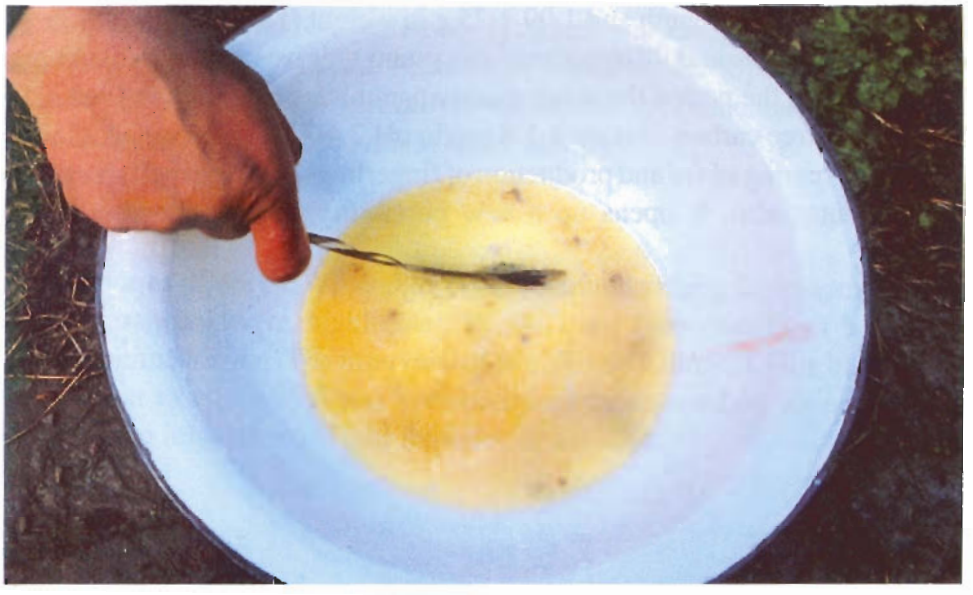
The mahseer seed production programme continued during the period under report, however, attempts were made to raise the small fry in bigger nursery tank and assess their over-wintering feasibility through the use of PVC covering. It was found that wild brood stock in the lake does not have the normal sex ratio, resulting in less number of ripe females. The female brooder were in the size range of 500-1600 g. In the pre-monsoon season breeding was successful with 78-90% fertilization and hatching rate, the yolk-sac got absorbed in 10-12 days at the temperature range of 18.5-23.5°C. The juveniles were fed on the already developed diet. The advanced fry produced during the period were stocked in Kumaon lakes and some of the fry were experimented for over-wintering when the temperature in hatchery falls below 5°C. For this experiment, fry in the size of 15-20 mm in length and 0.03-0.6 g in weight were stocked on October 10, 2001 in earthen pond. In winter growth was minimal due to low temperature but by March the fry had attained a size range of 40-60 mm in length and 0.7-2.4 g in weight. This gives an indication that mahseer seed with proper care can be maintained at lower temperatures.

Rainbow trout breeding and culture

In the state of Uttaranchal in Kumaon region, in the year 1910 about 10,000 trout ova were introduced from Kashmir in the Bhawali hatchery, near Nainital. Again in the year 1912 trout fingerlings were stocked in the Nainital, Naukuchiatal, Sattal, Malwatal and other lakes of Kumaon. But trout did not prove a success in Kumaon lakes due to comparatively high summer temperatures in the region. Whereas, in the Garhwal region of Uttaranchal trout culture commenced with the transplantation of eyed-eggs from Kashmir to Talwari and Kaldayani farms. However, in the recent past with the efforts of NRCCWF, success has been achieved in raising the brood stock of rainbow trout, *Oncorhynchus mykiss* at Chirapani fish farm in the Champawat district of Kumaon region. Further, during recent months success has also been achieved by NRCCWF in breeding rainbow trout at Chirapani fish farm, in hatching of eyed-ova of rainbow trout and then

rearing them at a lower altitude of 1332m above msl in Bhimtal that has comparatively higher range of temperature than Champawat.

Egg-taking from rainbow trout



Newly stripped eggs of rainbow trout are being fertilized

a) Trout breeding at Champawat:

Rainbow trout generally spawns during the winter season in February and March. At NRCCWF's trout farm in Champawat the farm reared brood stock was successfully bred by stripping on 1st February 2002 and 10,000 hatchlings were produced which are being reared and fed on the balanced artificial diet developed for this species. This is first ever attempt to breed this important fish under captivity in the Kumaon region.

b) Trout rearing in Bhimtal:

For the first time eyed-ova of rainbow trout obtained from Himachal Pradesh were procured in the last week of January 2002 and incubated under the warmer temperatures of Bhimtal. Due to higher temperature hatching started on February 8 and was complete by February 12 and it took another 10 days for yolk absorption at a temperature range of 5.5-13.5°C. Normally the hatching process should be carried out at uniform water temperature but at Bhimtal the diurnal fluctuation in water temperature was in the range of 6-8°C. Under this situation the successful hatching is very significant. Immediately after yolk-sac absorption the fry were fed initially on wet feed for a few days and subsequently put on the artificial balanced diet. The feed was given to stocks as per the rates on prescribed body weight and spread over 7-8 times during the day. In one month (30 days) the fry attained a size range of 45-50mm in length and 1.09-1.75 g in weight. This growth is quite good under the conditions and different culture system that was experimented upon at Bhimtal. During the period the water quality parameters ranged dissolved oxygen 5.6-7.6 mg/l ; free carbon dioxide 1-1.8 mg/l ; pH 7.4-7.8 ; and total alkalinity 80-84 mg/l. The rearing of fry and production of fingerlings will be experimented upon during summer also. It opens up a new possibility in trout farming at lower altitudes.

