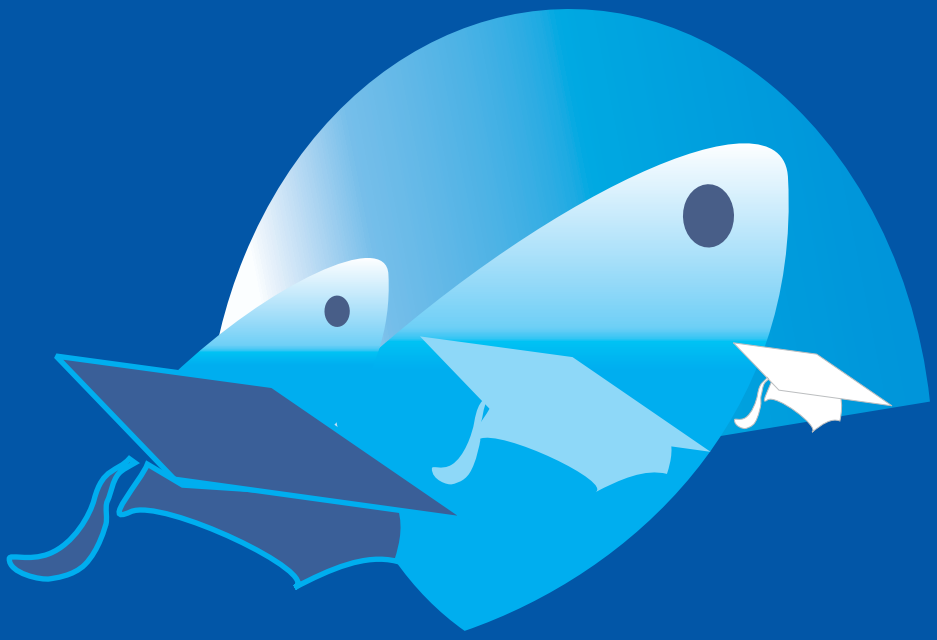
ANNUAL REPORT

2006-07



CIFE

central institute of fisheries education

(deemed university-icar)

7, bungalows, andheri (w)

mumbai - india

Contents

1 Preface

The year 2006-07 has been the year of change and major reorientation in CIFE's academic, research, field action and development support programs. 'CIFE Vision 2025: Perspective Plan' was prepared through an elaborate and intensive exercise. The Mandate has been revised in view of changed scenario and the future challenges so as to instill more focus and specificity and to achieve the vision of *'becoming a global player for specialised HRD in fisheries and be counted among the best for academic excellence'*. In academics, the structure and curricula of MFSc programs were reorganised to impart greater professional skills by including three months of hands on experience in relevant field through student attachments in farm, industry, NGO, etc while a week long training on board MFV Saraswati has been made compulsory for all. Also, the Aquaculture programs in MFSc & PhD was streamlined and strengthened by merging three separate programs of Inland Aquaculture, Freshwater Aquaculture and Mariculture into a unified MFSc (Aquaculture) and PhD (Aquaculture) programs.

The ongoing research programs were reviewed through a participatory exercise and six broad Thematic Areas were identified for taking up collaborative, multi-disciplinary and inter institutional research projects which would also avoid duplication of efforts among sister organisations. Under the theme areas, field oriented action research programs were initiated to develop 'Policy Framework for Fisheries and Aquaculture' through a consultative process and another program to evolve co-management and participatory extension models. These programs helped not only to sensitise the State Departments of Fisheries about the importance of State level Fisheries Policies but brought out the complex field level regulatory and HRD related problems in different States hindering sustainable development of fisheries.

Training programs at Regional Centres have got renewed thrust in terms of strengthening of infrastructure, increased no. of demand driven training programs and visible impact of these programs. Particularly the training programs at Kakinada Centre for farmers from Bihar and the field demonstration programs in Manipur, Tripura, Mizoram and Assam have been huge success. This year has also seen strengthening of linkages between CIFE and various State Departments of Fisheries in terms of development support, consultancy, field demonstration programs, policy advocacy etc bringing lot of synergies. Also, new academic linkages were forged with many institutions from across the country and abroad.

The significant achievements and important activities of the institute during 2006-07 are briefly brought out in this Annual Report under the heads: Research Achievements, Educational Achievements, Extension Achievements, Linkages and

Collaborations, Honours and Awards, Publications, etc. The efforts of all the faculty members, staff and students are noteworthy in this endeavour.

I am extremely thankful to Director General (ICAR), Deputy Director General (Fisheries) and Deputy Director General (Education) for their constant support and valuable suggestions. My sincere thanks are due to Members of Board of Management, Chairman and Members of Research Advisory Committee, Members of Academic Council, Staff Research Council, Extension Council, Board of Examiners and other Institute Level Committees for their cooperation and support. My Special thanks are due to the Publication Team for bringing out this annual report. My thanks and compliments are due to all the scientists, staff and students of CIFE.

(Dilip Kumar)
Director
CIFE, Mumbai
April 01, 2007

2 Executive Summary

The year 2006-07 saw one major event in CIFE, the biennial convocation on 06 February 2007. The remarkable feature of the convocation was the award of D.Sc. (*Honoris Causa*) to two distinguished fishery scientists, Dr. V. R. P Sinha and Dr. M. V. Gupta. Twenty-three students were awarded with Doctor of Philosophy and 83 with Masters Degrees, and two with the Post-Graduate Diplomas. The year also witnessed the successful completion of the workshops conducted for developing fisheries policy guidelines. The First Zonal Workshop on Policy Issues and HRD in Fisheries and Aquaculture for Northeastern States was held during 07-08 December 2006 at Guwahati and the Second Zonal Workshop on Fisheries and Aquaculture Policy: Ecosystem and Livelihood Perspectives in East Coast States during 22-24 March 2007 at the National Institute of Agricultural Extension Management, Hyderabad. Another workshop, The Fisheries Education Policy: Issues and Challenges, was held at the headquarters on 07 February 2007. In addition, national seminar Hindi, *Bharat ke Uttar Purvi Rajyon ki Matsyiki,* was held at Guwahati on 06 December 2006.

The approval of many externally-funded projects showed the faith of research funding agencies in the quality of scientific research at the institute. Apart from the total 19 externally-funded projects, institute continued with 22 institutional projects in four theme areas addressing novel issues of national importance. All the research programmes saw the remarkable reorientation to become farmer-centric inclusive of gender and social equity issues. The two international research projects one under the Indo-Norwegian Programme for Institutional Cooperation and the other in collaboration with the Australian Centre for International Agricultural Research being run at the Kakinada and Rohtak centres of this institute, respectively, saw remarkable achievements. The Niche Area Project for Aquaculture in Inland Saline Water saw a multidisciplinary approach. Efforts to cultivate seaweed, shrimps and fishes have given encouraging results. The institute has been recognized as a centre for experiential learning by the education division of the Council. Necessary infrastructure has been developed which includes a walk-in cold room, a modular kitchen, a sales counter and a food-grade extruder. It has been decided that the attachment programme of the M.F.Sc. students would be conducted in this facility and the undergraduate students from agricultural universities would be encouraged to have their RAWE programme utilising this facility.

The institute made remarkable contributions in increasing the productivity of Dhimbe reservoir. Through community participation, 125,000 advanced fingerlings of Indian major carps were raised in the floating cages and released into the reservoir. The catch composition of fishes has been slowly changing from low-value fishes to high-value fishes. Macro-algal diversity has been mapped and efforts made to understand the role of microbes in controlling seepage. Two empirical studies have been undertaken on intellectual property right issues in the fisheries sector and to analyse non-tariff barriers in fisheries trade. These have already found place in students' curricula and the data generated under these projects would provide excellent background for future studies in this area.

The educational programmes offered by the Institute progressed satisfactorily as per schedule: 44 students obtained their M.F.Sc. Degrees, five their Ph.D. Degrees and 23 their Post-Graduate Diploma in

Inland Fisheries. The admissions during the period were 45 for M.F.Sc. and 26 for Ph.D. programmes. Two training programmes were organized under the scheme Centre for Advanced Studies in Fishery Science on Genetic Improvement of Fish - A biotechnological Approach, and Nutritional Strategies and Feeding Management in Finfish and Shellfish in addition to the one on Recent Advances in Biochemical and Molecular Techniques and their Applications in Aquaculture, which was concluded on 17 April 2006. The institute organized nine workshops/write-shops/ interactive meetings during this period. The faculty participated in nine training programmes and 24 conferences/workshops/write-shops/interactive meetings.

During this period, Dr. Dilip Kumar received the *Ashirwad Swasti Chinh* for the promotion of the Official Language (Hindi) from Ashirwad, a literary-cultural organization. He was also awarded the Gold Medal by the Zoological Society of India for his outstanding contributions to Science. Dr. A. K Pal, Principal Scientist, was presented with the Bharat Ratna Dr. C. Subramaniam Award for Outstanding Teachers for the Biennium 2004-2005 for Excellent Teaching in Fishery Science. He was also admitted as the Fellow of the Linnean Society, London.

The significant extension achievements during this period include the tie up with the Government of Bihar for training the farmers from the state. Over 576 farmers from the state were trained at the institute's Kakinada Centre. In addition, 61 farmers were trained at the Kolkata Centre, 203 at Powarkheda Centre and 41 at Rohtak Centre. On-field demonstration programmes involving trickle-down extension system at Manipur has been a great success. It is evident from the Department of Fisheries' initiative to involve CIFE in all its programmes. Similar response has been received from the Department of Fisheries, Tripura. The institute organized 28 short-term training programmes. The institute was represented at nine exhibitions organized at various places throughout the country. The faculty participated in two television programmes and four radio talks, and rendered technical guidance and fishery advisory services to 351 farmers/fishers/entrepreneurs as per their requirements. A 45-member CIFE contingent participated in the ICAR Zonal Sports Tournament (West Zone) held at the Central Arid Zone Research Institute, Jodhpur. CIFE won silver medals in two team events, *i.e.,* kabbadi and shuttle badminton (men) apart from winning 13 individual prizes.

3 Introduction

The Central Institute of Fisheries Education (CIFE) was established on 06 June 1961 under the Government of India with the assistance of Food and Agriculture Organization of the United Nations/United Nations Development Programme. The main aim of this institute was to impart professional training and education to the in-service personnel of the expanding fisheries development sector at that juncture. The institute came under the administrative control of the Indian Council of Agricultural Research on 01 April 1979. The Deemed University status was accorded to CIFE on 29 March 1989. Subsequently, the scope and mandate have been widened to include education as well as research. At present, CIFE offers Masters programmes in seven and Doctoral programmes in eight disciplines.

Initially, CIFE was housed in the Institute of Science (Bombay) building and in 1964, it was shifted to a rented building at Masjid Bunder, Bombay. In March 1967, the Institute moved to the present independent campus at Seven Bungalows in the western suburbs of Bombay. CIFE headquarters is presently housed in the Seven Bungalows Campus, and the recently developed Yari Road Campus houses most of the research laboratories and the majority of the educational facilities. These two campuses are a kilometre apart from each other at Versova. The 2.3-ha Seven Bungalows Campus, which is located about half a kilometre away from the Versova beach, has a three-storey building that houses laboratories, classrooms, computer cell, committee room, auditorium, Director's chamber, library, aquarium, museum, workshop, and administrative and accounts sections together with a backyard wet-lab and prawn hatchery. The campus also has hostel and dormitory accommodation, guesthouse, staff quarters, gymnasium, healthcare centre and sports facilities. The 6.7-ha Yari Road Campus at present has an academic building (three floors and basement) that houses state of the art laboratories, classrooms, faculty and staff chambers, chambers of the Director and Joint Director, conference hall, community hall, aquarium, examination and academic cells, etc. Wet labs, ponds and hatcheries are also available in the Yari Road Campus. Library building, staff quarters and ladies hostel are under construction at this campus. CIFE also possesses two training-cum-research vessels, *MFV Saraswati* and *MFV Narmada*.

There are eight major functional divisions at CIFE equipped with state of the art laboratories and various sections/cells to carry out specific work. Apart from the headquarters in Mumbai, the Institute has four centres located in different aqua-climatic regions (Kolkata in West Bengal, Kakinada in Andhra Pradesh, Powarkheda near Bhopal in Madhya Pradesh and Rohtak in Haryana) of the country with farms and infrastructural facilities for imparting hands-on training to students, farmers and development personnel as well as to conduct need-based research projects.

Mandate:

The mandate of CIFE has been revised from time to time to keep in pace with the changing needs of the country. The mandate of CIFE which was revised in 1998 and was followed till February 2007 is

i. To conduct Masters and Doctoral programmes in various disciplines of fisheries science and technology
ii. To establish centres of excellence in emerging areas of fisheries science

iii. To conduct refresher training programmes for fisheries developmental and extension personnel
iv. To conduct basic and inter-disciplinary research in fisheries
v. To conduct need-based capsule/vocational training on various technologies related to fisheries and allied disciplines
vi. To provide institutional support for consultancy and participation in sponsored projects and programmes with other institutions, agencies and industries

The mandate has since been revised and the present one is

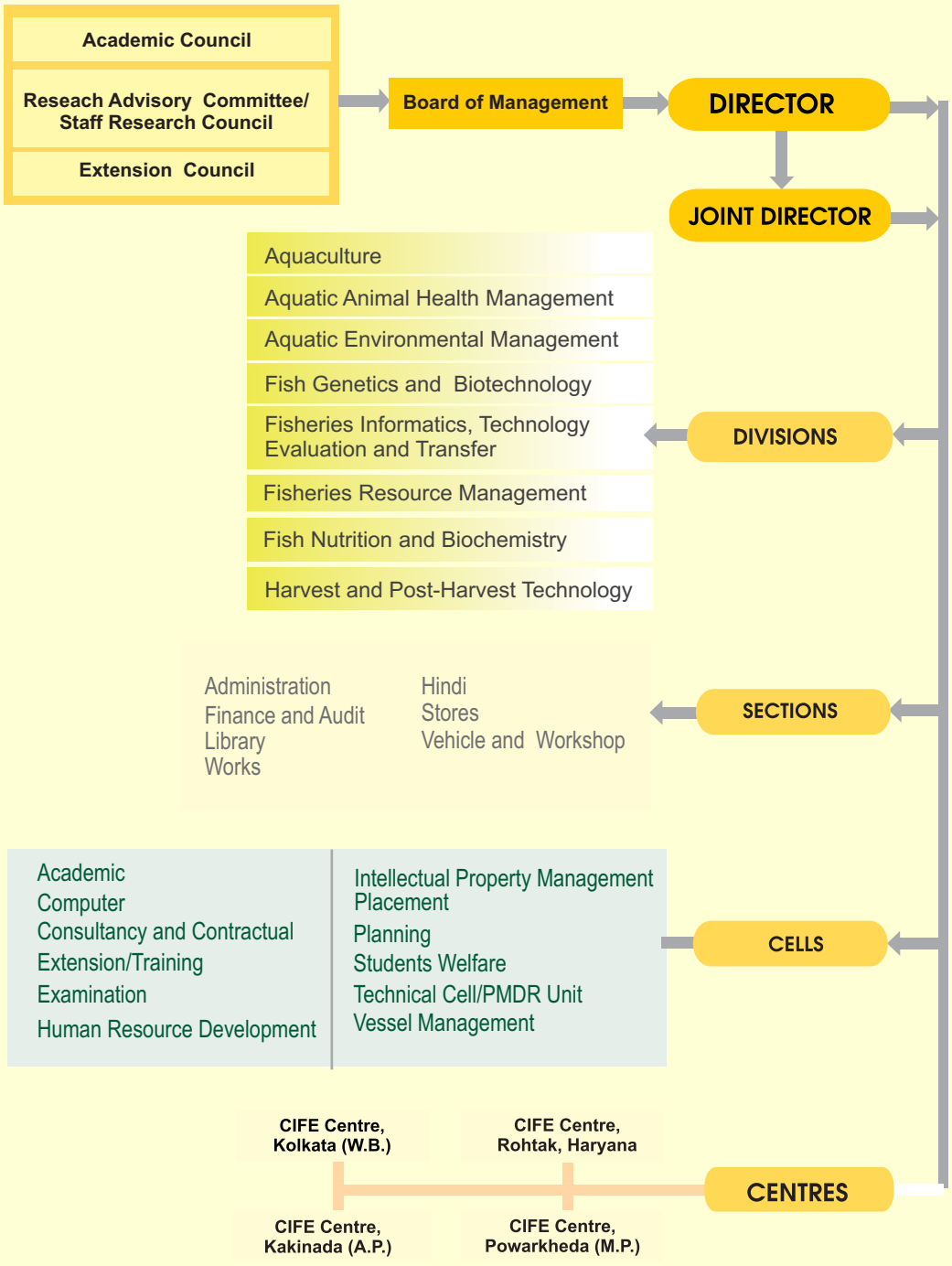
i. To conduct post-graduate academic programmes in core and emerging disciplines of fisheries science
ii. To conduct basic and strategic research in frontier areas of fisheries
iii. To conduct demand-driven training and educational programmes for different stakeholders in fisheries sector
iv. To provide technical support, inputs for policy development and consultancy services

Budget

S.L No	Plan Head Account	(Rs. In Lakhs) Revised Estimate	(Rs. In Lakhs) Expenditure
1	Establishment charges	0.00	0.00
2	Travelling Expenses (T.A)	10.14	9.96
3	Other Ch. Including Equipment & Library	120.23	120.8
4	Works	306.99	306.99
5	HRD	0.00	3.05
6	Information technology	10.00	7.87
7	Other Iteams		
	a) Seminar/Conference	1.53	0.00
	Total Plan	**448.89**	**448.67**
8	NEH	20.00	20.00
	Grand Total	**468.89**	**468.67**

Organization and Management

At the helm of affairs of overall Institutional Management, CIFE has a Board of Management which functions as the highest decision making body at the Institute level. The decisions and recommendations pertaining to academic, research and extension activities of the Institute are made by Academic Council, Research Advisory Committee/Staff Research Council and Extension Council, respectively.