Fish harvest and sale from a demonstration pond

Shri. Ishwari Datt, a progressive fish farmer at Champawat covered under technology transfer programme of the NRCCWF organized a sale of his fish stocks on December 1, 2001. Applying the package of practices evolved by NRCCWF for exotic carp farming in hills, the farmer harvested fishes in the size range of 350-1000 g attained in a period of 210 days, raised in 150 m^2 pond area. This demonstration sale of fish stocks from farmer's pond was formally inaugurated by Shri. P. S. Kutiyal, the additional District Magistrate, Champawat.

Distribution of Fish Seed

Under the TOT programme of the institute the advanced fry of Chinese carps viz., sliver carp, grass carp and common carp were distributed to the progressive farmers in Champawat, Nainital and Almora districts of Uttarachal.

Rajbasha Acitities and World Food day

During September 18-21, 2001 the institute at Bhimtal organized Hindi week. The main function was held on September 21, which was inaugurated by Smt. Bina Arya, Chairperson, Zila Parishad, Nainital. A workshop on "Upland fish farming techniques" in Hindi was organized at Chirapani experimental fish farm on October 16 and 17 to coincide with World Food Day.

Media interaction

The activities of NRCCWF and its contribution in fishery development in the state of Uttaranchal were highlighted by different Newspapers of Hindi and English from time to time. The interview of Shri Nitish Kumar Ji, Hon'ble Minister during his visit to NRCCWF was very prominently covered by all newspapers, highlighting the importance of hill fisheries in the state.

6. EDUCATION AND TRAINING

Training

- Shri. A.K. Nayak, Scientist attended training programme on "Digital Imaging and Publications" at CIFE, Mumbai during May 10-19, 2001.

- "Parvatiya kshetron mein vaigyanik vidhi dwara adhik matsya utpadan". A training programme organized by the Institute at its experimental fish farm at Chirapani, Champawat from July 10-14, 2001 was attended by 13 farmers and one scientist from G. B. Pant Institute of Himalayan Environment and Development (Ministry of Environment and Forest Government of India), Kosi, Distt. Almora.

- "Upland fish farming techniques". A training programme was organized on the occasion of World Food Day on October 16-17, 2001 at Chirapani experimental fish farm, Champawat. It was attended by the fish farmers, public representatives, villagers and students of the local schools and colleges.

- Dr. H. S. Raina, Principal Scientist participated in a training programme on "IPR & WTO to NARS scientists" held at Indian Institute of Sugarcane Research, Lucknow during September 5-7, 2001.

- Mr. A. K. Nayak, Scientist imparted in house training on "Microsoft Power Point–2000" to the staff members of the Institute from October 9-11, 2001.

- Ms. Yasmeen Basade, Scientist participated in a short-term training programme on "Molecular Markers: Tools for Fish Genetic Analysis" at NBFGR, Lucknow from October 20th to November 10th, 2001.

- The training was imparted to Uttaranchal State fisheries Department personnels during last week of January 2002 in computer data base output.

7. AWARDS AND RECOGNITION

Ms. Yasmeen Basade, Scientist was awarded Doctorate degree by Central Institute of Fisheries Education (Deemed University), Mumbai for her thesis work "Evaluation of the nutritional role of some growth promoters and possibilities of their utilization in mahseer culture".

Shri. A. K. Nayak, Scientist qualified "Hindi Prabodh" examination organized by Central Hindi Training Institute, New Delhi.

8. LINKAGES AND COLLABORATION

Linkage with North-East

In collaboration with the Department of Fisheries, Government of Arunachal Pradesh, ICAR has sanctioned a project to NRCCWF for establishing a hatchery for the artificial seed production of Chocolate mahseer *Acrossocheilus hexagonolepis* at Arunachal Pradesh. This will help in conserving the mahseer population in the State. The project cost is Rs.25.7 lakh and is likely to be completed within three years. It is one of the major initiative of NRCCWF in the north-east after an interactive meeting held by NRCCWF, QRT including Director with Chief Minister and Fishery Minister and other senior officers of the State at Itanagar on June 19 and 20, 2000.

State Agriculture Universities

The project on "Aquaculture in Coldwaters –Evaluation of Mahseer Fishery Potential and its Farming Feasibility for Conservation in Himalayan Region" funded by the World Bank under NATP approved by the Council with NRCCWF as a lead centre. The project aims at evaluation of mahseer fishery potential in the different Himalayan zones i.e., Kumaon, Garhwal, Himachal Pradesh and Jammu and Kashmir Himalayas with an integrated approach to generate reliable database on its status. The collaborating institutions – G. B. Pant University of Agriculture and Technology, Pantnagar (Uttaranchal), H. P. Krishi Vishwavidyalaya, Palampur (Himachal Pradesh) and S.K. University of Agriculture Sciences and Technology, Srinagar (Jammu and Kashmir) bear the responsibilities to enumerate the data on ecology and fishery of various mahseer waters in the respective regions. In addition, the culture technology will be evolved in each of the Himalayan region for conservation of this prized germplasm and to rejuvenate mahseer fishery in the depleted waters in Himalayas. Apart from NATP programme, the NRCCWF has very close linkage with the college of Fisheries, G. B. Pant Agricultural University and both have taken many joint initiatives towards hill fishery development programmes in the State of Uttaranchal.