4 Research Achievements

4.1. Institutional Projects

Evaluation of antibiotic residues in farmed shrimp and prawn of coastal India and antibiotic resistance of different bacteria of aquafarms

Personnel: K. Pani Prasad, S. C. Mukherjee, R. P. Raman

The project evaluated the antibiotic resistance of bacteria from the shrimp farms of Orissa, Maharashtra, Andhra Pradesh and Gujarat. Nineteen antibiotics were found to have produced resistance in bacteria. During this period, bacteria isolated from the *Penaeus monodon* samples from different farms in Maharashtra, Gujarat and Orissa were subjected to antibiotic sensitivity test to ascertain the resistant and sensitive bacteria to different antibiotics.

Geographical Information System for sustainable brackishwater aquaculture development in Maharashtra and Gujarat

Personnel: R. S. Biradar, N. Saharan

Dahanu in Thane District of Maharashtra was chosen as the study area. Soil parameters were estimated from ten sampling stations at two depths (15 and 60 cm) for eight parameters, *viz.,* pH; percentage of sand, clay, silt and organic carbon; total nitrogen; available phosphorus and organic matter. It was found that overall, the soil quality parameters in the study area are within the ideal range prescribed for brackishwater aquaculture except for silt and to some extent, clay and available phosphorus. The values for these three parameters also did not deviate much from the ideal range and hence, are not limitations.

Water quality was estimated at nine different sites on 14 parameters, *viz.,* pH, dissolved oxygen, salinity, alkalinity, carbon dioxide, ammonia, nitrite, nitrate, phosphate, chloride, hardness, chemical oxygen demand, biochemical oxygen demand and total organic matter. Overall, the values of different water quality parameters except salinity were within the ideal range for brackishwater aquaculture in the study area. Salinity was slightly higher than the ideal range of 10-25‰, during the time of sampling.

Sampling stations were marked on geo-registered LISS-IV IRS P6 satellite image of the study area in the GIS environment. Attribute table of soil and water quality parameters for each of the sampling stations was created. These data were analysed in the GIS environment to prioritise the area suitable for brackishwater aquaculture. Land-use and land-cover change studies from 1975 to 2005 indicated major changes in the perimeter of Dahanu and Saveta creeks in the study area.

A pilot study on supply chain management in fisheries

Personnel: S. N. Ojha

This project was taken up to understand the problems faced by the fisher-retailers in marketing fish. Many fishers (86.60% of the retailers), especially the fisherwomen (89.69% retailers), augment their family income through fish marketing. In order to facilitate fisher to get more share in the value consumers pay, marketing activities need to be studied. Municipal retail fish markets of Mumbai, therefore, were

selected and classified into three categories for this study as large, medium and small markets. In these markets, it was observed that procurement of fish by the retailers was prominent on three days since most of the consumers were purchasing fish (non-vegetarian) items on these days. Since the transaction in fish retailing was observed to be low, the credit need of the fishers was also low. Those who took loan, preferred traditional sources of credits only, like fish traders and money lenders (who mostly belong to the non-fisherfolk communities). Public transport, which was cheaper, could not be availed of because of odour and dripping water from fish baskets. The retailers mostly (81.44%) stored fish in thermocole boxes with ice at the retail spot due to the lack of cold storage facility.

Consumers in Mumbai ranked quality of fish as their first preference as indicated by retailers. The lack of market facilities (market space, security, shed-maintenance and hygiene) and storage problems were the major constraints of the fish retailers that need immediate attention. Institutional credits and grants in these markets may be provided to address these constraints on a priority basis. The factors that are of immediate importance in the supply chain management and efficient consumer response to fish are modernization of procurement of fish from wholesalers and landing centres, improving the marketing infrastructures for better hygiene, storage, and assured and cheap supply of water and ice.

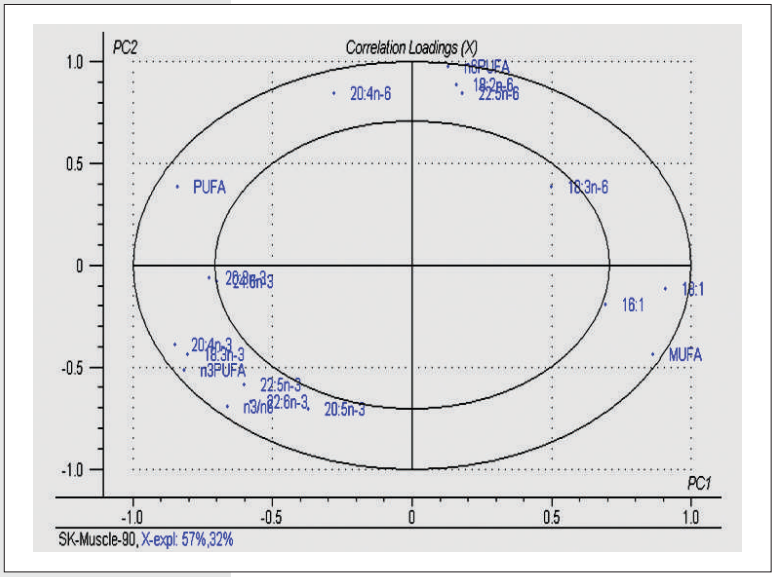
Studies on production potential and conversion efficiency of Omega-3 fatty acids in Indian major carps

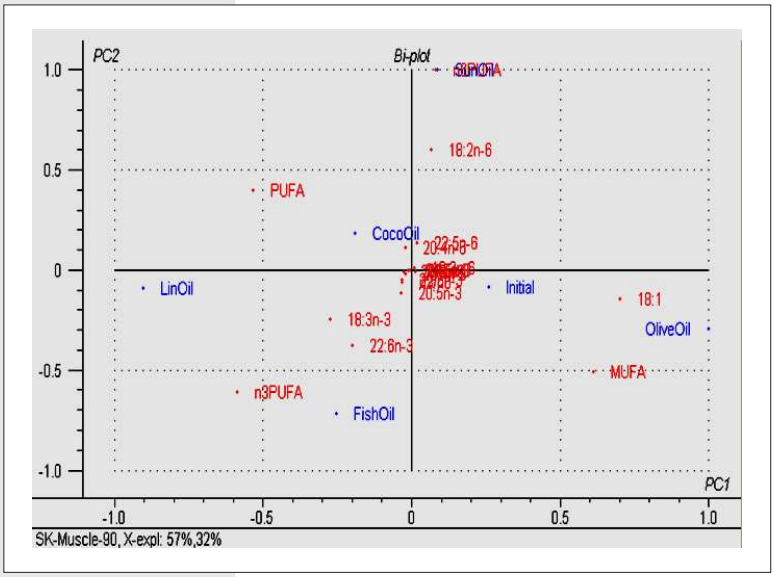
Personnel: G. Venkateshwarlu, S. D. Singh, A. K. Pal

The total lipid content and fatty acid composition of liver and muscle from wild and farmed rohu (*Labeo rohita*) were analyzed. The farmed species yielded significantly ($P<0.05$) higher lipid contents in both muscle and liver. The saturated and monounsaturated fatty acids were found significantly higher in cultured species whereas the n-6 and n-3 polyunsaturated fatty acid (PUFA) levels were higher in the wild-caught specimens. Palmitic acid was the most abundant fatty acid in rohu at the levels of 31.80 and 23.97% in muscle, and 33.96 and 31.21% in liver of farmed and wild-caught rohu, respectively. The fatty acids beneficial to human health such as docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA) and arachidonic acid (AA) were the predominant PUFA in both the groups, and were found significantly ($P<0.05$) higher in wild-caught specimens. In view of the higher total lipid contents of farmed rohu, it can be concluded from the present study that the amounts of HUFA provided by a given quantity of farmed fish would be almost equal to that produced by the same quantity of wild-caught fish despite the farmed rohu possessing relatively lower concentrations of HUFA. The nutritional value of farmed rohu can further be improved by incorporating the desired fatty acids such as linoleic acid, linolenic acid, EPA and DHA in the feed.

Principal Component Analysis (PCA) was performed (Unscrabmler, version 9.5, CAMO, Norway) on the data matrix of fatty acid composition of the muscle of rohu

fingerlings fed different dietary lipids. The PCA has been done to express the main information in the variables by a lower number of variables, which are called principal components (PC1, PC2,...). The main trends in the data were revealed by the score plots and the significant variables were identified by the loadings. The significant fatty acid variables have been identified based on high positive or negative loadings of the following plots:





Refinement of freshwater pearl culture technology for developing designer pearls

Personnel: K. Dube Rawat

Mussels were gathered at Neral fish farm but could not be implanted and kept in ponds for rearing. About 15 new dies were procured. Nuclei of different shapes were prepared and refined, and were made ready for implantation. Out of the 200 animals procured, 100 animals were implanted with the new dies.

Chromium-resistant bacteria as potential bioremediators in aquatic environments

Personnel: P. K. Pandey, C. S. Purushothaman, A. Vennila

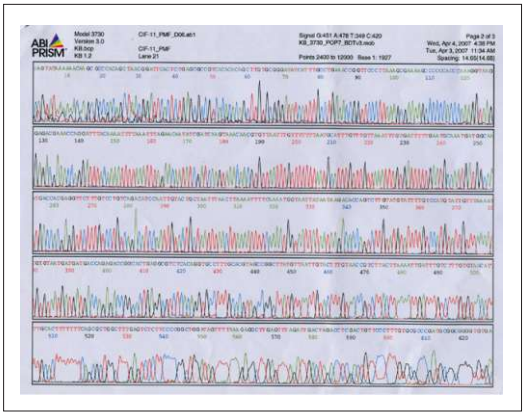
Characterisation of isolated bacteria is in progress, Water samples were collected from the tannery effluent contaminated sites near Chennai for microbial analysis.

Molecular studies on promoters and growth enhancers of commercially important fishes

Personnel: S. D. Singh

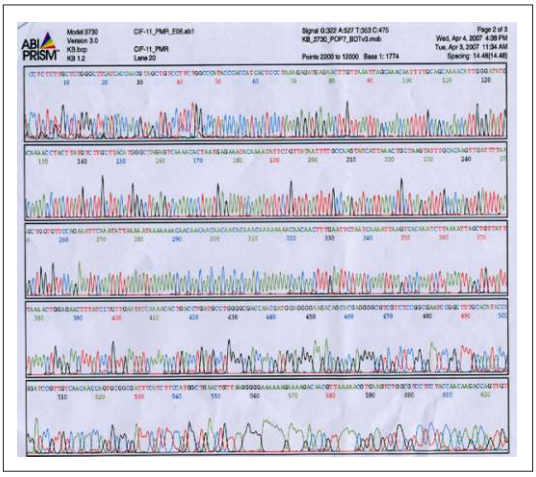
Both the growth hormone gene (1.3 kb) and Beta-actin gene promoter (2.3 kb) of Asian sea-bass *(Lates calacarifer)* have been isolated and purified to sequencing grade purity from respective ampicillin-resistant and white-recombinant clones (pTZ 57 R/T), and then sequenced using the DNA Sequencing Facility of the Department of Biotechnology (Government of India), New Delhi.

Nucleotide sequencing of growth hormone



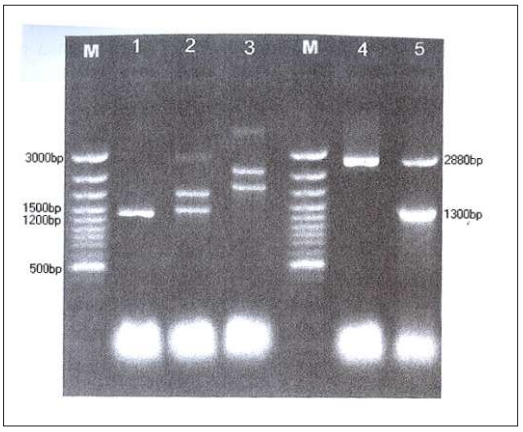
and Beta-actin gene promoter of Asian sea-bass, *Lates calcarifer*

Size and confirmation of origin of growth hormone gene (1.3 kb) and Beta-actin gene



promoter (2.3 kb) from Asian sea-bass ascertained by recombinant plasmid isolation, restriction enzyme digestion and PCR analysis

Characterization and confirmation of Asian sea-bass growth hormone gene in a



recombinant clone (M - DNA ladder, MW in bp; 1 - PCR amplified GH gene, 1.3 kb from Asian sea-bass; 2 - Plain pTZ plasmid, 2.88 kb; 3 - Recombinant plasmid with GH gene insert, 4.18 kb; 4 - Linearized pTZ plasmid, 2.88 kb with Hind III and Xba I; 5 - Recombinant plasmid releasing GH gene insert, 1.3 kb after cleavage with Hind III and Xba I

Barriers to international trade in fish products: A critical evaluation of trade under WTO (2005-06)

Personnel: P. S. Ananthan, R. S. Biradar, A. Sharma

The analysis of case studies and secondary data indicated that Non-Tariff Barriers (NTBs) in the form of quality and safety standards, technical regulations (labeling/packaging standards, etc.), antidumping provisions and subsidies to domestic fisheries industry are being increasingly used by different countries as effective instruments to restrict import and protect respective domestic industry. It has been observed that in the case of Indian firms, the cost of compliance to meet stringent standards has grown more than

two-fold in recent years. Most of the Indian processing and export firms being of small to medium size are finding it difficult to cope up with this increased cost.

Mapping of marine algal biodiversity along the Maharashtra coast

Personnel: G. Deshmukhe, R. S. Biradar

Data were collected on developmental changes in:

Malvan: Population data based on 2001 census were collected. Fisheries and tourism are the main industries of the town.

Srivardhan: The site, where the algal species were collected from is about 15 km away from main town. Two villages are located near the site, namely Koshti and Shekhadi. There is no industry located near the site. The population of both the villages together is about 500 with only 25 families in Shakhadi. At Shekhadi, 15 small boats were present.

Dominant algal species have been identified for all the stations and are being marked on the shore profile.

Refinement of existing and development of new technologies for inland-saline aquaculture

Personnel: C. S. Purushothaman, P. P. Joshi, S. Raizada, U. K. Maheshwari, N. K. Chadha, G. Deshmukhe, A. K. Verma

Seed of *Chanos chanos* (3000) and *Mugil cephalus* (2000) was procured from Mandapam and stocked on 04 December 2006 in a 0.2-ha pond of 6‰ salinity. However, all the fish died during the harsh winter. The pond was stocked again on 14 March 2007 with seed from Mandapam. Mortality occurred after one week as the seed were too small for stocking. Milkfish (300) and mullet (150) have grown to 150-220 and 50 g, respectively. Seaweed stocking material was procured and indoor experiment initiated, but the growth under indoor conditions was poor.

Nutrient management and seepage control in salt-affected areas for aquaculture

Personnel: A Vennila, N. Saharan, S. Raizada, V. K. Tiwari, P. K. Pandey, A. K. Verma

Water (from culture pond, fallow pond and tube wells) and sediment (from culture and fallow ponds) samples were collected for analyzing physicochemical and microbiological parameters from Lahli and Baniyani farms, Rohtak (Haryana). Lahli and Baniyani farm soils had low organic carbon, total nitrogen and available phosphorus. The soil was sandy-loam with loamy texture and a porosity of 37-44%. The water quality parameters were in the optimum range except hardness and chloride. The highest number of nitrogen-fixing bacterial colonies was observed in sediment samples of culture pond (130 x 10^3 CFU/g) followed by fallow ponds (82 x 10^3 CFU/g). The number of phosphatase-producing bacterial colonies was higher than the number of phosphate-solubilizing bacterial colonies in both culture and fallow ponds. The number of phosphatase-producing bacterial colonies was higher in the water of culture ponds (15.65x10^3 CFU/ml) and sediment of the fallow ponds (86.25 x 10^3 CFU/g). The number of phosphate-solubilizing bacterial colonies was higher in water (5.73 x 10^3 CFU/ml) and sediment (12.00 x 10^3 CFU/g) of the culture ponds. Two nitrogen-fixing and four phosphate-

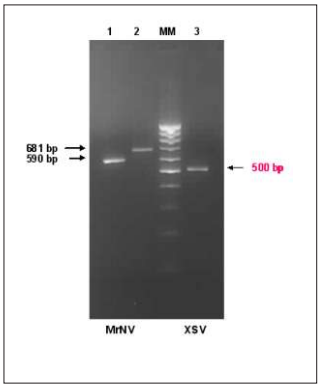
solubilizing bacteria were isolated on the basis of morphological characteristics and preserved on slants for further studies. Three phosphatase-producing bacteria (*Pseudomonas* sp., *Bacillus* sp. and *Delftia acidovorans)* and a phosphate-solubilizing bacterium (*Citrobacter* sp.) were tentatively identified using the automated microbial identification system (VITEK2, Biomerieux, France) compact identification cards.

Strategies for the control of nodavirus infection in *Machrobrachium rosenbergii*

Personnel: K. V. Rajendran, A. Chaudhari, M. Makesh

Ten samples (frozen) of juvenile/sub-adult *M. rosenbergii were collected from Andhra Pradesh and t*wo samples (muscle tissues) were subjected to total RNA extraction; the extracted RNA samples were quantified and a portion of the RNA was analysed on agarose gel for testing the quality. The extracted RNA was reverse-transcribed into cDNA using random hexamer primers. A known volume of cDNAs was subjected to PCR amplification using *M. rosenbergii nodavirus* (MrNV) and a specific band of 590 bp was obtained with both the samples tested. Subsequently, a few more (pooled) samples of post-larvae (PL) and juveniles (ethanol preserved) were obtained from Chennai. A portion of the PL (whole animal) and muscle tissue of juveniles were tested for MrNV infection using the procedure mentioned above. However, an additional MrNV-specific primer set was also used to generate a different amplicon of MrNV. This primer set generated a 681-bp MrNV-specific amplicon. Both the samples tested in the PCR gave positive amplification. cDNA prepared from PL was further tested for extra small virus (XSV) infection also using a specific primer set. The PCR generated a 500-bp XSV-specific amplicon.

Specific CR amplicons of MrNV and XSV amplified from the pooled samples of post-



larvae of *Macrobrachium rosenbergii*

Genotype environment interaction studies of *Macrobrachium rosenbergii for* economically important traits Brood Stock Management, Rearing and Evaluation of Genetic Parameters

Personnel: Gopal Krishna, S. S. Jahageerdar, G. Venugopal, N. K. Chadha, Somdutt

The project was initiated after the annual SRC during June 2006. It was planned to collect the stock of *M. rosenbergii* from Maharashtra (Mah), Gujarat (Guj), Orissa (Ori) and Andhra Pradesh (Andhra). The stock of these places were collected during the third quarter of the first year and maintained at the Balbhadrapuram farm of Kakinada centre. The stock was then maintained separately till the animals were of 2-3 g size. The animals were then tagged for the identification of the stocks during November 2006. A total of about 350-425 prawns were tagged from each stock. After tagging, the animals were kept in the FRP

tanks for acclimatization before being released and maintained in the earthen ponds for the growth and maturation studies. The prawns are being maintained at the Balbhadrapuram farm. Simultaneously, the animals were allocated for further nutritional studies.

Nutritional and biochemical responses of different *Macrobrachium rosenbergii* populations to varying environmental conditions

Personnel: N. P. Sahu, A. K. Pal**,** K. K. Jain

A feeding trial was conducted to study the interaction of different wild stocks of *M. rosenbergii* and dietary protein level on their growth and survival. Wild stock juveniles of *M. rosenbergii* were collected from Gujarat (0.90±0.04 - 1.06±0.08 g), Maharashtra (0.80±0.07 - 1.01±0.1 g) and Andhra Pradesh (3.06±0.13 - 3.10±0.23 g) and stocked in a culture pond of 200 m^2 at 1 juvenile/m^2. All the animals were tagged individually with a particular colour assigned to each stock and acclimatized for seven days before release to the pond. All the stocks were pulled together at a ratio of 75:70:55 (Andhra Pradesh: Maharashtra: Gujarat) and stocked in a pond. Either of the two feeds (one low protein feed, 27% crude protein and the other commercial feed, 32% crude protein) was fed at 6% of the body mass of the prawn in duplicate ponds for 60 days. Both protein level and stock type had a significant (P<0.05) effect on the weight gain of the prawn. There was around 95% difference in weight gain due to change in crude protein in the diet. Similarly, Gujarat and Maharashtra stock exhibited significantly higher (P<0.05) growth rate of approximately 90% than the Andhra Pradesh stock, though there was no difference between the Maharashtra and Gujarat stocks. However, there was no significant difference (P>0.05) due to interaction of stock and protein level. Survival rate among the different stocks varied from 56 to 77% but, there was no significant difference in the survival rate among the different stocks.

The animals were maintained as explained above. High protein-fed group exhibited higher haemolymph glucose, but stock type did not exhibit any variation in the glucose content in haemolymph. Higher respiratory burst activity (NBT) was recorded in the higher protein-fed groups. Maharashtra stock showed higher (P<0.05) NBT values than the Andhra Pradesh stock, but it was similar with Gujarat. Among the plasma fatty acid, SAFAs contributed 50-70% with maximum contribution by C16:0 (31-36% of total fatty acids), while MUFAs and n-6 were about 25.5-33.5 and 5.5-11.3%, respectively. The only n-3 (C18:3 n-3) was found only in the Andhra Pradesh and Maharashtra stocks at the higher dietary protein level in the rage of 0.15-0.30%. No higher chain fatty acid (>C20) was identified in any stock. No variation was found in plasma Ca level with respect to stock and protein level and it ranged from 26.0 to 29.5 mg/dl among all the stocks.

Isolation, identification and characterization of common pathogens of *Macrobrachium rosenbergii* from selected stocks

Personnel: M. Makesh, S. C.Mukherjee, K. Pani Prasad, R. P. Raman

Samples of *Macrobrachium rosenbergii* juveniles were collected from the farms in Gujarat and Maharashtra, and screened for

the presence of pathogens by culture techniques. Histopthological examination of the samples was conducted. No pathogenic organisms were detected in any samples. However, hepatopancreas of the Gujarat samples showed marked vacuolation and degenerative changes of the acinar cells. This may not be attributed to any pathogenic organism.

M. rosenbergii post-larval samples were collected from Kakinada in Andhra Pradesh and the hatchery at CIFE, Mumbai. These were screened for *M. rosenbergii* nodavirus (MrNV) and extra small virus (XSV) by RT-PCR. The samples collected from Kakinada were positive for MrNV and XSV.

Developing strategies for fisheries enhancement of Dimbhe reservoir, Maharashtra, through management interventions and community participation

Personnel: M. P. S. Kohli, N. Saharan, K. Dube Rawat, L. Shenoy, V. K. Tiwari, S. S. Salim

A preliminary survey was conducted to study the morphometry, catchment area characteristics, water quality, biotic community and fish fauna followed by RRA and meeting with fishermen. It was found that this water body is oligotrophic in its aquatic productivity aspect. The net primary productivity of the reservoir is in the range of 230 to 260 mg C m^{-3} d^{-1}. The water alkalinity and total hardness were in the range of 27 to 30 mg l^{-1} and 35 to 38 mg l^{-1}, respectively. The zooplankton was scanty. Among the phytoplankton, mainly *chlorophyceans* were present, but almost in negligible quantity. The fish species reported in the reservoir are 15. Common species were: rohu, catla, reba, minows, tilapia, *Chela spp*., minor carps and in lesser quantity catfishes. For fishing, the villagers use gill net of 5 x 8 cm mesh size and fishing period is two hours in the morning and two hours in the evening. The total number of fishing lines is 57. The present catch per day is around 100 - 200 kg. Marketing of fish is done at Pune through fishermen cooperatives. During November 2006, the post-monsoon survey of the reservoir was carried out. In the village pond at Phulawade, 5000 fry were stocked for raising fingerlings for reservoir stocking. At regular intervals, the reservoir was stocked with carp fingerlings (50 – 80 mm). So far, a total of 125,000 advanced fingerlings have been stocked in the reservoir. During the end of November, a set of four cages was shifted from Lonavla to Dimbhe reservoir. The frames and the floating devices were made by the fishermen with the support from the non-governmental organisation Shashwat. The cages were mended by them and were installed in the reservoir.

Development of a fisheries co-management model for selected coastal segments of Maharashtra

Personnel: S. K. Chakraborty, S. N. Ojha, G. Deshmukhe

Savitri Estuary, Dharmtar Creek, Sakhar Creek (near Alibagh) and sites situated on Kundalini River (Nava Navkhar, Agrao and Revdanda Creek) were selected for the study. Secondary data and other information were collected on bio-resources, their status and probable reason for their decline. The main resources of these sites comprised mangroves, clams, oysters, prawns and fishes (mullet, mudskipper, etc.). As per the stakeholders (fishermen) of the area, all these resources

are vanishing due to many reasons like pollution, siltation and sand dredging.

Sustainable fisheries development through co-management

Personnel: P. K. Ghosh, P. K. Roy, B. N. Tiwari, Somdutt, S. S. H. Razvi

As per the technical programme, a survey was made to identify villages, farmers and their water bodies under Sandeshkhali Block-I, Sandeshkhali PS, 24 Parganas (N) District, West Bengal. Altogether, 49 farmers were selected/identified where 11 were Result Demonstration Farmers (RDF) and the rest 38 were Fellow Farmers (FF). During interaction with the farmers, the objectives, nature and mode of work were explained to them so as to make them involved with the job. Their problems for low production were identified. All FF were brought under the leadership of RDF in several groups each comprising 5-7 farmers. The intervention continued with both FF and RDF either jointly and/or individually for work and/or discussion. The work is in progress.

As per the technical programme of the first year, identified two farmers and selected two water bodies in two blocks of Hoshangabad District. Gathered information regarding package of practices being adopted by the farmers, present production, yield gaps and the constraints realized by the farmers. Study of major water quality parameters were carried out in the above water bodies. These studies are to be continued further as per the technical programme.

Developing appropriate policy framework for the development of fisheries and aquaculture in India

Personnel: Dilip Kumar, R. S. Biradar, P. S. Ananthan, S. S. Salim, A. Vennila, A. Sharma, L. Shenoy, S. N. Ojha, B. B. Nayak, R. P. Raman

The extent and quality of development is largely conditioned by the given policy, regulatory mechanism and enabling institutional environment. A broader policy framework at the Centre and comprehensive policies at state levels in harmony with the Centre's policy framework are, therefore, the need of the hour. Several countries like Bangladesh, Cambodia, China, Thailand, etc. have comprehensive fisheries policies. European Union's (EU) Common Fisheries Policy has provided a dynamic policy environment to several EU countries and has shaped the fisheries development in the last three decades.

Out of the five zonal workshops planned as part of the project, two workshops (one for northeastern states and the other for the east coast states) were conducted and draft recommendations prepared. The workshops were successfully organized wherein academicians, researchers, department of fisheries officials, extension officers, representative fishers, farmers, representatives of NGOs, co-operatives and industry from the respective regions participated in addition to the policy makers and experts from across the country. The workshops consisted of inaugural programme, presentations by the state departments of fisheries followed by open sessions, technical sessions and work-group discussions. Draft policy inputs by work-groups were presented. Summary recommendations and proceedings of the workshop were prepared.

Empirical analysis of IPR in fisheries sector

Personnel: A. Sharma, G. Venkateshwarlu, Gopal Krishna, B. B. Nayak, P. S. Ananthan

An empirical study of patents in the fisheries sector was conducted with the objective of compiling Indian, US and European patents in fisheries sector. Its analysis was conducted with reference to pre- and post- TRIP periods and also the development of an IP management strategy in fisheries sector. The methodology for the project and the selection of fisheries-related IPC Code (Version 8, WIPO) were finalized as per the reviews available. Documenting the Indian patents in fisheries sector from the Gazette of India has been completed during the period. The procurement of patent database for US and European patent in fisheries sector is in progress.

Development of Ready-to-Cook Fish Products from Under-utilized Fish

Personnel: S. Basu, B. B. Nayak

Trials were carried out to prepare dry, ready-to-cook fish chunks from low-cost fish (sciaenids) using twin-screw extruder. Effect of different starches like corn flour, tapioca flour and wheat flour on the texture of the fish extrudate was studied. It was found that these starches did not impart desired texture to the extrudate. Actually, the extrudate had quite tough texture with little expansion and little water absorption capacities. In many cases, the starch gelatinization was incomplete and raw starch leached out in the soak water.

Further trials with defatted soybean flour imparted meaty texture to the extrudate with good expansion. Through different trials, the fish protein concentration, the barrel temperature, feed moisture, revolution rate of the screw and die diameter were optimized. Addition of 1% $NaHCO_3$ further enhanced the expansion. A product was prepared with 20% fish powder and 80% defatted soybean powder. The product when soaked and cooked, had meaty texture with attractive fish flavour. The product did not disintegrate during soaking and cooking. The cooked product was found to be quite acceptable.

The product was packed in three packaging materials namely polyester-polyethylene, metallized polyester-polyethylene and aluminium film-lined polyester-polyethylene, and storage life studied. The product was found to be acceptable for 150, 165 and 210 days, respectively, in the above three packages. It was found that 11% was the critical moisture content, beyond which the product became soft and soggy with a rancid odour. So, aluminium film-lined polyester-polyethylene is suggested as packaging material for the product having a storage life of seven months.

Sperm preservation of Asian Catfish *Clarias batrachus*

Personnel: Gopal Krishna

Clarias batrachus milt was evaluated, and its chemical and biochemical compositions were analyzed. The milt was further extended in the artificially prepared extender with cryoprotectant. The milt was then cryopreserved under liquid nitrogen using horizontal freezing technique. Scanning and transmission electron microscope studies were conducted. Cryopreservation was successful for two months and fertility trials yielded 15-20%

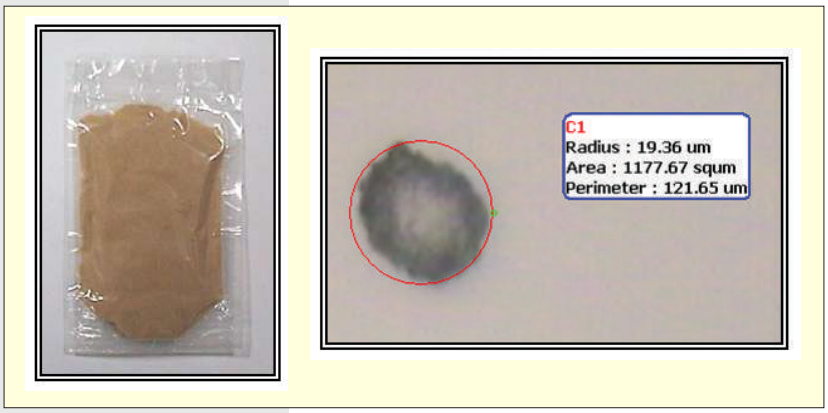
success.

Studies on nutrient dense micro-particulate diet for hatchery rearing of *Macrobrachium rosenbergii*

Personnel: A. K. Pal, N. P. Sahu, G. Venkateswarlu

Larvae of *Macrobrachium rosenbergii* were fed with microparticulate diet at different replacement doses with *Artemia* nauplii. Trials were conducted with different percentages (10, 20, 40, 60 and 100) of replacement of *Artemia* nauplii. Based on the growth and survival studies, it is concluded that 40% replacement of *Artemia* nauplii with microparticulate diet gives the desirable result.

Vacuumed packed microparticulate diet



Prevalence of aflatoxin in feed ingredients, remedial measures and its effects on growth performance and metabolic responses in Indian major carp, *Labeo rohita* (Ham.)

Personnel: N. P. Sahu, **K. K. Jain**

Analysed the feed ingredient samples collected from different places. Aflatoxin percentage was calculated and results obtained were correlated. Results showed that groundnut oil cake is prone to aflatoxin production. Higher moisture content increases aflatoxin production. At 40% moisture level, total aflatoxin production increased to the tune of 8.5 times compared to the initial level.

Strategical approach for the development of compounded feed for carp and prawn-based polyculture system

Personnel: P. Sardar, R. C. Das, A. Sinha, S. Datta

Three kinds of feeds having protein percentages of 15, 20 and 25, respectively, were evaluated on the basis of growth performance of Indian major carps and freshwater prawn under polyculture system where optimum manuring and fertilizing measures were taken in experimental ponds for sufficient plankton production. Both slow-sinking extruded pellets and steam-compressed rapid-sinking pellets were prepared for each kind of feed for the trial. Both hand broadcasting and tray system of feeding methods were employed for each feed during experiment. Based on the growth performance of carps and prawn, it was demonstrated that slow-sinking extruded pellets are superior to steam pellets when feed was broadcasted. During the tray system of feeding, fish and prawn fed extruded pellets and steam-compressed pellets showed comparable growth performances for each kind of feed, but the feed input cost was higher for extruded pellets than steam pellets. Feed having 20 and 25% protein levels were comparable and both were superior to feeds containing 15% protein in terms of growth performance of carps and prawn under polyculture system where optimum and routine manuring and fertilizing measures were taken in experimental

ponds. Based on these observations, it is concluded that feed with 20% protein level can fulfill the nutritional requirements of carps and prawn under polyculture system where optimum and routine manuring and fertilizing measures are taken in culturing ponds. For hand broadcasting and tray system of feeding methods, slow-sinking extruded pellets and rapid-sinking steam-compressed pellets, respectively, are suitable for optimum production of Indian major carps and freshwater prawn under the polyculture system.

Development of alternative shellfish and finfish for brackishwater aquaculture

Personnel: G. Venugopal

Polyculture of *Mugil cephalus* with *Chanos chanos* was taken up in a 0.2-ha pond. *M. cephalus* fingerlings were stocked at 3,250/ha and *C. chanos* at 2,500/ha.

Formulated feed was provided at 2-3% of average body weight daily. Water exchange was done during full-moon and new-moon tides, and also water pumping was done as and when required. Water samples were collected fortnightly for pH, DO_2, free CO_2, total alkalinity, salinity and temperature during the culture period. After 255 days of culture, 206.796 kg of *M. cephalus* with 97% survival and 200.3 kg of *C. chanos* fish with 98% survival were harvested.