Sister Institutes and Outside ICAR

- The Institute have linkages with Institutes–CIFA, Bhubaneswar; NBFGR, Lucknow; Kumaon University, Nainital, and DARL, Pithoragarh for the various coldwater fisheries research and development activities including fish feed nutrition, cryopreservation of milt and other fish conservation aspects for promoting the hill fishery.

- The Institute has developed linkages with the State Fisheries Department of Uttaranchal, Himachal Pradesh and Uttar Pradesh for various research and development activities.

- The Institute have strong linkages with regard to transfer of technology programme for aquaculture in hills with - Sainik School, Ghorakhal; Birla Institute, Bhimtal; District Development Department, Champawat; Village Panchayats in Pati and Bhimtal Block.

- The Institute established linkages for the usage of watershed programmes in development of coldwater fisheries with CSWCR & TI, Dehradun.

9. PUBLICATIONS

Book chapters

Shyam Sunder and H. S. Raina. Fishery resources and their management in Kashmir Himalaya-a profile. In: Natural Resources of Western Himalaya (Ed. Ashok K. Pandit): 223-243

Vass, K. K. Status and future thrust of coldwater fisheries in Himalayas. In: Coldwater fish Genetic Resources and their Conservation. NATCON Publication No. **7**: 37-46.

Singh, A. K. Biotechnology in coldwater fishery development, molecular biology and fish genetics. *Ibid.* 75-88.

Shyam Sunder and C. B. Joshi. Ecology and Fishery of the rivulet Ladhiya in Uttaranchal. *Ibid.* 189-194.

Full papers

Vass, K. K. 2001 Indian Coldwater Fisheries–Technology support. SOUVENIR. Fishery Technology & their Commercialization. Indian Fisheries Association, CIFE, Mumbai. pp 61-66.

Vass, K. K. 2002. Water Management and Fishery Development–Problems and Issues. In: Riverine and Reservoir Fisheries of India. (Boopendranath, M.R., Meenakumari, B., Joseph, J., Shanker, T.V., Pravin, P., & Edwin, L., Eds.) pp 338-344; Society of Fisheries Technologists (India), Cochin.

Seminar/ Symposium/ Workshops

Joshi, K. D. 2001. Brood stock rearing of threatened *Schizothorax richardsonii* in farm conditions. "Workshop on Captive Breeding of Prioritized Cultivable and Ornamental Fishes for Commercial Utilization and Conservation". National Bureau of Fish Genetic Resources, Lucknow. NBFGR-NATP Publication-3. Paper No. 22 : 1-2.

Joshi, K. D. 2001. Status of sport fisheries resources in Kumaon Hills. "Workshop on Integration of Fish Biodiversity Conservation and Development of Fisheries in North Eastern Region through Community Participation. National Bureau of Fish Genetic Resources, Lucknow and NEC, Shillong. Guwahati. Abst. Page No. 84-85.

Mohan, M., Basade, Y., Bhanja, S.K., and Kapila, S. 2001. Experimental growth performance of golden mahseer fed with diffrent fish diets. International Symposium on "Fish for Nutritional security in 21st centuary" Central Institute of Fisheries Education (Deemed University). Mumbai.

Mohan, M. 2000. Fish and fisheries of Gaula river in Kumaon Himalaya. 89th Session of Indian Science Congress, Lucknow.

Departmental Books/ Reports/ Bulletins/ Pamphlets

Joshi, K. D. 2001. Uttaranchal mein matsayaki vikas ki sambhawanayei. Bulletin No. 6

Vass, K. K. 2001. Contribution of NRCCWF in coldwater fisheries research and extension. Bulletin No. 7.

Raina, H. S., Sunder, S., Joshi, C. B., and Mohan, M. 2002. Sunheri mahseer. Bulletin No. 8.

Joshi, C. B. 2002. Trout fisheries in India. Bulletin No. 16.

Sunder, S. 2002. Himalaya khetron mein asela (Snow-trout) matsyaiki. NRCCWF Publ. No. 17.

Sunder, S. 2002. Sheetjal matsya ahar. NRCCWF Publ. No. 18.

NRCCWF – NEWS Vol 4 (1 & 2).

10. APPROVED ONGOING PROJECTS

Title of the Projects	Project Leaders & Associates	Year of Start	Likely year of termination
Ecological modeling and fishery enhancement in lakes/ wetlands in Himalayan/ sub-Himalayan region	Dr. K.K. Vass Dr. H.S. Raina Dr. C.B. Joshi	1998	2003
Establishment of baseline information with respect to aquatic resource assessment and bio-diversity with application of GIS	Dr. H.S. Raina Dr. S. Sunder Dr. A.K. Singh	1998	2003
Nutrition and feed development for upland fish with the focus on indigenous species	Dr. M. Mohan Dr. Y. Basade	1998	2003
Studies on induced ovarian development, maturation and spawning of grass carp (*Ctenopharyngodon idella*) and silver carp (*Hypophthalmicthys molitrix*) in coldwaters.	Dr. B.C. Tyagi Dr. K.D. Joshi	2000	2004
Conservation and genetic upgradation of golden mahseer, *Tor putitora*	Dr. A.K. Singh Dr. K.D. Joshi	2001	2004
Demonstration of exotic carp farming in coldwaters	Dr. B.C. Tyagi Dr. K.D. Joshi	1998	2003
Computer application in coldwater fisheries resource assessment and management	Mr. A.K. Nayak Dr. K.K. Vass	2000	2003

11. CONSULTANCY, PATENTS, COMMERCIALIZATION OF TECHNOLOGY

The Institute has sufficient expertise in the field of Hill Aquaculture and Aquatic Resource Management and we are evolving multiple mechanisms to exploit the existing complementary linkages with national R & D organizations for providing technology backup in the hill fisheries development. During the period following consultancies have been finalized :

- Largest reservoir on the river Bahgirathi for power generation in the State of Uttaranchal being developed by Tehri Development Corporation. The organization as part of environmental restoration is embarking on mahseer conservation programme in the reservoir. In this context NRCCWF is providing consultancy for designing of entire hatchery and farm complex for mahseer seed production at the project site. The NRCCWF will also provide initial training to the project staff in breeding and hatchery management. The consultancy and MOU has already been signed and work has been initiated. The NRCCWF will be paid Rs. 7.50 lakh by THDC for this consultancy.