Marsupenaeus japonicus culture was taken up in two ponds each of 0.2 ha. Ponds were

Culture duration (d)	*Mugil cephalus*		*Chanos chanos*	
	Average length (mm)	Average weight (g)	Average length (mm)	Average weight (g)
Initial	135.0	35.0	81.0	3.6
50	208.0	107.0	220.0	110.1
86	228.5	140.0	280.0	170.3
120	236.0	142.0	285.0	172.6
150	248.0	166.0	300.0	205.2
180	277.0	235.0	355.4	290.7
210	295.0	296.0	300.2	341.5
254	336.4	326.7	370.5	408.7

treated with 20 ppm bleaching powder one week before stocking and fencing was done to prevent the entry of birds. A total of 14,000 post-larvae received from the Central Institute of Brackishwater Aquaculture, Chennai, was stocked on 22.6.2006 after acclimatization at 7000/pond. After 48 hours, 100% survival was recorded in the *hapas*.

Starter feed was provided to the shrimp. After 80 days of culture, the entire stock succumbed to white spot syndrome.

Culture duration (d)	Pond no. 2		Pond no. 3	
	Average length (mm)	Average weight (g)	Average length (mm)	Average weight (g)
Initial	21.3	0.37	21.3	0.37
17	53.4	1.02	57.4	1.30
30	74.4	2.95	76.5	3.56
40	87.2	6.00	85.0	5.84
46	87.9	6.08	88.8	6.00
56	92.0	7.00	93.2	7.41
63	98.5	8.27	93.8	7.81
69	98.6	8.27	100.2	8.80
77	100.0	8.50	101.0	9.00

4.2. Externally-funded Projects

Bacterial fertilizers for organic aquaculture

Principal Investigator: P. K. Pandey

Funding agency: Indian Council of Agricultural Research, New Delhi

Interview for the recruitment of a Senior Research Fellow in the project was conducted on 14 July 2006. Protocols for the work have been standardized. Water and soil samples were collected from Saphale and Aarey fish farms for the enumeration of relevant bacteria.

Mapping of microbial diversity in the marine ecosystem in and around Mumbai

Principal Investigator: C. S. Purushothaman

Funding Agency: Indian Council of Agricultural Research, New Delhi (Application of Microorganisms in Agriculture and Allied Sectors)

Water and sediment samples were collected onboard *MFV Narmada* in September 2006 from the sea off Versova, Mumbai. Seawater samples were also collected onboard *MFV Saraswati* off Mumbai in November 2006 at different latitudes and longitudes (N 18º 32.070', E 72º 31.316'; N 18º 00.523', E 72º 42.835'). A total of 180 bacterial isolates were obtained on ZoBell's marine agar. Forty-four isolates were identified up to the generic level on the basis of morphological and biochemical tests. They belong to the genera *Pseudomonas, Vibrio, Bacillus, Micrococcus and Enterobacter. Bacillus badius, B. larvae, B. lentimorbus, B. circulans, B. macerans and Micrococcus luteus* were tentatively identified on the basis of biochemical tests. *Aeromonas hydrophila, Enterobacter cloacae, Bacillus pasteurii, B. alvei, B. sphaericus* and *Pseudomonas stutzeri* were identified using using Biomerieux Vitek-2 Bacterial Identification System and further confirmed by biochemical tests. The salt-tolerance test was performed on 58 isolates using nutrient broth without NaCl and the concentration of salt was adjusted to 2.5, 5.0, 7.5 and 10.0% using brine and incubated at 37° C. Forty-seven cultures were found to tolerate 10.0% concentration of salt and eight cultures were found to tolerate 7.5% concentration of salt.

Development of bacterial consortia for bio-processing agricultural wastes and bioremediation of aquaculture effluent

Principal Investigator: C. S. Purushothaman

Funding Agency: Indian Council of Agricultural Research, New Delhi (Application of Microorganisms in Agriculture and Allied Sectors)

Cellulolytic bacteria were isolated from water, sediment, paddy stubbles and compost samples collected from Andhra Pradesh, Maharashtra and Orissa. Eighty isolates were obtained initially. Cellulase activity of all the isolates was estimated qualitatively using Congo red dye-CMC method. Twenty-five isolates exhibited good cellulase activity, and were chosen for the quantitative estimation of cellulase activity by Nelson-Somogyi method and DNSA method for sugar estimation. Few of the isolates were identified using Biomerieux Vitek-2 Bacterial Identification System as *Bacillus* spp. and *Serratia* spp.

Utilization of inland saline and sodic soils for aquaculture

Principal Investigator: C. S. Purushothaman

Funding Agency: Indian Council of

Agricultural Research, New Delhi (Niche Area of Excellence Programme)

The major emphasis during the period under report has been on infrastructure development and procurement of material. With the available facilities, an attempt was made to study the survival and growth of marine fishes at inland saline waters with low (6‰) salinity. A consignment of marine fish, *i.e., Chanos chanos* (milk fish) and *Mugil cephalus* (grey mullet), seed (fry of 20-30 mm size) was procured through natural collection from Mandapam and nearby areas in Tamil Nadu, and was airlifted from Madurai to Delhi from where it was transported by road to Lahli, Rohtak. After conditioning, the seed was stocked in a pond at 25,000 fry/ha on 03 December 2006. The salinity of the water was maintained at 6‰ with ground saline water pumped through a tube-well. During the exceptionally harsh winter, when the water temperature dropped below 8° C, complete mortality was observed. Based on this observation and past experience, it may be concluded that winter months are not good for stocking and rearing of marine fish seed. Another consignment of milkfish and mullet seed also collected from the same area was stocked in the same pond with 6‰ salinity after conditioning on 13 March 2007.

Ten ponds of 0.02 ha each and a pond of 0.04 ha have been renovated and lined with high-density polyethylene. These ponds have also been provided with water filling and dewatering facilities to be used as a flow-through system. The larger pond is to be utilized for the treatment and disposal of saline water resulting from the culture operations. Two training programmes of the duration of one week each were taken up for the benefit of the state fisheries officials and fish farmers, respectively, in the month of March 2007. Six officials and 12 farmers took part in these programmes.

Nutritional requirement, feed development and feeding strategies of indigenous freshwater ornamental fishes having export value

Principal Investigator: A. Sinha

Funding Agency: Indian Council of Agricultural Research, New Delhi

Experimentation is being carried out on the nutritional requirement of *Chanda ranga* and *Puntius ticto*. Only protein and energy requirement study is completed. The protein requirement of *P. ticto* was 36.13% whereas that of *C. ranga* was found to be 34.46%. Based on the findings, another experiment with reference diet was carried out. Study on other requirements like crude fat, carbohydrate and crude fibre will be carried out in future.

Ornamental fish breeding and culture – An innovative scheme for the development of rural women

Principal Investigator: A. Sinha

Funding Agency: Department of Biotechnology (Government of India), New Delhi

The project was initiated on 12 March 2007. Appointment of the Technical Assistant has been carried out. Three different farms have been selected to provide infrastructure for training to 25 women in each farm.

Enhancement of fish production through cage aquaculture

Principal Investigator: Somdutt

Funding Agency: Department of

Biotechnology (Government of India), New Delhi

Under this project, three training programmes were conducted. A total 159 beneficiaries were trained under this project during the period under report. About 15,000 carp fingerlings (35-40 mm) were reared in cages under this project. Final harvesting of reared fishes was done in January 2007 with 70% recovery. The fishes attained an average size of 120 mm.

Improvement of economic traits in rohu by diallele crossing of inbred strains

Principal Investigator: S. S. Jahageerdar

Funding Agency: Indian Council of Agricultural Research, New Delhi

Five ponds and one working shed were constructed under this project. The rearing of rohu fingerlings continued for future use. Periodical assessment of water quality parameters of experimental ponds continued. One Senior Research Fellow has been appointed at the Powarkheda Centre under this project with effect from November 2006.

Predictive modeling of Bombay duck landings off northwest coast of India

Principal Investigator: R. S. Biradar

Funding Agency: Ministry of Earth Sciences (Government of India), New Delhi

The project was initiated in 2003. Seasonal ARIMA models were fitted to the quarterly Bombay duck landings for the period 1967-2002 for the original (untransformed) and log-transformed data. The quarterly landing data for the years 2003 and 2004 were used as test data and were not used in the generation of models. After model building, landings in the different quarters of these years were compared with the forecasts for the same quarters and years, to ascertain the efficacy of the models. Goodness of Fit Statistics Akaikes Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) were worked out for different models. The models with the lowest AIC and SBC are considered to be the best. Mean absolute percentage error (forecast) was also worked out to ascertain the suitability of the chosen model for forecasting.

The forecasted Bombay duck landings were compared with the observed landings. The mean absolute percentage error (forecast) was lower for the models based on the northwest coast (comprising both Maharashtra and Gujarat) data as compared to the state-level models. ARIMA (0,1,1) (0,0,1)4 with only MA component was found suitable for the northwest coast of India.

Integrated aquaculture for sustainable resource management in bio-villages

Principal Investigator: S. N. Ojha

Funding Agency: Department of Biotechnology (Government of India), New Delhi

The primary aim of this project was to generate facilities that can create opportunities for the prosperity of the poorest community. Therefore, after assessing the needs of the *adivasis* of Mahim and Masvan villages in Palghar Taluka of Thane District (Maharashtra) for fisheries-related activities, the project was launched in these villages in 2002. It was observed that between the two villages, Mahim is having more *adivasis* and, therefore, this village was considered as the central point. Components mentioned in the project were implemented in both the

villages. Facilities created in Mahim Village are: giant freshwater prawn hatchery-cum-ornamental fish breeding and culture shed (1 no.), mushroom culture unit (1 no.), vermicompost shed (1 no.), nursery ponds (4 nos.), rearing ponds (2 nos.) and grow-out pond (1 no.). In addition, one village pond was de-weeded. In Masvan Village, the facilities created are: ornamental fish breeding and culture shed (1 no.), grow-out pond (1 no.) and village pond (1 no.). Illustration-based training manuals were prepared and the villagers were provided with hands-on training. In the 20 different training programmes organized during the period, there were 279 participants. In addition to that, 167 participants were provided with additional training under the "Earn while you learn" programme to sustain their livelihood. Through this process, 26 skilled persons could be produced. Furhther, six aspiring entrepreneurs of nearby areas could be trained. The rise in income during the project period was through the earn while you learn programme. A beginning was made in terms of income generation through the sale of seed and fish organised under the buy-back arrangements.

Potential uses of thermal effluents of nuclear power plants for carp breeding and seed production

Principal Investigator: A. K. Pal

Funding Agency: Board of Research in Nuclear Sciences (Government of India), Mumbai

The warm-water effluent from the Kaiga Nuclear Power Plant was efficiently used for the breeding and rearing of *Labeo rohita* by maintaining the fishes at the optimum temperature (30-31° C). It was observed that the warm-water effluent reduces hatching time and enhances growth. Laboratory trials were also conducted on *Cyprinus carpio* to elucidate the effect of different acclimation temperatures (26, 31, 33 and 36° C) in combination with persistent sub-lethal chlorine (0.1 mg l^{-1}). It was observed that increasing acclimation temperature alters the immune status of *C. carpio* advanced fingerlings and persistent sub-lethal exposure to chlorine augments temperature-induced immunosuppression. Results indicated that hsp70 was induced at 36° C in temperature control groups but not in the respective temperatures in the presence of chlorine. Studies on enzymes of various metabolic pathways indicated that exposure to chlorine at higher temperatures affected protein metabolism and gluconeogenic pathway, and subsequently the glycolytic pathway, leading to an energy-limited condition. Alterations in the histoarchitecture of vital organs, *viz.,* liver, gill and kidney, were also observed as the combined effect of chlorine and temperature.

Bio-safety study of Bt. cotton with Cry 1 Ac gene on common carp (*Cyprinus carpio*)

Principal Investigator: K. K. Jain

Funding Agency: Central Institute for Cotton Research, Nagpur

Common carp seed was procured for the

experiment. Different experimental diets were prepared with different doses (0, 10, 20 and 30%) of Bt. and non-Bt cotton seed. The experiment was set up in the wet laboratory of CIFE. The seed was stocked as per the experimental design. Feeding trial under the experiment started on 01 March 2007 and two readings have been recorded on 15 and 30 March 2007. Fishes are growing well and the final data would be analysed after the completion of the experiment.

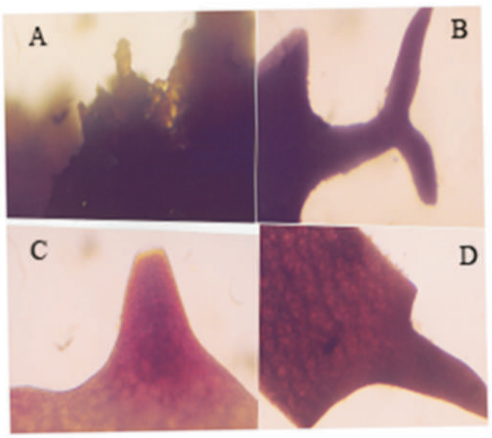
Studies on germ-plasm preservation of marine algal biodiversity

Principal Investigator: G. Deshmukhe

Funding Agency: Ministry of Earth Sciences (Government of India), New Delhi

The project was initiated in 2004. *Rhodymenia* and *Gracilaria* thalli were collected from Colaba, and reared under laboratory condition. The spores were cryo-preserved to estimate the survival rate. *Sargassum* rhizoids that were tested for cryo-preservation showed some shoot initiation.

A. Root formation in *Sargassum*



B: Thallus regeneration in *Gracilaria*

C: Thallus tip and *necrosis*

D: Gracilaria thallus

Assessment of intertidal biodiversity in and around Mumbai Coast

Principal Investigator: S. K. Chakraborty

Funding Agency: Indian Council of Agriculture Research, New Delhi

The project started in 2004. Regular sampling for water quality parameters and biodiversity (plankton and benthos) is being conducted at Tata Institute of Fundamental Research, Girgaon, Bandra (Bandstand) and Mudh Island sea shores, and Vashi Creek along with simultaneous analysis. All the sites are rich in various types of coastal biodiversity. Molluscs were found to be abundant at TIFR, Bandstand and Madh Island rocky shores. Girgaon being sandy shore, harboured different types of fauna. Along with some sand-dwelling bivalves, four types of sea anemones were also recorded. Vashi Creek harbours many types of mangrove vegetation along with some euryhaline molluscs.

Genetic improvement of *Penaeus monodon* through selective breeding for growth and white spot resistance

Principal Investigator: Dilip Kumar

Funding Agency: Indo- anrogramme of Institutional Cooperation, New Delhi

During the reporting period, full-sib families were procured from Andhra Pradesh and reared in 1000-l tanks individually. Regular monitoring of the water quality parameters and growth was conducted. Standard feeding and water quality management practices were followed. The facilities for rearing the full-

sib families were arranged at a private entrepreneur's farm near the Kakinada Centre of CIFE. The full-sib families were procured from the hatcheries and collected at rearing site during August, and the rearing was continued till the animals were approximately of 2.0 g size. This took about three months. Ten families from Andhra Pradesh (approx. 5000 post-larvae in each family) were transported to Chennai as the link families to Tamil Nadu during the first week of September 2006. A total of 30 families (including five families from Tamil Nadu as link families) were reared and the animals were tagged with five coloured, viz., blue, green, orange, pink and red, VIE tags at the end of the rearing period. A total of about 6000 animals were tagged between 25 and 30 November 2006 from 29 families of which 3295 animals were transported by road to the experimental farm of the Central Institute of Brackishwater Aquaculture (CIBA) at Muthukadu for challenge testing, commercial rearing and brood stock rearing. Approximately, 2000 animals were kept for commercial testing at Kakinada centre. We received about 1200 animals (Tamil Nadu stock) from CIBA for environmental testing at Kakinada. In the mean time, from the institute funds, facilities were developed to rear 30 families in one go by procuring 30 numbers of 1200-l FRP tanks, construction of shade, water connections and other necessary arrangements. The pond facilities were upgraded.

Developing aquaculture in degraded inland areas in India and Australia

Principal Investigator: S. Raizada

Funding Agency: Australian Center for International Agricultural Research, Canberra; and Indian Council of Agricultural Research, New Delhi

An experiment to determine the optimum level of potassium in the amended saline water for the larval rearing of prawn was successfully completed. The results indicated that though the larvae survive at all the levels of potassium ranging from 40-100%, there was a major difference in the survival rates. The highest survival was recorded at 100% level of potassium equivalent to coastal sea water but there was insignificant difference of only 2% at 80% potassium level. However, the survival at 60 and 40% potassium levels was significantly poor and the growth of larvae was also reported poor in comparison to 80 and 100% potassium levels.

An indoor nursery rearing experiment to evaluate the role of potassium on growth and survival at 7‰ salinity (ambient) was carried out during May-June 2006. The experiment was arranged in triplicate in 500-l FRP tanks with two treatments of 75 and 100% potassium equivalent to sea water and with two stocking densities of 30 and 45 PL/m^3 along with controls of raw saline water. It was evaluated that prawn post-larvae did not survive for more than 30 days in raw saline water at both the stocking densities whereas their average survival was recorded between 88.3% at 75% potassium level and 85.8% at 100% potassium level at stocking density of 30 PL/m^3 after 45 days of rearing. The survival was, however, more or less the same at the higher density of 45 PL/m^3 showing 85.0 and 81.1%,, respectively at potassium levels of 75 and 100%. It was evaluated that potassium supplementation is essential in inland saline water having salinity above 6‰ and addition of 75% potassium is sufficient to get high survival and growth of prawns. However, there was slight decrease in the body length and weight in the prawn

juveniles at the stocking density of 45 Pl/m^3.