- A consultancy for preparation of feasibility report for development of Coldwater Fisheries in the higher reaches of Kerala is under advanced stage of negotiations with the State authorities.

12. RAC, MC, SRC, QRT MEETINGS

Research Advisory Committee (RAC)

The Research Advisory Committee of the Institute was re-constituted vide ICAR order No. 18 (1) 197-ASR-Z dated 18.9.2001 and comprises following eminent experts in the field of fisheries :

Dr. S.N. Dwivedi	Ex-Director CIEF, Mumbai & Ex-D.G., MPCST, Bhopal	Chairman
Dr. K. Radhakrishna	Ex-ADG (M.Fy.), ICAR, New Delhi	Member
Dr. Kuldip Kumar	Director of Fisheries, Himachal Pradesh	Member
Dr. U.P. Singh	Dean, College of Fisheries G.B. Pant University of Agriculture & Technology, Pantnagar	Member
Dr. M.K. Joyti	Professor of Zoology Jammu University	Member
Dr. K.K. Vass	Director, NRCCWF, Bhimtal	Member
Dr. B.N. Singh	ADG (I Fy), ICAR, New Delhi	Member
Dr. M. Mohan	Principal Scientist, NRCCWF, Bhimtal	Member Secretary

Research Advisory Committee meeting (October 30-31, 2001)

The annual meeting of the Research Advisory Committee was convened under the chairmanship of Dr. S.N. Dwivedi, Ex-Director General, Madhya Pradesh Council of Science and Technology, Bhopal; Ex-Director, Central Institute of Fisheries Education, Mumbai; Ex-Additional Secretary, Government of India. The meeting was attended by above members. Two representatives of Management Committee viz., Dr. Jagdish Chandra Nirmohi from Delhi and Shri Pramod Kumar Raju from Patna were invited for the meeting as per ICAR norms but only Mr. Raju participated in the meeting. After the introductory remarks by the committee members a thorough discussion was held on the progress of various research projects of the Institute during the year. The major observations of the RAC were to examine the possibility of initiating two cess fund projects one on brown trout

with Himachal Fisheries and another on expansion of carp culture with Sainik School Ghorakhal; development of computerised database collection formats for hill fisheries resources; networking with local SAU's and academic universities for taking up M. Phil and Ph.D. students on coldwater fishery problems to generate more information, with joint involvement of faculty from universities and NRCCWF; a working group on Hill Fisheries to be constituted at national level ; the web-page of the centre to be revised ; the NRCWF to be up-scaled to address the coldwater problems of other States as well ; the frequency of Newsletter to be increased by including activities of other users of this sector; the success stories of the institute should be documented. The committee members were very much satisfied with the performance of each project and overall institute activities. They felt happy that complex is getting ready and it will greatly help to widen the research focus of NRCCWF that will serve the coldwater fisheries sector immensely.

Dr. K. Radhakrishna, Dr. S.N. Dwivedi and Dr. B.N. Singh, ADG (IFY) during RAC meeting

Dr. K.K. Vass, Director addressing the RAC meeting

Management Committee (MC)

The meeting of the management committee was held on December 15, 2001 under the chairmanship of the Director, NRCCWF and the various agenda items were discussed and decisions taken for the smooth functioning of the Institute. The following members of the committee attended the meeting;

Dr. K.K. Vass	Director, NRCCWF, Bhimtal	Chairman
Dr. Kuldip Kumar	Director of Fisheries, Govt. of Himachal Pradesh	Member
Dr. U.P. Singh	Dean, College of Fisheries, GBPUA&T, Pantnagar	Member
Dr. M.P. Singh Kohli	Principal Scientist, CIFE, Mumbai	Member
Dr. H.S. Raina	Principal Scientist, NRCCWF, Bhimtal	Member
Dr. Jagdish Chander Nirmohi	Delhi	Member
Shri. Promod Kumar Raju	Patna	Member
Shri. J.C. Pant	F & AO, IVRI, Izatnagar	Member
Dr. Madan Mohan	Principal Scientist, NRCCWF, Bhimtal	Member Secretary

Management Committee members visiting the NRCCWF complex (under construction)

Staff Research Council (SRC) Meeting

The annual meeting of Staff Research Council (SRC) of the institute was held on May 28, 2001 at Bhimtal. Apart from scientific staff of the institute Dr. B.N. Singh ADG (Inland fisheries) ICAR also attended the meeting. During the meeting a thorough assessment of progress of work under each on-going programmes was made. On the lake project it was pointed out that impact of free carbon dioxide in winter on fish mortality may be looked into. On nutrition project the ADG observed that amino acid composition in the feed especially the levels of hystidine to be evaluated. On the carp brood stock maturation at Chirapani it was suggested that Ovaprime and HCG hormones may be tried in experiments. On the riverine fish biodiversity programme it was observed that efforts should also be made to locate potential seed collection grounds. On the technology transfer of carp culture in hills it was suggested that more beneficiaries be brought under this activity. The work on the computer application has been recently initiated but has made good progress and it should focus on development of database formats for hill fisheries resource databank. The progress under NATP project was also evaluated and a new proposal on mahseer sex ratio and traits in natural populations approved to be initiated. The SRC lent its approval to the project programme of NRCCWF for the year 2001-2002. During the meeting some administrative and financial matters of the institute were also discussed by the ADG and he at the end expressed satisfaction over the progress made by the institute in all its activities.

Quinquennial Review Team (QRT) Meeting

Prior to the Chairman of the committee Dr. M.Y. Kamal, V.C., SUKAST submitted his final report and recommendations to the D.G., ICAR & Secretary DARE on June 6, 2001, he held a wrap-up meeting at Bhimtal on April 24-25, 2001 in which two other members Dr. C.S. Singh and Prof. (Dr.) D.P. Zutshi participated.

Vision-2020 Review Meeting

The Vision 2020 document of NRCCWF which was prepared with the approval of ICAR in the year 1997 has been in operation during the entire period of IX plan. It was directed by ICAR that after having implemented the VISION for five (5) years it was advisable to have the progress and constraints faced in its implementation evaluated by the peers. Accordingly NRCCWF took the initiative to get VISION progress reviewed, discussed and evaluated by a high level team comprising Dr. S.N. Dwivedi, Chairman RAC and Dr. S.A.H. Abidi, member, ASRB on 4-5th February 2002 at NRCCWF Bhimtal. Prior to the meeting a document on the proposed review was prepared by the centre and submitted to the peers. The Director, Dr. K.K. Vass made a presentation highlighting the progress in implementation, success achieved, constraints faced and suggested changes

Dr. S.N. Dwivedi, Chairman RAC, Dr. S.A.H. Abidi, Member ASRB and Dr. K.K. Vass, Director at VISION 2020 review meeting

Dr. S.A.H. Abidi releasing Institute's publication at VISION 2020 review meeting

required in the VISION-2020 document for the remaining period. The minor changes proposed were with regard to preamble, wording in the mandate, scientific cadre strength & discipline, programmes, new initiatives and up-scaling of the

Vision 2020 Review Team inspecting a fish haul at Chirapani fish farm, Champawat

NRCCWF. The changes in the sector with regard to increased resource base, scenario, strengths, weaknesses were also discussed in the meeting. The peers observed that hill fisheries is gaining importance nationally accordingly we should enlarge our research focus in this sector and provide better state of art institutional & infrastructure support to this important sector. They observed that this sector can provide opportunities for international collaboration. The committee also paid a visit to Chirapani experimental farm where they inspected different field activities under TOT and farm facilities. The committee appreciated the progress achieved by the NRCCWF in implementing VISION-2020 action during last five years.

Other Committees

Official Language Committee

Dr. K.K. Vass	Chairman
Dr. A.K. Singh	Member Secretary
Shri. A.K. Nayak	Member
Smt. Susheela Tewari	Member
Shri Harish Ram	Member
Shri Amit Kumar Joshi	Hindi Translator & Member
Shri Ravinder Kumar	Member

Terms of Reference

- To monitor the progress of work done in official language from time to time
- To organize *Raj Bhasha* activities as intimated by the council from time to time

The regular quarterly meetings of the committee were held under the Chairmanship of the Director. In the meetings it was decided to celebrate the current year as *Hindi chetana mass* in order to bring awareness among the staff members about our national language. During September 18-21, 2001 The Institute celebrated Hindi week.

Joint Staff Council

Official side	Staff side
Dr. K.K. Vass, Chairman & Director	Shri Harish Ram, Asst. & Member CJSC
Dr. Madan Mohan, Principal Scientist	Shri T.M. Sharma, Technical, Member
Dr. Shyam Sunder, Principal Scientist	Shri Baldev Singh, Technical, Member
Dr. A.K. Singh, Senior Scientist	Shri, J.C. Bhandari, LDC, Member
Dr. K.D. Joshi, Scientist (SS)	Shri Ravinder Kumar, SSG-III, Member
Shri R.L. Raina, AAO, Member Secretary	Shri H.S. Bhandari, SSG-II, Member.

The Institute's Joint Staff Council's meetings were held regularly under the Chairmanship of the Director and was attended by all the members from official side and staff side. In the meetings action taken on previous agenda items were reviewed and various new agenda items regarding welfare of the staff were discussed.

Sports Meet

The staff of the Institute participated in the zone IV Inter-Institutional Sports Meet held at Central Institute for Research on Buffalo, Hissar, Haryana during November 3-7, 2001.

13. PARTICIPATION IN CONFERENCES, SEMINARS, MEETINGS AND WORKSHOPS

Conferences/ Meetings/ Symposiums/ Seminars/ Workshops	Participants
Workshop on "Research Prioritization for Diversification of Agriculture and Rural Industries" April 26, 2001. At G.B. Pant Agriculture University, Pantnagar.	Dr. C.B. Joshi
Workshop on "Captive Breeding of Prioritized Cultivable and Ornamental Fishes for Commercial Utilization and Conservation". July 29-30, 2001. At National Bureau of Fish Genetic Resources, Lucknow.	Dr. M. Mohan Dr. A.K. Singh Dr. K.D. Joshi
National workshop on "Mighty Mahseer-Biodiversity and Genetic Conservation". August 24-25, 2001. At The Tata Power Company Limited, Lonavla.	Dr. K.K. Vass Dr. Shyam Sunder
National Workshop on "Basic Sciences and Fisheries". September 11-12, 2001. At CIFE, Mumbai.	Dr. M. Mohan
International symposium on "Fish for Nutritional Security in 21st Century". December 4-6, 2001. At CIFE, Mumbai.	Dr. K.K. Vass Dr. M. Mohan
Workshop on " Integration of Fish Biodiversity Conservation and Development of Fisheries in North Eastern Region through Community Participation". December 12-13, 2001. NBFGR, Lucknow and NEC, Shillong. At Guwahati.	Dr. A.K. Singh Dr. K.D. Joshi
89th session of Science Congress January 3-7, 2002 At Lucknow.	Dr. Madan Mohan