An indoor experiment was conducted to observe the survival of prawn post-larvae at 5 and 10‰ salinities in raw and potassium-amended water. The experiment was carried out in a battery of 12 FRP tanks (500 l) and filled with 400 l test medium along with the controls of raw saline water. The two test media of 5 and 10‰ salinities were prepared by adding potassium (I.P. grade potassium chloride) equivalent to coastal sea water, whereas no potassium was added in the control water. Each tank was stocked with 17-19 mm prawn post-larvae at 50 PL/m^3 and fed with scampi starter feed *ad-libitum*. The tank water was cleaned every alternate day and topped up with identical media. The post-larvae were reared for 45 days. It was observed that there was total mortality at 10‰ in control media within 15 days, whereas the media added with potassium exhibited an average survival of 33.3% after 45 days of rearing. On the contrary, the survival in potassium-amended media at 5‰ salinity was 96.6% after 45 days of rearing though the survival in control water of the same salinity was only 11.6%.

Development of egg-yolk antibodies for fish health management

Principal Investigator: K. Pani Prasad

Funding Agency: Indian Council of Agricultural Research, New Delhi

The hens were immunized with vibrios and white spot syndrome virus (WSSV) for the production of edible antibodies (Ig Y). The eggs were collected everyday and titration of antibodies was conducted by agglutination for vibrios and western blot for WSSV. The eggs collected were clarified, and anti-WSSC and anti-vibrio immunoglobulins separated by ammonium sulphate precipitation. Ig G was purified by anion exchange chromatography and ELISA was performed for detection of the antigen.

Development of immunodiagnostic kits for viral diseases of freshwater prawn *Macrobrachium rosenbergii*

Principal Investigator: K. Pani Prasad

Funding Agency: Department of Biotechnology (Government of India), New Delhi

The nodavirus was purified using density-gradient centrifugation and used for the immunization of rabbits to produce nodavirus antiserum. The rabbits were immunized sub-cutaneously with nodavirus and complete adjuvant, every week for five weeks. Five days after the last injection, blood was collected and immunoglobulins separated. The immunoassays like ELISA and dot ELISA were standardized using the purified immunoglobulins. Experiments were conducted to amplify MrNV capsid gene and cloned in plasmid expression vector (pPROEX HTa). But the expression was not found due to unknown reasons.

Development of monoclonal antibody-based diagnostic tests for the rapid detection of *Macrobrachium rosenbergii* nodavirus and extra small virus of *Macrobrachium rosenbergii*

Principal Investigator: M. Makesh

Funding Agency: Department of Biotechnology (Government of India), New Delhi

Primers were designed to amplify the gene encoding the capsid protein of *M. rosenbergii* nodavirus (MrNV) and extra small virus (XSV). The capsid protein genes were amplified by RT-PCR using the

designed primers.

Population genetic evaluation of growth of mahseer *Tor tor*

Principal Investigator: Gopalkrishna

Funding Agency: Indian Council of Agricultural Research, New Delhi

The project findings include that *Tor tor* can be bred in the farm environment without the help of inducing agents. The rearing of the fish at the farm is a critical area and the breeding of the fish with the aim to produce the full-sib families was very critical as the mature brooders were not available at the same time. The full-sib families were reared in a separate enclosure and the fecundity, fertilization, hatching, yolk-sac absorption and growth were monitored. The genetic parameters of these traits were estimated.

Seed production of freshwater ornamental fish at Mumbai

Principal Investigator: M. P. Singh Kohli

Funding Agency: Indian Council of Agricultural Research, New Delhi (Mega Seed Project)

The following fish seed (no.) was produced and reared:

Goldfish	Small 7100	Medium500
Angel	Small1300	Medium 500
Fighter	Small 400	Medium 400
Zebra danio	1000	
Tetra	500	
Gourami	4000	
Guppy	7000	
Molly	***7000***	

An aquarium hatchery shed of 20 x 15 m was constructed under the project. Existing hatchery units were strengthened with aquarium for breeding of ornamental fish. Two earthen ponds of 50 x 20 x 3 m were dug out for brood stock rearing. Two air blowers for continuous air supply have been installed. One tube-well was constructed for regular water supply. Eight cement tanks (2 x 1 x 1 m) for rearing of ornamental fish have been constructed. Eight existing cement tanks of 3 x 3 x 1 m for the culture of live-feed organisms were renovated.

5 Educational Achievements

5. 1. Eighth Biennial Convocation

The Eighth Biennial Convocation of the institute was held in the Yari Road Campus on 06 February 2007. Padma Vibhushan Dr. R. Chidambaram, Principal Scientific Advisor to the Government of India and DAE-Homi Bhabha Chair Professor, was the Chief Guest at the function. Seventy-three Masters of Fisheries Sciences, 2 Postgraduate Diplomas in Fisheries Sciences and 19 Doctor of Philosophy degrees were awarded at the convocation. In addition, two D.Sc. *(Honoris Causa)* degrees were also awarded for their outstanding contribution to the field of fisheries.

Course : M. F. Sc.

Batch	In person	In Absentia	Total
2002-2004	01	-	01
2003-2005	16	24	40
2004-2006	34	08	42
		Total	**83**

Course : D. F. Sc.

Batch	In person	In Absentia	Total
		02	02

Course: Ph.D

Batch	In person	In Absentia	Total
2002-2004	06	17	23

Dr. Hiralal Choudhury Gold Medal

M. F. Sc.	2003-2005	09
M. F. Sc.	2004-2006	09

Dr. C. V. Kulkarni Gold Medal

M. F. Sc.	2003-2005	01
M. F. Sc.	2004-2006	01

D.Sc. (Honoris Causa)

Dr. M. V. Gupta

Dr. V. R. P. Sinha

5.2. Results

S. no.	Name of the programme	Number of successful candidates
1.	Ph.D.	5
2.	M.F.Sc. (Fish Pathology and Microbiology)	5
3.	M.F.Sc. (Fish Nutrition and Biochemistry)	4
4.	M.F.Sc. (Fisheries Resource Management)	5
5.	M.F.Sc. (Fish Business Management)	5
6.	M.F.Sc. (Inland Aquaculture)	5
7.	M.F.Sc. (Fish Genetics and Biotechnology)	5
8.	M.F.Sc. (Post-harvest Technology)	6
9.	M.F.Sc. (Mariculture)	4
10.	M.F.Sc. (Freshwater Aquaculture)	5
11.	P.G. Diploma in Inland Fisheries	23

5.3. Ph.D. Theses

1. "Studies on some Aspects of the Reproductive Physiology of *Metapenaeus monoceros* (Fabricius)" by Joice Abraham under the guidance of Dr. (Ms.) M. K. Manissery, Principal Scientist, Central Marine Fisheries Research Institute (CMFRI), Kochi
2. "Effect of Cryoprotectants on Biochemical and Functional Properties in Common Carp, *Cyprinus carpio,* Surimi during Frozen Storage" by Jiten Sarma under the guidance of Dr. J. Joseph, Principal Scientist, Central Institute of Fisheries Technology (CIFT), Kochi
3. "Epizootiological and Interventive Aspects of White Spot Syndrome Virus" by Pramod Kiran under the guidance of Dr. S. C. Mukherjee, Joint Director, CIFE, Mumbai
4. "Production Performance of Kalbasu, *Labeo calbasu* (Hamilton), in Nursery, Rearing and Grow-out Production Systems" by Pradeep Kumar Sahu under the guidance of Dr. J. K. Jena, National Fellow, Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar
5. "Effect of Molecular Weight and Degree of Deacetylation on the Functional Properties of Chitosan Membrane and the Recovery of Protein from Surimi Wash Water by C. S. Shine Kumar under the guidance of Dr. K. G. R. Nair, Principal Scientist, CIFT, Kochi

5.4. M.F.Sc. dissertations

1. "Cloning, Sequencing and Expression of VP19 Gene of WSSV collected from Different Locations of India" by V. Hari Krishna under the guidance of Dr. M. Makesh, Scientist (Senior Scale), CIFE, Mumbai
2. "Molecular Cloning and Characterization of Prophenoloxidase Gene of the Giant Freshwater Prawn *Macrobrachium rosenbergii (de* Man) by P. S. Rao under the guidance of Dr. K. Pani Prasad, Senior Scientist, CIFE, Mumbai
3. "Probiotic Potential and Immunomodulatory Effect of *Bacillus licheniformis* on *Cirrhinus mrigala* (Ham.) Fingerlings" by R. K. Brahmchari under the guidance of Dr. R. P. Raman, Senior Scientist, CIFE, Mumbai
4. "Comparative Characterization and Antigenicity of Virulent Strains of

Aeromonas hydrophila and Edwardsiella tarda" by A. K. Padhy under the guidance of Dr. S. C. Mukherjee, Joint Director, CIFE, Mumbai

5. "Detection of *Salmonella* by BAXPCR from Seafood" by S. K. Nayak under the guidance of Dr. K. Pani Prasad, Senior Scientist, CIFE, Mumbai
6. "Isolation and Partial Characterization of Serum Immunoglobulin of Khudree Mahseer *(Tor khudree)" b*y Gunjan Kumar under the guidance of Dr. K. Pani Prasad, Senior Scientist, CIFE, Mumbai
7. "Studies on Fatty Acid Profile and Oxidative Status of Rohu *(Labeo rohita)* in Response to Dietary PUFA" by P. Sharma under the guidance of Dr. G. Venkatehwarlu, Senior Scientist, CIFE, Mumbai
8. "Immunomodulation of *Labeo rohita* Fingerlings due to Dietary Supplementation of Microbial Levan" by S. K. Gupta under the guidance of Dr. A. K. Pal, Principal Scientist, CIFE, Mumbai
9. Gelatinized to Non-gelatinized Starch Ratio in the Diet of *Labeo rohita* Fingerlings for Maximum Growth and Immunity" by Vikas Kumar under the guidance of Dr. N. P. Sahu, Senior Scientist, CIFE, Mumbai
10. "Utilization of Rubber Seed Cake in the Diet of *Labeo rohita* (Ham.) Fingerlings" by R. R. Nair under the guidance of Dr. K. K. Jain, Principal Scientist, CIFE, Mumbai
11. "Comparative Study of Fishing Efficiency of Nylon Monofilament and Multimonofilament in Gillnet Operations in Mumbai Coast" by C. S. Rao under the guidance of Dr. L. Shenoy, Senior Scientist, CIFE, Mumbai
12. "Predatory Diversity of Finfish Species inhabiting the same Ecological Niche" Deepa Sudheesan under the guidance of Dr. A. K. Jaiswar, Technical Officer, CIFE, Mumbai
13. "A Study on the Variation in *Harpadon nehereus* (Hamilton, 1822) Stocks from East and West Coasts of India" by G. P. Deepak under the guidance of Dr. S. K. Chakraborty, Principal Scientist, CIFE, Mumbai
14. "A Taxonomy Study of Family Carangidae along Mumbai Waters" by C.M. Roshit under the guidance of Dr. S. K. Chakraborty, Principal Scientist, CIFE, Mumbai
15. "Cryopreservation of Economically Important Seaweeds along Maharashtra Coast" by P. L. Lalrinsanga under the guidance of Dr. G. Deshmukhe, Senior Scientist, CIFE, Mumbai
16. "Protoplast Isolation and Regeneration of Economically Important Marine Algal Species" by N. Barman under the guidance of Dr. G. Deshmukhe, Senior Scientist, CIFE, Mumbai
17. "Present Status and Market Dynamics of Aqua Feed and Aqua Chemicals Industry in West Coast of India" by S. S. Samal under the guidance of Dr. P. S. Ananthan, Scientist, CIFE, Mumbai
18. "Present Status and Future Prospect of Aquaculture in Haryana and Punjab with Respect to Aqua Input Uses" by J. K. Singh under the guidance of Dr. S. N. Ojha, Senior Scientist, CIFE, Mumbai
19. "Barriers to Trade in Fish Products - Case Studies of Indian Exporters" by K. J. Vincy under the guidance of Dr. P. S. Ananthan, Scientist, CIFE, Mumbai

20. "Assessment of the Potential of Microfinance for Fisherwomen in Dakshina Kannada, Karnataka" by V. B. Reena under the guidance of Dr. A. Sharma, Senior Scientist, CIFE, Mumbai
21. "Landing, Utilisation and Marketing of Low Value Fish Catch in Thane District of Maharashtra" by Paras Narayanam under the guidance of Dr. R. S. Biradar, Principal Scientist, CIFE, Mumbai
22. "Screening and Evaluation of Aromatic Herbal Materials as Feed Attractants for *Labeo rohita* (Hamilton) Fingerling" by A. P. Muralidhar under the guidance of Dr. S. Patil, Scientist (Senior Scale), CIFE, Mumbai
23. "Effect of Dietary Aflatoxin on Growth and Metabolic Response of *Labeo rohita* (Hamilton) Fingerlings" by S. Mohapatra under the guidance of Dr. N. Saharan, Principal Scientist, CIFE, Mumbai
24. "Growth, Survival and Fatty Acid Composition of *Macrobrachium rosenbergii* (de Man, 1879) Post Larvae fed HUFA Enriched *Moina micrura"* by S. K. Das under the guidance of Dr. V. K. Tiwari, Senior Scientist, CIFE, Mumbai
25. "Effect of Enriched Probiotics on the Growth and Survival of *Macrobrachium rosenbergii* (de Man, 1879) Larvae" by A. Arun under the guidance of Dr. Chandra Prakash, Technical Officer, CIFE, Mumbai
26. "Effect of Exogenous Neurotransmitters on Growth and Survival of *Macrobrachium rosenbergii*" (de Man, 1879) Larvae and Post Larvae" by J. K. Chettri under the guidance of Dr. A. K. Reddy, Technical Officer, CIFE, Mumbai
27. "A Study of Genetic Variation in Different Stocks of Silver Carp *Hypophthalmichthys molitrix* (Valenciennes, 1884)" by B. Naorem under the guidance of Dr. S. S. Jahageerdar, Senior Scientist, CIFE, Mumbai
28. "Geographical Distribution and Potential of Microsatellite Marker linked with WSSV Disease Resistance in *Penaeus monodon* (Fabricius, 1798)" by P. K. Annam under the guidance of Dr. Gopal Krishna, Senior Scientist, CIFE, Mumbai
29. "Design and Engineering of Biosensor Gene Constructs to sense Aquatic Lead Toxicity" by T. Chakraborty under the guidance of Dr. A. Chaudhari, Senior Scientist, CIFE, Mumbai
30. "Genetic Variation among Selected Population of *Penaeus monodon* (Fabricius, 1798) in India using Microsatellite Markers and Morphometrics" by M. Sekar under the guidance of Dr. Gopal Krishna, Senior Scientist, CIFE, Mumbai
31. "Design and Engineering of Biosensor Gene Constructs to sense Aquatic Inorganic and Organo- Mercurial Toxicity" by A. Alam under the guidance of Dr. A. Choudhari, Senior Scientist, CIFE, Mumbai
32. "Neuroendocrine Regulation of Reproduction in the Freshwater Catfish *Heteropneustes fossilis* (Bloch)" by C. V. Mani under the guidance of Dr. A. K. Pandey, Senior Scientist, CIFA, Bhubaneswar
33. "Colour Development in Rosy Barb (*Puntius conchonius*) Fed Carotenoids from Different Leafy Sources" by S. C. Naik under the guidance of Dr. S. K. Swain, Senior Scientist, CIFA,

Bhubaneswar

34. "Growth and Nutrient Utilization of *Catla catla* (Hamilton) Fingerlings: Effect of Dietary Protein and Lipid Levels and Use of Plant Proteins as Fishmeal Substitute" by L. L. Edward under the guidance of Dr. S. S. Giri, Senior Scientist, CIFA, Bhubaneswar
35. "Purification and Characterization of A-Glucan Binding Protein from Haemolymph of *Macrobrachium malcolmsonii* (Milne Edwards)" by Shailesh Kumar under the guidance of Dr. J. Mohanty, Senior Scientist, CIFA, Bhubaneswar
36. "Selection of Specific Cell Wall Antigen for Rapid Detection of Fish Pathogen *Vibrio parahaemolyticus* by Enzyme Immunoassay" by P. S. S. Anand under the guidance of Dr. K. S. Sobhana, Senior Scientist, CMFRI, Kochi
37. "Effect of Bivalve Farming on Sediment Characteristics in Selected Mariculture Sites of Southern Kerala" by C. Kalidas under the guidance of Dr. D. Prema, Senior Scientist, CMFRI, Kochi
38. "Nutritive Value of Bacterial Fermented Tuna Waste and its Use as a Dietary Ingredient for Ornamental Fish Feed" by H. Vijayan under the guidance of Dr. I. Joseph, Senior Scientst, CMFRI, Kochi
39. "Solid State Fermentation of Vegetable Waste using Aspergilluss niger from Mangrove Swamp" by N. Rajesh under the guidance of Dr. Imelda Joseph, Senior Scientist, CMFRI, Kochi
40. "Phytochemical Screening and Pharmacological Evaluation of *Eichhornia crassipes* (Martius) Solms – Laubach" by B. Sanitha under the guidance of Dr. S. Mathew, Senior Scientist, CIFT, Kochi
41. "Partial Purification and Studies on the Characteristics of Alkaline Proteinase from Fish Viscera and its Immobilization using Chitosan" by T. R. Johns under the guidance of Dr. P. T. Mathew, Principal Scientist, CIFT, Kochi
42. "Prevalence, Pathogenicity and Molecular Characteristics of Enterococci from Fish and Shellfish" by P. M. Jose under the guidance of Dr. N. Thampuran, Principal Scientist, CIFT, Kochi
43. "Studies on the Effect of Hydrocolloids on Functionality of Batter Coating Systems" by A. A. Rahim under the guidance of Dr. A. C. Joseph, Principal Scientist, CIFT, Kochi
44. "Influence of Ionic Strength on Conformation and Functional Properties of Fish Muscle Protein" by V. R. Devi under the guidance of Dr. T. V. Sankar, Senior Scientist, CIFT, Kochi
45. "Studies on the Occurrence of Enterocin Producing *Enterococcus* Species in Fish and Fishery Products" by T. Obullesu under the guidance of Dr. M. K. Mukundan, Principal scientist, CIFT, Kochi