Meetings

Brainstroming session on "Introduction of **Exotics and Quarantine". Nov**ember 1-2, 2001. At NB**FGR, Lucknow.**	Dr. A.K. Singh
ICAR-ICLARM interaction meeting at N**BFGR, Lucknow on April 12-13, 2001**	Dr. K.K. Vass
QRT discussions with DDG (Fy) for finalization **of report and recommendations** at ICAR on April, **2001**	Dr. K.K. Vass

Meeting of the sub-group for X plan proposal for fisheries under the chairmanship of DDG (Fy) at ICAR on May 3, 2001.	Dr. K.K. Vass
Discussion on the proposed fisheries development project at Tehri with Dy. GM (Env) Tehri Hydro Dev. Crop. Ltd. on May 8-10, 2001	Dr. K.K. Vass
57th meeting of the Project Screening Committee and Scientific Panel for Fisheries at ICAR, June 12-14, 2001	Dr. K.K. Vass
DPC for Carreer Advancement Scheme for ARS Scientist at CIFE, Mumbai, July 18, 2001.	Dr. K.K. Vass
Director's conference at NBPGR , New Delhi and Fisheries Divisional Meeting, July 23-25, 2001.	Dr. K.K. Vass
Summer Institute Lecture at CICFRI, Barrackpore August 10, 2001.	Dr. K.K. Vass
Meeting with the Principal Secretary Forest & Rural Development, Govt. of Uttaranchal, Dehradun, August 31 & September 1, 2001.	Dr. K.K. Vass

Dr. K.K. Vass, Director participating in First meeting of Asia Regional Advisory Group at NACA Hqrs., Bangkok, Thailand

Meeting regarding cadre strength of scientist in Fisheries institutes in view of X plan at CIFE, Mumbai September 22-24, 2001.	Dr. K.K. Vass
Meeting on Genetic Improvement of Farmed Carps under Indo-Norwegian Project at KAB-II on October 1, 2001.	Dr. K.K. Vass
First meeting (AGM-I) of the Asia Regional Advisory Group on Aquatic Animal Health (AG) from November 7-9, 2001 at NACA Headquarters, Bangkok, Thailand.	Dr. K.K. Vass
Meeting on the revised IX Plan EFC proposal at ICAR Hq Under the Chairmanship of DDG (Fy), ICAR on December 20-21, 2001	Dr. K.K. Vass
Director's Meeting at NBPGR, New Delhi between December 27-28, 2001	Dr. K.K. Vass
Meeting with high level committee on VISION review at Chirapani experimental farm, on February 5, 2002.	Dr. K.K. Vass
58th Meeting of the Project Screening Committee (PSC) and the Scientific Panel for Fisheries at KAB-II, New Delhi March 5-7, 2002	Dr. K.K. Vass

14. WORKSHOP & FARMERS'S EVENTS ORGANIZED

Fish Farmer's Day

Government of India declared 10th July as Fish Farmer's Day. NRC on Coldwater Fisheries celebrated Fish Farmer's Day by organizing a training programme at Chirapani experimental fish farm, Champawat for four days between July 10-14, 2001 with a focus on " learning by doing". The theme of the training programme was "Parvatiya kshetron main vaigyanik vidhi dwara adhik matsya utpadan". The programme was designed to meet the needs of many farmers who are now attracted towards fish cultivation in hill regions and are ready to adopt the culture technologies evolved by the Institute. In all 13 farmers and one scientist from G.B. Pant Institute of Himalayan Environment and Development (Ministry of Environment and Forest, Government of India), Kosi, District Almora participated in the training programme. They were imparted practical training and demonstration of farm activities. The scientists of the Institute were resource persons and the valedictory function was graced by Shri. S.K. Maheshwari, IAS, District Magistrate, Champawat, who distributed certificates to the trainees.

Fish farmer's Day, Training and Hindi Workshop organized at Chirpani fish farm, Champawat

Training-cum-Hindi Workshop

On the occasion of World Food Day–October 16, 2001 the Institute organized a Hindi Workshop from October 16-17, 2001 at its Champawat research centre. Shri. Mahendra Singh Maharana, Chairman, Zila Panchayat, Champawat presided at the concluding session. The resource person from the institute Dr. Shyam Sunder, Dr. B.C. Tyagi, Dr. A.K. Singh and Dr. K.D. Joshi delivered lectures and imparted training to the participants in fish culture methodologies. The chief guest distributed certificates to the trainees and stressed in his remarks that Hindi literature produced by NRCCWF will be of immense value to local farmers.

The audience at Hindi Workshop and Fish Farmer's Day at Champawat

Kisan Mela

The Institute participated in Kisan Mela organized by Krishi Vigyan Kendra of G.B. Pant University of Agriculture and Technology, Pantnagar at Sui village, Lohaghat on May 7, 2001 and exhibited various research and extension activities of the Institute. The Institute's stall was visited by the Hon'ble Minister of Irrigation and Energy, Govt. of Uttaranchal Shri. Bhagat Singh Kaushyari Ji along with other dignitaries of Champawat district.

Goshthi

Dr. K.D. Joshi, Scientist participated in 'Kharif goshthi and Nivesh mela" organized by district adminstration at Panchayat Bhavan, Champawat. He also delivered a talk on "Parvatiya kshetron mein matsya palan ki vidhiyan" on the occasion. Shri. S.K. Maheshwari, IAS, District Magistrate, Champawat presided over the function and many extension officers, gram pradhans and farmers of the district attended the function.

Hindi Week

The Institute organized Hindi week during September 18-21, 2001 at Bhimtal. On the concluding day of Hindi week celebration, an essay competition, debate and goshti were organized in which the staff members of the Institute, students from local schools and colleges and invited guests participated. The occasion was inagurated by Smt. Bina Arya, Chairperson, Zila Panchayat, Nainital; Shri P.K. Mishra Deputy Director, Central Silk Research Station, Bhimtal and Miss. Rina Ray, Manager, State Bank of India, Bhimtal were among the dignitaries present. The chief guest awarded certificates & momentos to winners of various competitions. Speaking at the function the Director of the Institute highlighted the activities and achievements of the Rajbhasha Implementation Cell of the Institute. On this occasion Hindi Publications of the Institute were exhibited which evinced keen interest of participants. The chief guest in her remarks appreciated the efforts of NRCCWF scientists in bringing out the publications in Hindi thus making it easy for the common masses to understand and adopt the technologies of fish cultivation in hill areas.

Director welcoming Smt. Bina Arya, Chairperson, Zila Panchayat, Nainital during Hindi Week Celebration of NRCCWF, Bhimtal

15. DISTINGUISHED VISITORS

Following distinguished dignitaries visited the Institute during the year between April-March 2001–2002.

His Excellency Governer of Uttaranchal Shri Surjeet Singh Barnala ji visits NRCCWF experimental fish farm, Chirapani, Champawat

Hon'ble Governer is being briefed by the Director about the NRCCWF activities

Hon'ble Governer feeding the fishes in a pond at Chirapani fish farm, Champawat

Shri. Surjeet Singh Barnala Ji, His Excellency Governor of Uttaranchal.

Shri. Nitish Kumar Ji, Hon'ble Union Minister of Agriculture, Government of India.

Shri. Nav Prabhat, Hon'ble State Minister of Forest and Environment, Government of Uttaranchal.

Dr. M. Mahadevappa, Chairman, Agricultural Scientists Recruitment Board, ICAR, New Delhi.

Dr. S.A.H. Abidi, Member, Agricultural Scientists Recruitment Board, ICAR, New Delhi.

Dr. A.G. Sawant, Member, Agricultural Scientists Recruitment Board, ICAR, New Delhi.

Shri R.S. Prasad, Financial Advisor, DARE/ ICAR, New Delhi.

Dr. M.Y. Kamal, Vice Chancellor, S.K. University of Agricultural Sciences and Technology, Srinagar, Jammu and Kashmir.

Dr. K. Gopakumar, Deputy Director General (Fisheries), ICAR, New Delhi.

Dr. Kiran Singh Deputy Director General (Animal Science), ICAR, New Delhi.

Dr. M.P. Yadav, Director, Indian Veterinary Research Institute, ICAR, Izatnagar.

Dr. S.N. Dwivedi, Ex-Director General, M.P. Council of Science and Technology, Bhopal; Ex-Director, Central Institute of Fisheries Education (Deemed University), Mumbai and Ex-Additional Secretary, Government of India.

Dr. D.P. Zutshi, Ex-Director, CORD, Kashmir University, Srinagar, Jammu and Kashmir.

Dr. C.S. Singh, Former Dean (Fisheries), G.B. Pant University of Agricullture and Technology Agricultural University, Pantnagar

Dr. K. Radhakrishna, Ex-Assistant Director General (Marine Fisheries), ICAR, New Delhi.

Dr. B.N. Singh, Assistant Director General (Inland Fisheries), ICAR, New Delhi

Shri Nitish Kumar Ji, Hon'ble Minister of Agriculture, Government of India is being breifed by the Director about NRC's activities

Hon'ble Minister Shri Nitish Kumar Ji addressing NRCCWF staff

Hon'ble Minister Shri Nitish Kumar Ji and Deputy Director General (Fisheries), ICAR, Dr. K. Gopakumar at the Mahseer hatchery site, inspecting the mahseer fry rearing in a tank

Shri. S.K. Maheshwari, IAS, District Magistrate, District Champawat, Uttaranchal.

Shri. P.S. Kutiyal Additional District Magistrate, Champawat, Uttaranchal.

ASRB Chairman Dr. M. Mahadevappa vists NRCCWF centre at Bhimtal

ASRB Chairman viewing the NRC's activities from a computer

Prof. M. Jyoti, Jammu University, Jammu and Kashmir

Dr. Kuldip Kumar, Director of Fisheries, Government of Himachal Pradesh

Dr. U.P. Singh, Dean, College of Fishery Sciences, G.B. Pant University of Agriculture and Technology, Pantnagar

Dr. M.P. Singh Kohli, Principal Scientist, Central Institute of Fisheries Education (Deemed University), Mumbai

Dr. S.D. Singh, Principal Scientist, Central Institute of Fisheries Education (Demed University), Mumbai.

Students of Fisheries College, GB Pant University of Agricultural and Technology, Pantnagar.

Students from Zoology Department, Chaudhary Charan Singh, University, Meerut, Uttar Pradesh

Dr. Praveen Tamot, Joint. Director, M.P. Council of Science and Technology Bhopal, Medhya Pradesh

Mr. S.R. Chaniyal, Joint. Director, Uttaranchal Department of Fisheries Dehradun, Uttaranchal.