5.5. Admissions

5.5.1. Ph.D.

Fisheries Resource Management

PhD-255	Mr. Deepak George Pazhayamadom
PhD-256	Ms. Deepa Sudheesan
PhD-257	Mr. P. L. Lalrinsanga (ST)
PhD-258	Mr. Chilla Srinivasa Rao (SC)
PhD-259	Mr. Debabrata Panda

Aquaculture

PhD-260	Ms. P. S. Shyne Anand
PhD-261	Mr. Sanjaya Kumar Das
PhD-262	Mr. Satendra Kumar
PhD-263	Mr. Shailesh Kumar
PhD-264	Mr. Muralidhar Penchala Ande (SC)

PhD-265 Mr. Ganikant Paswan (SC)
PhD-266 Mr. Pravin Kumar
PhD-267 Ms. Sipra Mohapatra
PhD-268 Mr. Mrinal Kanti Datta
PhD-269 Mr. Nagesh Ram (In-service)

Post-harvest Technology
PhD-270 Mr. N. G. Kiran
PhD-271 Mr. K. Dhanpal (SC)

Fish Biotechnology
PhD-272 Mr. Annam Pavan Kumar
PhD-273 Mr. Tapas Chakraborty

Fish Genetics
PhD-274 Mr. Niraj Kumar
PhD-275 Mr. E. Suresh

Fish Pathology and Microbiology
PhD-276 Mr. Vungaral Hari Krishna
PhD-277 Mr. Sujit Kumar Nayak (SC)

Fish Nutrition and Biochemistry
PhD-278 Ms. Biji Xavier
PhD-279 Mr. M. Sekar (SC)

Fish Business Management
PhD-280 Mr. Suman Shekhar Samal

5.5.2. M.F.Sc.

Fisheries Resource Management
FRM-200 Ms. Thankam Theresa Paul
FRM-201 Ms. K. M. Sandhya
FRM-202 Mr. Jhutan Das (SC)
FRM-203 Mr. Ghatge Swapnil Shivaiirao
FRM-204 Mr. Gole Rohan Shamrao

Fish Genetics and Biotechnology
FGB-26 Mr. T. N. Vinay
FGB-27 Mr. Pulak Ranjan Nath (UPS)
FGB-28 Mr. Subrata Kumar Sahoo
FGB-29 Mr. S. Imtiaz Ahmed
FGB-30 Mr. Wanglar Chimwar (ST)

Fish Nutrition and Biochemistry
FNB-26 Mr. Niraj Kumar (SC)
FNB-27 Ms. Ciji Alexander
FNB-28 Mr. Dharmendra Kumar Meena (ST)
FNB-29 Mr. S. Saravanan
FNB-30 Mr. Shahbaz Akhtar

Fish Business Management
FBM-21 Mr. Deepak Kumar
FBM-22 Ms. Tanmaya Dev
FBM-23 Mr. Ashok Kumar
FBM-24 Mr. Sadafule Nakul Avinash (SC)
FBM-25 Mr. Raghavendra

Fish Pathology and Microbiology
FPM-27 Mr. Satish Kumar
FPM-28 Mr. Gyanaranjan Dash
FPM-29 Mr. Jayant Ranjan (SC)
FPM-30 Mr. Binoy Rajan
FPM-31 Ms. Swarnalata Misra

Post-harvest Technology
PHT-42 Ms. Merlin Alex
PHT-43 Ms. K. Nagalakshmi
PHT-44 Mr. Tapas Kumar Sethi (SC)
PHT-45 Ms. P. Viji
PHT-46 Ms. E. B. Sumitha

Aquaculture
AQ-201 Mr. Tarkeshwar Kumar
AQ-202 Mr. Umesh Kumar Dharua (ST)
AQ-203 Mr. Mallikarjun Handigund
AQ-204 Mr. Subodh Kumar
AQ-205 Mr. Pawar Nilesh Anil
AQ-206 Mr. Shripathi
AQ-207 Mr. A. Satheesha
AQ-208 Mr. Chandan Debnath (UPS)
AQ-209 Mr. K. Periasamy
AQ-210 Mr. R. Kiruba Sankar (SC)
AQ-211 Mr. Jacob Cherian
AQ-212 Ms. Fathima S. Hameed
AQ-213 Ms. Surabhi Chandran (SC)
AQ-214 Ms. G. Santhi Krishna
AQ-215 Mr. K. R. Sreenath

6 Extension Achievements

6.1. Training programmes

Sr. no.	Name of the STP	Duration	Venue	Number of participants
1.	Hatchery and Grow-out Aspects of Freshwater Fishes	16 April - 15 October 2006	Lucknow	8
2.	Interactive Meeting on Implementation of Coastal Aquaculture Authority Act	02 June 2006	CIFE, Mumbai	69
3.	River and Water Management	03-07 July 2006	Powarkheda	18
4.	Interactive Meeting on Guiding Principles underlining the draft National Policy for Farmers	10 July 2006	CIFE, Mumbai	24
5.	HRD Programme on Breeding, and Hatchery and Nursery Pond Management Indian Major Carps	18-24 July 2007	Lucknow	07
6.	Carp Fish Breeding Seed and Rearing	20-29 July 2006	Powerkheda	14
7.	Management of Giant Freshwater Prawn Hatchery and Grow-out System	01-04 August 2006	Mumbai	11
8.	Breeding and Culture of Carp and Magur	08-17 August 2006	Kakinada	25
9.	Management of Commercial Giant Freshwater Prawn Hatchery	21-30 August 2006	Agartala	24
10.	Fish and Prawn Culture	22-31 August 2006	Kakinada	40
11.	Fish a Farming in Village Ponds	01-05 August 2006	Powarkheda	11
12.	Management of Ornamental Fish Breeding and Culture	04-10 August 2006	Kolkata	II
13.	Carp Culture	04-10 September 2006	Powarkheda	17
14.	Brackishwater Aquaculture and Giant Prawn Hatchery	04-13 September 2006	Kakinada	18
15.	Breeding and Culture of Carps and Magur	05-14 September 2006	Balbhadrapuram	25
16.	Aquarium Management and Ornamental Fish Culture	10-20 September 2006	Mumbai	11
17.	Integrated Fish Farming	11-17 September 2006	Powarkheda	18
18.	Prawn Culture (in Hindi)	12-18 September 2006	Powarkheda	10
19.	Fish and Prawn Culture	16-25 September 2006	Kakinada	37
20.	Farm Management	18-27 September 2006	Powarkheda	05
21.	Fish and Prawn Culture	06-15 November 2006	Kakinada	41
22.	Fish and Prawn Culture	20-29 November 2006	Kakinada	40
23.	Fish and Prawn Culture	04-13 December 2006	Kakinada	33
24.	Fish and Prawn Culture	18-27 January 2007	Kakinada	40
25.	Fish and Prawn Culture	31 January - 07 February 2007	Kakinada	40
26.	Fish and Prawn Culture	18-27 February 2007	Kakinada	40
27.	Pisciculture	12-17 March 2007	Kolkata	10

6.2. Participation in exhibitions

S. No.	Name of the Exhibition and Venue	Date
1.	Kisan Mela-cum-Exhibition' Programme, Powarkheda	26-27 May 2006
2.	Carrier Expo, Mumbai	27 May 2006
3.	Indian African Project Partnership, Mumbai	04 August 2006
4.	Sustainable Fisheries Development for Food and Health Security, Mangalore	20-21 December 2006
5.	Western Regional Agriculture Fair & Exhibition 2007, Indore	14-17 February 2007
6.	8th Agricultural Science Congress, Coimbatore	15-17 February 2007
7.	Krishi Expo 2007, New Delhi	21-25 February 2007
7.	Agribusiness Enterprises, Pune	01-03 March 2007
8	Kisan Mela-cum-Exhibition under 'Bharat Nirman Abhiyan – 2007, indore	12-17 March 2007
9	Kisan Mela-cum-Exhibition, Powarkheda	16-17 March 2007

World Environment Day was observed at Kaiga fish hatchery complex project site. On this occasion, Shri Harsha Kapur, Station Director, Kaiga Nuclear Power Station, released advanced fingerlings in Kadra reservoir, which were bred and reared at the project site. Fingerlings of carps were handed over to a local farmer who has started aquaculture under the guidance of CIFE and Karnataka state fisheries department.

Distribution of fish seed to the farmers at Kaiga.

Dr. (Ms.) A. Sinha, Senior Scientist and Mr. S. K. Sharma, (T -6) organized an exhibition in National Expo-2006 on the theme "Sustainable Development" during 01-08 September 2006 at Netaji Maidan, Baranagar, Kolkata, which was arranged by Central Calcutta Science & Culture Organization. Dr. P. Sardar trained 40 fishermen and fisherwomen at Sandeshkhali, North 24 Parganas, West Bengal, as one of the associates of the component entitled "Preparation of value-added fish products and their marketing" under the joint project between CIFE and Indian Institute of management, Ahmedabad, entitled "A public-private community partnership approach toward marketing of fish and fish products --An action oriented research" during 25-29 October 2006.

Aquaculture Development in North Eastern States by CIFE

Development of Loktak lake, Manipur, through Fisheries Co-Management Approach

Loktak lake is one of the biggest wetlands brought under Ramsar sites. Under the joint developmental plan, CIFE, Mumbai, and the Department of Fisheries, Government of Manipur have selected a 100-ha segment of the lake in Sendra and Thanga villages in Moirang Taluka (Bishnupur District) for development through community participated fisheries co-management approach. In order to improve the stock and socio-economic condition of the community, it was proposed to employ the "Fisheries Co-Management Model" where the local communities will work hand-in-hand with the department as partners in the management of the lake. Under this project, following steps have been initiated so far – (a) Participatory Rural Appraisal (PRA) and (b) Raising of carp fingerlings in earthen nursery ponds and pens. Community members were organised under seven groups for the management of various activities, and watch and ward. Technical guidance and financial assistance were provided by CIFE. Department officials are regularly monitoring the developmental activities. Regular training programmes to the community members are organized by CIFE. So far, seven training sessions have been conducted at the site itself.

Construction of giant freshwater prawn hatchery at Imphal, Manipur

The construction of the giant freshwater prawn hatchery by CIFE under the centrally sponsored scheme is in progress at Imphal. It is scheduled to be operational in the forthcoming season.

Construction of giant freshwater prawn hatchery at Natanglu, Nagaland

As per the request of the Directorate of Fisheries, Government of Nagaland, the site at Natanglu was selected by CIFE for the construction of giant freshwater prawn hatchery. The layout plan and design for the construction of 1.0 million seed production capacity hatchery was given to the Director of Fisheries, Government of Nagaland. The hatchery construction were completed and became operational in the month of March 2007.

Construction of giant freshwater prawn hatchery in Mizoram

As per the request of Directorate of Fisheries, Government of Mizoram, a giant freshwater prawn hatchery project plan has been prepared and submitted for onward submission to the funding agency.

CIFE participates in Matsya Mahotsav - 2007 at Guwahati

Faculty members of CIFE participated in the Matsya Mahotsav 2007 organized by the Department of Fisheries, Government of Assam during 06-08 March 2007 at Guwahati. On this occasion, many lectures on aquaculture, ornamental fish and product development were delivered by the CIFE resource persons for the benefit of fish farmers of Assam and other northeastern states.

Dr. G. Venugopal, Principal Scientist, Kakinada Centre, attended as an expert member in the committee to recommend the measures to rehabilitate the Kolleru lake fisher population and to stock the lake with fish seed during 09-12 October 20006 at Eluru/Vijayawada. Technical guidance was extended in detail on specific aspects of aquaculture by visiting the site. Regular rapport is being maintained with the farmers/shrimp/scampi/hatchery operators, etc.

In addition, advisory services were rendered to number of fish/scampi/ prawn/farmers on various aspects and the details are shown below:

S. no.	Type of farmers	Number of farmers
1	Scampi hatchery	12
2	Scampi farming	12
3	Magur hatchery	6
4	Magur culture	6
5	Fish culture (Indian major and exotic carps)	15
6	Carp seed production	15
7	*Mugil cephalus* culture	6
8	*Chanos chanos* culture	6
9	Seabass culture	3
10	Crab culture	10
11	Tiger prawn culture	10
12	*Marsupenaeus japonicus* hatchery	3
13	*M. japonicus* culture	2
14	Live-feed culture	6
15	Artemia hatching/culture	6

The staff of Kakinada Centre delivered talks at All India Radio, Visakhapatnam; the details are as follows:

S. No	Name of Faculty	Topic
1	V. Narasimhacharyulu	*scampi royyala cheruvulalo neeti yajamanyam*
2	K. Murali Mohan	*Palachepalato kalipi manda pethala pempakam*
3	R. R. Patnaik	*Scampi royyala nursery yajamanyam*

Dr. U. K. Maheshwari, Principal Scientist, Rohtak Centre, visited the Agriculture Technology and Information Centre, Indian Agricultural Research Institute, Pusa, New Delhi, on every second Friday of the month to give necessary inputs to the visiting farmers on various technologies of fish and prawn culture, and breeding.

The Aaj Tak TV Channel prepared a documentary on the various activities of the center on 26 August 2006.

Technical guidance on fish culture aspects was rendered by the Powarkheda Centre to the fish farmers namely Mr. J. Singh, Pipariya, Hoshangabad; Mr. Shusil Bara, Timarani, Harda; Mr. Suresh Mehara, Jamunia, Raiseri, etc.

Dr. R. K. Upadhyay, Technical Officer, provided answers to the questions of farmers under the live programme with farmers on 10May 2006 and 01January 2007. This programme was telecast by Bhopal Doordarshan.

7 Honours and Awards

Dr. Dilip Kumar, Director CIFE has awarded by Indian Society of Environment Education and Research (ISEER), Jodhpur.

Dr. Dilip Kumar has been awarded by Ashirwad Swasti Chinh by Ashirwad a literary cultural organization based in Mumbai for promotion of official language (Hindi) for the year 2006-'07.

Dr. Dilip Kumar, Director CIFE has been bestowed with Zoological Society of India Gold Medal for his outstanding contribution in fisheries research and education.

Dr. A. K. Pal, Principal Scientist, Division of Fish Nutrition and Biochemistry, Central Institute of Fisheries Education, Mumbai,

has been awarded "Bharat Ratna Dr. C. Subramaniam Award for Outstanding Teachers" for the biennium 2004-'05 for excellent teaching in fisheries science. The Award, which carries a certificate, a cheque of Rs. 50,000/- and a citation, was presented to him by Shri Akhilesh Prasad, Union Minister of State for Food, Govt. of India in a ceremony on August 18, 2006 at New Delhi.

Dr. A K Pal, Principal Scientist, Central Institute of Fisheries Education, Mumbai has been admitted as a Fellow of National Academy of Veterinary Sciences (India) at the 5th Convocation of the Academy at the College of Veterinary Science & Animal Husbandry, JNKVV, Jabalpur in recognition of his significant contributions.

He has also been honoured with the Fellowship of the Linnean Society of London for the cultivation of the Science of Natural History especially in branch of ecophysiology of fishes.

Dr. Sanjay Jadhao, Scientist, Division of Fish Nutrition & Biochemistry, CIFE, Mumbai is one of the eight scientists (below 40 years of age) selected from all over the country across disciplines during 2006 by National Academy of Agricultural Sciences (NAAS) as an Associate. The selection is w.e.f. from Jan 1, 2007 for the period of five years. Out of total 25 associates selected so far, Dr. Jadhao is the only animal/fish nutritionist.

Dr. (Ms.) Archana Sinha, Senior Scientist, received the Best Scientist Award of CIFE on 10 July 2006.

Dr. A. K. Pal, Principal Scientist, was

declared as the Fellow of the Linnaean Society of London in 2006. He was also presented with the Bharat Ratna Dr. C. Subramaniam Award for Outstanding Teacher of ICAR in Fisheries Science for the years 2004-2005. The award was received from Mr. Akilesh Singh, Minister of State, Government of India, on 18 August 2006.

Mr. Ram Singh, Dr. Dilip Kumar, Dr. (Ms.) Arpita Sharma, Dr. (Ms.) Rama Sharma and Dr. R. S. Biradar received the "Best Paper Award" for the research paper entitled “Mapping of fisheries profile of Gujarat state through GIS" at the XXVI INCA International Congress which was held at the National Agricultural Science Centre, New Delhi, from 22 to 24 November 2006.

Dr. K. Pani Prasad, Senior Scientist, was presented the Young Scientist Award 2006 at the 8th Indian Agricultural Scientists and Farmers Congress of the Bio-ved Research and Communication Centre, Allahabad, at Banaras Hindu University, Varanasi.

Ms. Rama Sharma, Technical Officer, received the degree of Ph.D. (Statistics) on the topic "Statistical Investigations for some Economically Important Fish-species" from Chaudhary Charan Singh University, Meerut, on 04 November 2006.

8 Linkages and Collaboration

The institute maintains linkages with various national and international institutions and agencies for educational, research and developmental collaborations.

International institutions

- WorldFish Center, Penang, Malaysia
- Food and Agriculture Organization of the United Nations, Rome, Italy

Government of India Organisations

- Integrated Fisheries Project, Kochi
- Central Institute of Coastal Engineering for Fishery, Bangalore
- Central Institute of Fisheries Nautical and Engineering Training, Kochi
- Fishery Survey of India, Mumbai
- Marine Products Export Development Authority, Kochi
- National Remote Sensing Agency, Hyderabad
- Indian Institute of Technology, Kharagpur
- Indian Institute of Technology, Chennai
- Indian Institute of Science, Bangalore
- National Institute of Nutrition, Hyderabad
- Zoological Survey of India, Kolkata
- Bhabha Atomic Research Centre, Mumbai
- Department of Ocean Development, Government of India
- Department of Science and Technology, Government of India
- Department of Biotechnology, Government of India

ICAR Institutes

- Central Marine Fisheries Research Institute, Kochi
- Central Institute of Brackishwater Aquaculture, Chennai
- Central Institute of Freshwater Aquaculture, Bhubaneswar
- Central Inland Fisheries Research Institute, Kolkata
- Central Institute of Fisheries Technology, Kochi
- National Bureau of Fish Genetic Resources, Lucknow
- National Research Centre on Coldwater Fisheries, Bhimtal
- ICAR Research Complex for Goa, Goa
- ICAR Research Complex for Eastern Region, Patna

CSIR Institutes

- Industrial Toxicology Research Centre, Lucknow
- Central Drug Research Institute, Lucknow
- Central Institute of Medicinal and Aromatic Plants, Lucknow
- Central Food Technological Research Institute, Mysore
- National Institute of Oceanography, Goa
- Centre for Cellular and Molecular Biology, Hyderabad
- National Botanical Research Institute, Lucknow

Universities

- Cochin University of Science and Technology, Kochi
- Annamalai University, Chidambaram
- University of Goa, Goa
- Acharya N. G. Ranga Agricultural University, Hyderabad
- Andhra University, Visakhapatnam
- Acharya Nagarjuna University, Guntur
- Mangalore University, Mangalore

State Governments

- Department of Fisheries, Government of Haryana
- Department of Fisheries, Government of Uttar Pradesh

- Department of Fisheries, Government of Bihar
- Department of Fisheries, Government of Tamil Nadu
- Department of Fisheries, Government of Andhra Pradesh
- Department of Fisheries, Government of Tripura
- Department of Fisheries, Government of Arunachal Pradesh
- Department of Fisheries, Government of Meghalaya
- Department of Fisheries, Government of Nagaland
- Department of Fisheries, Government of Assam
- Department of Fisheries, Government of Manipur
- Department of Fisheries, Government of Mizoram
- State Institute of Fisheries Technology, Kakinada

Other Organisations

- Tata Power Company, Mumbai
- Action Aid International, Port Blair
- M. S. Swaminathan Research Foundation, Chennai

9 Publications

9.1. Research Publications in Refereed Journals

Barse, A. V., Chakrabarty, T., Ghosh, T. K., Pal, A. K. and Jadhao, S., 2006. One-tenth dose of LC_{50} of 4-tert-butylphenol causes endocrine disruption and metabolic changes in *Cyprinus carpio*. *Pesticide Biochem. Physiol.,* **86** (3): 172-179.

Barse, A. V., Chakrabarti T., Ghosh, T. K., Pal A. K. and Jadhao, S., 2007. Endocrine disruption and metabolic changes following exposure of *Cyprinus carpio* to diethyl phthalate. *Pesticide Biochem. Physiol.,* **88** (1): 36-42.

Baruah, K., Pal, A. K., Sahu, N. P., Debnath, D., Norouzitallab, P. and Sorgeloos, P., 2007. Microbial phytase supplementation in rohu (*Labeo rohita*) diet enhances growth performance and nutrient digestibility. *J. World Aquac. Soc.,* **38:** 129-137.

Baruah, K., Sahu, N. P., Pal, A. K., Debnath, D. and Yengkokpam, S., 2007. Interactions of dietary microbial phytase, citric acid and crude protein level on mineral utilization by rohu, *Labeo rohita* (Hamilton), juveniles. *J. World Aquac. Soc.,* **38**: 238-249.

Baruah, K., Sahu, N. P., Pal, A. K., Jain, K. K., Debnath, D. and Mukherjee, S. C., 2007. Dietary microbial phytase and citric acid synergistically enhances nutrient digestibility and growth performance of *Labeo rohita* (Hamilton) juvenile at sub-optimal protein level. *Aquac. Res.,* **38:** 109-120.

Biswas, P., Pal, A. K., Sahu, N. P., Reddy, A. K., Ashisa, K. P. and Misra, S., 2007. Lysine and/or phytase supplementation in the diet of *Penaeus monodon* (Fabricius) juveniles: Effect on growth, body composition and lipid profile. *Aquaculture*, **265**: 253-260.

Chakraborty, S. K., Biradar, R. S., Jaiswar, A. K. and Palaniswami, R., 2006. Stock assessment of *Otolithes cuvieri* (Trewavas) off Mumbai. *J. Mar. Biol. Ass. India,* **48** (2): 270-273.

Chettri, J. K., Sahu, N. P., Pal, A. K., Reddy, A. K, Kumar, S. and Kumar, V., 2007. Comparative performance of gamma amino butyric Acid (GABA) and 5-Hydroxytryptamine (5-HT) in the diet of larvae and post-larvae of giant freshwater prawn, *Macrobrachium rosenbergii:* Effect of dose and route of administration on growth and survival. *Aquaculture*, **270** (1-4): 240-248.

Das, S. K., Tiwari, V. K., Venkateshwarlu, G., Reddy, A. K., Parhi, J., Sharma, P. and Chettri, J. K., 2007.Growth, survival and fatty acid composition of *Macrobrachium rosenbergii* (de Man, 1879) post-larvae fed HUFA-enriched *Moina micrura*. *Aquaculture,* **269:** 464-475.

Das T., Pal, A. K., Chakraborty, S. K., Manush, S. M., Chatterjee, N. and Apte, S. K., 2006. Metabolic elasticity and induction of heat shock protein (hsp-70) in *Labeo rohita* acclimated to four temperatures. *Asian Australasian J. Anim. Sci.,* **19** (7): 1033-1039.

Das, T., Pal, A. K., Chakraborty, S. K., Manush, S. M., Dalvi, R. and Mukherjee, S. C., 2006. Thermal dependence of embryonic development and hatching rate in *Labeo rohita* (Hamilton, 1822). *Aquaculture,* **255** (1-4): 536-541.

Datta, S., Das, S. C. S. and Das, R. C., 2006. Influence of water pH on the acute toxicity of arsenic (As) and mercury (Hg) to *Cyprinus carpio* var. *communis*. *Environ. Ecol.,* **24:** 289-292.

Debnath, D., Pal, A. K., Sahu, N. P., Baruah, K., Yengkokpam, S., Das, T. and Manush, S. M., 2006. Thermal tolerance and metabolic activity of yellowtail catfish, *Pangasius*

pangasius (Hamilton, 1822), advanced fingerlings, with emphasis on their culture potential. *Aquaculture,* **228:** 606-610.

Debnath, D., Pal, A. K., Sahu, N. P., Yengkokpam, S., Baruah, K., Choudhury, D. and Venkateshwarlu, G., 2007. Digestive enzymes and metabolic profile of *Labeo rohita* fingerlings fed diets with different crude protein levels. *Comp. Biochem. Physiol.,* **146** (Part B): 107-114.

Ghosh, P. K. and Adhikari, C., 2006. Per capita fish consumption in Bidhanagar (Salt Lake) area. *Enviorn. Ecol.,* **24** (3): 538-541.

Gupta, S. K., Jha, A. K., Pal, A. K. and Venkatshwarlu, G., 2007. Use of natural carotenoids for pigmentation in fishes. *Natural Product Radiance,* **6** (1): 46-49.

Kaushal, V. K., Purushothaman, C. S. and Desai, A. S., 2007. Bacterial flora in the internal organs of selected fish species in Mumbai waters. *J. Microb. World,* **9** (1): 139-144.

Kumar, R., Mukherjee, S. C., Prasad, K. P. and Pal, A. K., 2006. Evaluation of *Bacillus subtilis* as a probiotic to Indian major carp, *Labeo rohita* (Ham.). *Aquac. Res.,* **37:** 1215-1221.

Kumar, S., Sahu, N. P., Pal, A. K., Choudhary, D. and Mukherjee, S. C., 2006. Studies on digestibility and digestive enzyme activities in *Labeo rohita* (Hamilton) juveniles: Effect of microbial alpha-amylase supplementation in non-gelatinized or gelatinized corn-based diet at two protein levels. *Fish Physiol. Biochem.,* **32:** 209-220.

Kumar, V., Sahu, N. P., Pal, A. K. and Kumar, S., 2007. Immunomodulation of *Labeo rohita* juveniles due to dietary gelatinized and non-gelatinized starch. *Fish Shellfish Immunol.,* **23**(2): 341-353.

Manush, S. M., Pal, A. K., Das, T., Chatterjee, N., Sarma, K. and Mukherjee, S. C., 2007. Ultrastructural alterations in the gills of *Macrobrachium rosenbergii* acclimated to three different temperatures. *Asian J. Cell Biol.,* **2** (1): 1-10.

Mishra, S., Sahu, N. P., Pal, A. K., Kumar S., Xavier, B. and Mukherjee, S. C., 2006. Pre- and post- challenge iommuno-haematological changes in *Labeo rohita* juveniles fed gelatinized and non-gelatanised carbohydrate with n-3 PUFA. *Fish Shellfish Immunol*., **21:** 346-356.

Nair, S. R., Pandey, S. K., Sharma, A. and Salim, S. S., 2007. An evaluation of the business performance of fishery cooperative societies in Vasai taluka of Thane district, Maharashtra. *Indian Cooperat. Rev.*, **44** (3): 224-233.

Pandey, P. K., Jha, B. C., Patil, S. D. and Somdutt, 2006. Comparison of plankton populations of two aquatic habitats using biodiversity. *J. Aqua. Biol.,* **21**(1): 14-18.

Prabhakar, S. K., Sardar, P. and Manohar, S., 2006. Effect of starvation followed by re-alimentation on performance of *Labeo rohita* (H). *Indian J. Anim. Nutr.,* **23** (2): 113-118.

Prabhakar, S. K., Sardar, P. and Shah, M. H., 2006. Effect of feed restriction followed by re-alimentation on nutrient utilization, biochemical and haematological changes of Indian major carp, rohu (*Labeo rohita* H.). *Enviorn. Ecol.,* **24** (4): 1192-1196.

Prusty, A. K., Sahu, N. P., Pal, A. K., Reddy, A. K. and Kumar, S., 2007. Effect of dietary tannin on growth and haemato-immunological parameters of *Labeo rohita* (Hamilton) fingerlings. *Anim. Feed Sci. Technol.,* **136** (1-2): 96-108.

Rairakhwada, D., Pal, A. K., Bhathena, Z. P., Sahu, N. P., Jha, A. and Mukherjee, S. C., 2007. Dietary microbial levan enhances

cellular non-specific immunity and survival of common carp (*Cyprinus carpio*) juveniles. *Fish Shellfish Immunol.,* **22:** 477-486.

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Sarkar, M. K., Roy, B. and Sardar, P., 2007. Status of minerals in feed, fodders and blood plasma of cattle and goats in hill zone of West Bengal. *Enviorn. Ecol.,* **25** (1): 202-206.

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9.2. Papers in Seminars, Symposia, etc.

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Jaiswar, A. K. and Kulkarni, B. G., 2006. Diversity indices and distribution pattern of molluscs, the indicators of health status of intertidal ecosystem of Mumbai. *In: Conference on Environmental Pollution and Toxicology, Thakur College of Science and Commerce, Mumbai,* **p.** 55.

Jaiswar, A. K.,Varshney, P. K. and Prakash, C., 2006. Ecology studies of Seven Bungalows and Versova beaches of Mumbai, India. *In: Conference on Environmental Pollution and Toxicology, Thakur College of Science and Commerce, Mumbai,* **p.** 70.

Pandey, P. S., Tiwari, B. N., Das, P. B., Patra, P. K. and Kapil, K., 2006. *Ganne ke khamerikrit gur ka matsanupurak aahar ke sath anuprayog*. *In: Rashtriy Sangoshti: Bharat ke uttar-purvi rajyon ki matsiki*. Central Institute of Fisheries Education, Mumbai, at Guwahati, 06 December 2006, p. 83.

Raman R. P., 2006. *Avanchit videshi machliyon ke swadeshiy jal mein pravesh se deshaj matsy sampada par prabhav – Ek adhyayan. In: Rashtriy Sangoshti: Bharat ke uttar-purvi rajyon ki matsiki*. Central Institute of Fisheries Education, Mumbai, at Guwahati, 06 December 2006, p. 90.

Salim, S. S. and Verma, A. K., 2006. *Bharat ke purvottar rajyon mein matsyiki : Ek adhyayanatmak vishleshan. In: Rashtriy Sangoshti: Bharat ke uttar-purvi rajyon ki matsiki*. Central Institute of Fisheries Education, Mumbai, at Guwahati, 06

December 2006, p. 46.

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Singh, S. D., Kumar, V., Kumar, S., Kumar, R., Fernandez, N., Jadhav, S. and Brujkishore, 2006. *Uttar-purviy rajyon ki matsy jaiv vividhata adhyayan mein jaiv proudyogiki ka adhyayan. In: Rashtriy Sangoshti: Bharat ke uttar-purvi rajyon ki matsiki*. Central Institute of Fisheries Education, Mumbai, at Guwahati, 06 December 2006, p. 26.

Sinha, A., Das, R. C., Nandi, A. and Saha, S., 2006. *Bharat ke uttar-purvi rajyon ki alankari matsyiki. In: Rashtriy Sangoshti: Bharat ke uttar-purvi rajyon ki matsiki*. Central Institute of Fisheries Education, Mumbai, at Guwahati, 06 December 2006, p. 44.

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Tiwari, V. K., 2006. *Uttar-purvi rajyon mein magur beej utpadan ki sambhavanayem. In: Rashtriy Sangoshti: Bharat ke uttar-purvi rajyon ki matsiki*. Central Institute of Fisheries Education, Mumbai, at Guwahati, 06 December 2006, p. 81.

Uniyal, R. P., 2006. *Bharat ke uttar-purvi rajyon ke matsy vikas mein bhasha-boli ki samasyayen. In: Rashtriy Sangoshti: Bharat ke uttar-purvi rajyon ki matsiki*. Central Institute of Fisheries Education, Mumbai, at Guwahati, 06 December 2006, pp. 100-103.

Varshney, P. K., Agrahari, R. K. and Singh, S. K., 2006. *Gomti nadi ke pradushit kshetr* Daliganj, Lucknow, U.P. *mein nitaliy jeev vividhata – Ek adhyayan. I n: Rashtriy Sangoshti: Bharat ke uttar-purvi rajyon ki matsiki*. Central Institute of Fisheries Education, Mumbai, at Guwahati, 06 December 2006, pp. 92-97.

10 Participation of Faculty in Conferences, Meetings, Etc.

10. 1. Workshops, Seminars, Symposia, Write-shop, etc.

Dr. (Ms.) Archana Sinha, Dr. S. Datta and Dr. P. Sardar attended the State-level Workshop on Emerging Challenges in Enhancing Sustainable Fish Production in West Bengal during 05-06 April 2006 jointly organized by the Department of Fisheries, Aquaculture, Aquatic Resources and Fishing Harbours, Government of West Bengal and Central Institute of Fisheries Education, Kolkata Centre, Salt Lake City, Kolkata, at Poilan Meen Bhawan, Kolkata.

Dr C. S. Purushothaman participated in the Brainstorming Session on Role of Agriculturally Important Microorganisms in Sustainable Food and Agriculture Production organised by the National Bureau of Agriculturally Important Microorganisms, Mau on 18 April 2006.

Dr. C. S. Purushothaman attended the National Conference on Deemed to be Universities: Roles and Responsibilities during 04-05 May 2006 organized by the University Grants Commission and the Ministry of Human Resource Development (Government of India) at the National Agricultural Science Complex, New Delhi.

Dr. P. K. Pandey and Dr. (Ms.) A. Vennila attended a 5-day Writeshop on Mahseer Conservation and Management during 17-21 June 2006 at Lonavla.

Dr. U. K. Maheshwari, Dr. S. Raizada, Dr. N. K. Chadha and Dr. V. K. Tiwari attended the National Consultation on Water Management in Fisheries and Aquaculture during 23-24 June 2006 at the National Agricultural Science Complex, New Delhi.

Dr. Dilip Kumar and Dr. C. S. Purushothaman attended and led the group activities at the Participatory Review Workshop for Fisheries and Aquaculture Development in Bihar during 23-24 July 2006 at Patna.

Dr. R. S. Biradar and Dr. C. S. Purushothaman attended the Sensitization Workshop on National Agricultural Innovation Project 19 August 2006 at CIFE, Mumbai.

Dr. (Ms.) Archana Sinha attended the National Seminar on Fishery as a Tool to uplift Rural Economy and Unemployed Youth organized by Central Calcutta Science and Culture Organization for Youth in collaboration with the Department of Fisheries, Government of West Bengal, at Netaji Colony Maidan, Baranagar, Kolkata, on 06 September 2006.