Dr. A.G. Sawant, Member ASRB being briefed about NRCCWF's activities

Dr. R.S. Prasad, FA, DARE is being briefed by the Director about NRCCWF activities

Dr. Kum Kum Shah, Lecturer Post-graduate College, Pithoragarh, Uttaranchal.

Shri. M.S. Maharana, Chairman, Zila Parishad Campawat, Uttaranchal

Shri. R.S. Nayal, S.P. Champawat, Uttaranchal.

Smt. Bina Arya, Chairperson, Zila Panchayat, Nainital, Uttaranchal.

Shri. P.K. Mishra, Deputy Director, Central Silk Research Institute, Bhimtal, Uttaranchal

Ms. Reena Ray, Manager, State Bank of India, Bhimtal, Uttaranchal.

16. PERSONNEL AS ON MARCH 31, 2002

SCIENTIFIC

1. Dr. K.K. Vass, Director
2. Dr. Madan Mohan, Principal Scientist
3. Dr. H.S. Raina, Principal Scientist
4. Dr. C.B. Joshi, Principal Scientist
5. Dr. Shyam Sunder, Principal Scientist
6. Dr. B.C. Tyagi, Principal Scientist
7. Dr. A.K. Singh, Senior Scientist
8. Dr. K.D. Joshi, Scientist
9. Dr. Yasmeen Basade, Scientist
10. Shri. Rajeev Kapila, Scientist (After Study leave reported on March 19, 2002)
11. Shri. A.K. Nayak, Scientist

ADMINISTRATIVE

1. Shri. Prakash Chandra Arya, AF&AO (on promotion to ICAR, New Delhi w.e.f. 29.5 2001)
2. Shri. R.L. Raina, AAO
3. Shri, Harish Ram, Asstt.
4. Shri. Manni Lal, Asstt.
5. Smt. Susheela Tewari, Stenographer
6. Smt. Khilawati Rawat, Senior Clerk
7. Shri. P.C. Tewari, Junior Clerk
8. Shri. Pratap Singh, Junior Clerk
9. Shri. J.C. Bhandari, Junior Clerk
10. Smt. Munni Bhakt, Junior Clerk (Compassionate Appointment on 12.11.2001)

TECHNICAL

1. Shri. R.S. Haldar, T-5
2. Shri. Amit Kumar Joshi, T-3 (Hindi Translator)
3. Shri Baldev Singh, T-3
4. Shri. Santosh Kumar, T-3
5. Shri. Ravinder Kumar, T-2
6. Shri. Gopal, T-2
7. Shri. R.K. Arya, T-2
8. Shri. Hansa Dutt, T-2
9. Shri. T.M. Sharma, T-2
10. Shri. Bakshi Ram, Driver (T-1)
11. Shri. Bhagwan Singh, Driver (T-1)

SUPPORTING

1. Shri. Japhu Ram, SSGr IV
2. Shri. Sant Ram, SSGr IV
3. Shri. Ravinder Kumar, SSGr III
4. Shri. Om Raj, SSGr III
5. Shri. H.S. Chauhan, SSGr III
6. Shri. H.S. Bhandri, SSGr II
7. Shri. Dharam Singh, SSGr I
8. Shri. Sunder Lal, SSGr I
9. Shri. Manoj Kumar, SSGr I
10. Shri. Pooran Chandra, SSGr I
11. Shri. Kuldeep Kumar, SSGr I
12. Shri. Bhola Dutt, SSGr I
13. Shri. Prakash Akela, SSGr I
14. Shri. Chander Shekhar, SSGr I
15. Smt. Basanti Devi, SSGr I (Compassionate Appointment on 12.11.2001)

17. SPECIAL INFRASTRUCTURAL DEVELOPMENT

After the foundation stone ceremony for the NRCCWF complex at Bhimtal, held on March 12, 2001, the construction work on the Phase-I of the complex was initiated by CPWD in full swing. The progress on the construction so far has been satisfactory and the estimated construction time given by CPWD authorities is 18 (eighteen) months. There is a close interaction between the works committee of the

A model of NRCCWF complex at Bhimtal is being inspected by Shri Nitish Kumar ji, Hon'ble Minister of Agriculture, Goverment of India

institute with execution agency and the progress is monitored regularly at meetings held from time to time. During the period under report many dignitaries from ICAR, outside organizations, and members of different committees viz., QRT, RAC and Management, visited the construction site. Some of the VIP's who paid a visit to site are Shri Nitish Kumar Ji, Hon'ble Minister of Agriculture and Railway, Govt. of India, Hon'ble Minister of Industries, Govt. of Uttaranchal ; Dr. S.A.H. Abidi, Member ASRB, New Delhi; Dr. M.Y.Kamal, Vice-Chancellor, SUKAST, Sringar; Dr. S.N. Dwivedi, Chairman RAC ; Dr. M.P. Yadav, Director IVRI, Izatnagar ; all of these expressed satisfaction over the progress of work and gave suggestions to the execution authorities.

RAC Chairman Dr. S.N. Dwivedi with other members visits NRCCWF complex at Bhimtal

Further, with the initiative of institute and support from DDG (Fy) and DG, ICAR, through submission of the revised IX ECF for works, the Council accorded administrative approval and financial sanction to initiate Phase-II activities of the complex also. This has enabled the institute to give construction work order for phase-II to CPWD in March 2002, during the terminal year of IX plan. It is expected that NRCCWF infrastructure will be ready very soon which will greatly facilitate its working. Apart from this major work, additional farm and hatchery facilities were also created and up-scaled at Bhimtal and Chirapani during the period under report.