Dr. C. S. Purushothaman attended the Indian Ocean Biogeographic Information System Workshop Programme (IndOBIS) during 25-26 September 2006 at National Institute of Oceanography, Regional Centre, Kochi.

Dr. R. S. Biradar attended the National Conference on Globalisation and Higher Education in India during 01-02 November 2006 at New Delhi.

Dr Dilip Kumar and Dr. R. S. Biradar attended the Brain-storming Workshop on Indo-US Agricultural Knowledge Initiative during 04-05 November 2006 at G. B. Pant University of Agriculture and Technology, Pantnagar.

Ms. Asha T. Landge attended the One-day Workshop on Aquarium Fish Breeding and Management jointly organized by Maharashtra Council for Agricultural Education and Research, Pune; College of Fisheries, Ratnagiri; and agricultural Technology Management Agency, Pune; at Maharashtra Council for Agricultural Education and Research, Pune, on 23 November 2006.

Dr. V. K. Tiwari attended the One-day Workshop on Fish Biodiversity in Central India organized by the National Bureau of

Fish Genetic Resources, Lucknow, on 24 November 2006 at Bhopal.

Dr. Somdutt, Mr. S. S. H. Razvi and Dr. R. K. Upadhyay attended the workshop on Conservation Assessment of Freshwater Fish for Central India at the Central Institute of Agricultural Engineering, Bhopal on 25 November 2006.

Dr Dilip Kumar, Dr. R. S. Biradar, Dr. C. S. Purushothaman, Dr. (Ms.) Archana Sinha, Dr. Somdutt, Dr. V. K. Tiwari and Dr. (Ms.) A. Vennila attended the Hindi Workshop on *Bharat ke Uttar-purvi Rajyon ki Matsiki* at Guwahati on 06 December 2006.

Dr. Dilip Kumar, Dr. R. S. Biradar, Dr. C. S. Purushothaman, Dr. (Ms.) Archana Sinha, Dr. Somdutt, Dr. V. K. Tiwari and Dr (Ms.) A. Vennila attended the First Zonal Workshop on Policy Issues and HRD in Fisheries and Aquaculture for Northeastern States during 07-08 December 2006 at Guwahati.

Dr. S. Raizada attended a Workshop on *Matsya Palan evam Antasthaliya Matsiki* during 21-22 December 2006 organized by the National Bureau of Fish Genetic Resources, Lucknow.

Dr. A. K. Jaiswar attended a National Conference on Environmental Pollution and Toxicology during 22-23 December 2006 at Thakur College of Science and Commerce, Mumbai.

Dr. Dilip Kumar, Dr. R. S. Biradar and Dr. C. S. Purushothaman attended the Indo-US Joint Curriculum Development Workshop during 21-23 January 2007 under the Human Resources and Institution Building Component of Indo-US Agricultural Knowledge Initiative at National Agricultural Science Complex, New Delhi.

Dr. Somdutt attended the workshop organized by M.P. State Fisheries Directorate, Bhopal, on Enhancement of Fish Production in Tanks and Reservoirs through Recent Technology during 23-26 January 2007 at Bhopal.

Dr. S. S. Salim attended the Eight Agricultural Science Congress during 15-17 February 2007 at Tamil Nadu Agricultural University, Coimbatore.

Dr. S. Raizada attended a workshop on Integrated Fish Farming on 14 March 2007 organized by the Department of Fisheries, Government of Uttar Pradesh at Lucknow.

Dr. (Ms.) Archana Sinha attended the National Workshop on *Matsyiki Anusandhan evam Vikas – Dishayen aur Aayam* during 17-18 March 2007 organized by the Central Inland Fisheries Research Institute, Kolkata.

Dr. R. S. Biradar, Dr. S. S. Salim, Dr. (Ms.) A. Vennila and Dr. P. Rami Reddy attended the Second Zonal Workshop on Fisheries and Aquaculture Policy: Ecosystem and Livelihood Perspectives in East Coast States during 22-24 March 2007 at the National Institute of Agricultural Extension Management, Hyderabad.

10.2. Meetings

Dr. S. Raizada attended the meeting of the Mega Seed Project during 06-07 April 2006 at the Central Institute of Freshwater Aquaculture, Bhubaneswar, and during 27-28 June 2006 and 01-02 March 2007 at National Agriculture Science Complex, New Delhi.

Dr. S. Raizada attended the meetings on Networking in Nutrition on 08 April 2006 at the Central Institute of Freshwater Aquaculture, Bhubaneswar.

Dr. R. S. Biradar had a meeting with the Australian delegates regarding the progress of the project entitled Developing Aquaculture in Degraded Inland Areas in

India and Australia on 04 May 2006 at CIFE, Mumbai.

Dr. Dilip Kumar, Dr. Somdutt, Mr. S. S. H. Razvi and Dr. R. K. Upadhyay attended the meeting with Mr. Moti Kashyap, Hon'ble Minister for Fisheries, Government of Madhya Pradesh, Bhopal, on 09 January 2007.

Dr. Somdutt attended the Working Group Meeting for the Finalization of Modular Package for Certificate Programme (Level I) in Fisheries during 29 January – 02 February 2007 by the National Centre for Educational Research and Training, Bhopal.

Dr. Somdutt attended the meeting called by Matstya Maha Sangh, Bhopal, to give expert opinion on the rights of fishing in Tawa and Barana reservoirs of Madhya Pradesh on 27 February 2007.

Dr. Somdutt attended the meeting called by the Director of Fisheries, Government of Madhya Pradesh, Bhopal, to discuss the effects of fishing on the ecology of Tawa reservoir on 12 March 2007.

10.3. Training programmes

Ms. R. H. Khandagale attended a training programme on Introduction to GIS and its Applications during 03-28 April 2006 at National Remote Sensing Agency, Hyderabad.

Ms. M. Pikle, Mr. R. Singh and Ms. R. H. Khandagale attended a training programme on Arc Info University Lab Kit GIS Software during 10-16 May 2006 at ESRI India held at CIFE, Mumbai.

Dr. R. S. Biradar attended a training programme on Domestic Enquiry and Disciplinary Proceedings during 18-21 May 2006 at National Institute of Public Administration, Bangalore.

Dr. R. S. Biradar attended the programme on Development of Research Proposals in Public-Private Consortia Mode on 27 June 2006 at the National Academy of Agricultural Research Management, Hyderabad.

Dr. R. S. Biradar and Mr. Dasari Bhoomaiah attended a training programme on GIS Applications in Land Resource Management during 31 July - 04th August 2006 at International Centre for Research in Semi-Arid Tropics, Hyderabad.

Dr P. Sardar and Dr. S. Datta attended a training programme on Complementary Role of Livestock and Fisheries in Sustainable Hill Farming of 21 days duration organized by the Division of Animal Production, ICAR Research Complex for NEH Region, Barapani, during 09-29 August 2006.

Dr. P. K. Pandey attended the training programme on Metagenomics of Microorganisms in Agriculture and Allied Sectors during 07-11 February 2007 at National Bureau of Agriculturally Important Microorganisms, Mau.

Ms. K. Biswas attended a training programme on Basic Knowledge of Computer (Windows Environment) - in Hindi – for five days at Rajbhasha Vibhag, Centre for Development of Advanced Computing (Government of India), Kolkata, during 05-09 March 2007.

Dr. (Ms.) R. Sharma attended the training on SAS Software during 19-23 March 2007 organised by SAS Institute Pvt. Ltd. Mumbai.

11 Workshops, Write-shop and Interactive Meeting Organised

11.1. Meetings

S. no.	Meeting	Period
1.	Quinquennial Review Team	01-02 May 2006
2.	Board of Examinations	24-25 May 2006 05 September 2006 13 September 2006 14 November 2006 06 March 2007
3.	Staff Research Council	12-14 June 2006 05 January 2007
4.	Board of Management	07 July 2006
5.	Town Official Language Implementation Committee (North Mumbai)	20 September 2006 08 February 2007
6.	Academic Council	12 October 2006
7.	Research Advisory Committee	27 March 2007

11.2. Worksops, Write-shop, Interactive meeting

The following workshops, write-shop and interactive meeting were organized during the tear under report:

State-level Workshop on **Emerging Challenges in enhancing Sustainable Fish Production in West Bengal** during 05-06 April 2006 in collaboration with the Department of Fisheries, Aquaculture, Aquatic Resources and Fishing Harbours, Government of West Bengal, at Pailan Meen Bhawan, Kolkata.

Interactive Meeting on **Implementation of Coastal Aquaculture Authority Act** jointly organized with the Coastal Aquaculture Authority and Marine Products Export Development Authority on 02 June at CIFE, Mumbai.

Five-day day Write-shop on Mahseer Conservation and Management during 17-21 June 2006 at Tata Power Company, Lonovla.

Sensitization Workshop on National Agricultural Innovation Project on 19 August 2006 at CIFE, Mumbai.

National Seminar on **Fishery – As a Tool to uplift Rural Economy and Unemployed Youth** on 06 September 2006 jointly with Central Calcutta Science and Culture Organization for Youth in collaboration with the Department of Fisheries, Government of West Bengal, at Netaji Colony Maidan, Baranagar, Kolkata.

National Workshop on ***Bharat ke Uttar-purvi Majyon ki Matsiki*** on 06 December 2006 at Guwahati.

The First Zonal Workshop on **Policy Issues and HRD in Fisheries and Aquaculture for**

First Zonal Workshop on Policy Issues and HRD in Fisheries and Aquaculture for Northeastern States

Second Zonal Workshop on Fisheries and Aquaculture Policy: Ecosystem and Livelihood Perspectives in East Coast States

Northeastern States during 07-08 December 2006 at Guwahati.

The Second Zonal Workshop on **Fisheries and Aquaculture Policy: Ecosystem and Livelihood Perspectives in East Coast States** during 22-24 March 2007 at the National Institute of Agricultural Extension Management, Hyderabad.

CAS Training Programmes

"Recent Advances in Biochemical and Molecular Techniques..."

Dr. Dilip Kumar, Director, CIFE, Mumbai and Faculty Members with trainees of CAS Programme

The Centre of Advance Studies (CAS) Training Programme on "Recent Advances in Biochemical and Molecular Techniques and their Applications in Aquaculture" was conducted during 28 March to 17 April 2006. A total of 20 participants from different states of the country participated in the training and learned various techniques, both theory and practicals. The training programme was inaugurated by Dr. Dilip Kumar, Director, CIFE. The Chief Guest of the valedictory programme was Professor H. P. Singh, Vice-Chancellor, Rajendra Agricultural University, Pusa, Bihar.

"Genetic Improvement of Fish - A Biotechnological Approach"

Trainees of the CAS Programme Genetic Improvement of Fish

CAS training programme on "Genetic Improvement of Fish - A Biotechnological Approach" was conducted by the Division of Fish Genetics and Biotechnology from 18 May to 07 June 2006. A total of 14 trainees participated in the training programme. Dr. C. P. Puri, Director, Institute of Research in Reproduction, Parel, Mumbai, inaugurated the training programme. The participants were from different Institutes, SAUs and traditional universities. The certificates were distributed by Dr. Dilip Kumar, Director, CIFE. The programme concluded with the remarks by Dr. S. C. Mukherjee, Joint Director and Dr. C. S. Purushothaman, CAS Director.

"Nutritional Strategies and Feeding Management in Finfish and Shellfish"

A 21 days' training programme titled "Nutritional Strategies and Feeding Management in Finfish and Shellfish" was conducted during 29 March to 18 April, 2007 under Centre of Advanced Studies in Fisheries Science at CIFE Mumbai. Twenty participants from Universities/Research Institutions/Fisheries Colleges participated in the training programme. In total there were about 20 practicals and 38 lectures / talks / discussion on various topics. The pre-training and post-training tests and feedback from trainees showed 100 percent gain in trainees knowledge with about 90% trainees rating this training as excellent.

Fisheries Education Policy Workshop

A Consultative Workshop on 'Fisheries Education Policy : Issues and Challenges' was held at CIFE, Mumbai on 07 February 2007. In this merathan meet, Deans from Fisheries Colleges, Scientists from various ICAR Instituions, representatives from NGOs and farming and processing industries, State and Central Government bodies, students and alumni associations participated. The proceedings of the Workshop containing various policy recommentations have been published.

12 Distinguished Visitors

12.1. Headquarters

Dr. S. J. Kaushik	French National Institute for Agricultural Research (INRA), Paris
Dr. K. Gopakumar	Former Deputy Director General (Fisheries), Indian Council of Agricultural Research, New Delhi
Dr. M. Devaraj	Former Director, Central Marine Fisheries Research Institute, Kochi
Dr. R. Fotedar and **Dr. B. Philip**	Muresk Institute, Curtin University of Technology, Perth (Australia)
Mr. Tony	Food and Agriculture Organisation of the United Nations, the Netherlands
Dr S. Fielder	Project Leader; and Dr. G. Allan, Project Associate; Australian Centre for International Agriculture Research, Canberra (Australia)
Dr. T. Nasser	Senior Programme Advisor, Bay of Bengal Programme, Chennai
Dr. M. V. Gupta	World Food Laureate, Hyderabad

12.2. Rohtak Centre

Dr S. Fielder	Project Leader; and Dr. G. Allan, Project Associate; Australian Centre for International Agriculture Research, Canberra (Australia)
Dr. A. G. Ponnaiah	Director, Central Institute of Brackishwater Aquaculture, Chennai
Dr. S. Ayyappan	Deputy Director General (Fisheries), Indian Council of Agricultural Research, New Delhi
Ms. K. Jain	Managing Director, Matsya Maha Sangh, Bhopal
Mr. F. A. Kidwai, I.A.S.,	Collector, Hoshangabad

12.3. Kakinada Centre

Mr. M. M. Pallam Raju,	Hon'ble Minister of State for Defence, Govt. of India, New Delhi
Mr. M. Gopala Krishna	Hon'ble M.L.A., Kakinada
Mr. T. Rama Reddy	Hon'ble M.L.A., Anaparty
Mr. D. Venkatewarlu	Hon'ble M.L.A., Tallarevu
Mr. K. L. Durgesh	Hon'ble M.L.C., Hyderabad
Mr. P. Sundar Kumar	Commissioner of Fisheries, Govt. of Andhra Pradesh, Hyderabad
Mr. N. P. R. K. Reddy,	I.A.S., Additional Secretary (Animal Husbandry and Fisheries), Government of Andhra Pradesh, Hyderabad
Mr. C. S. Reddy, I.A.S.,	Joint Collector and Additional Magistrate, East Godavari District
Dr. A. G. Ponnaiah	Director, Central Institute of Brackishwater Aquaculture, Chennai
Dr. (Ms.) T. Rajya Laxmi,	Former Director, Central Institute of Brackishwater Aquaculture, Chennai
Dr. C. C. P. Ranga Rao	Former Director, Central Institute of Fisheries Technology, Kochi
Commandent S. K. Nath,	Commanding Officer, Indian Coast Guard, Kakinada
Mr. M. R. Gopal Rao	Principal, State Institute of Fisheries Technology, Kakinada
Mr. Nilank Kumar, I.R.S.,	Assistant Commissioner, Central Excise, Kakinada
Dr. M. Rye	Institute of Aquaculture Research, Ås (Norway)
Dr. A. Partha Sarathi	FAO Consultant, Akiveedu

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T-8

Mr. N. L. Singh

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Mr. A. D. Ragabhagat

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Mr. R. K. Langer
Dr. Chandra Prakash

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Mr. D. R. Khogare
Dr. M. K. Chouksey
Mr. S. S. Kamat
Mr. M. H. Chandrakant
Dr. (Ms.) Zeba Jaffer Abidi

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Mr. Ram Singh
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Ms. Rajani H. Khandgale
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Mr. R. Palaniswamy
Ms. S. M. Bagwe
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Mr. S. M. Shinde
Mr. R. G. Kudale
Mr. B. S. Rawat
Ms. A. Mehta
Mr. C. B. Kareer
Mr. A. Sadanandan
Mr. B. G. Mandhare
Mr. P. K. Das
Ms. Nalini Poojary

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Ms. Rakha Nair
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Mr. B. T. Phande
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Mr. B. R. Jaiswar
Mr. S. V.Patil
Mr. B. J. Rathod

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Mr. S. R. Vinarkar

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Mr. R. D. Deshmukh
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Mr. S. S. Hussain
Mr. D. S. Rawat
Mr. V. G. Dhindore
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T-1

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Mr. Chironji Lal

Finance and Accounts Officer

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Ms. A. A. Shukla
Ms. D. S. Naik

Upper Division Clerks

Mr. J. D. Chandramore
Ms. F. G. Fernandes
Ms. C. S. Khundol
Mr. D. S. Ingale
Mr. R. R. Kadam
Mr. R. G. Gamare
Ms. S. S. Koli
Mr. V. S. Kuveskar
Mr. D. V. Raorane
Ms. S. V. Pawar

Ms. A. U. Joshi
Ms. Y. S. Dhatavkar
Mr. A. G. Kolambkar

Lower Division Clerks
Ms. S. S. Parab
Mr. B. P. Chauhan
Mr. P. G. Angne
Ms. C. C. Raut
Ms. Anu Grover
Mr. S. H. Bhosale
Mr. K. K. Jagtap
Ms. N. A. Sawant
Mr. M. B. Waghela
Mr. N. L. Ghane

Supporting

Grade IV

Mr. M. R. Wasnik

Grade III
Mr. V. P. Tiwari
Mr. S. R. Jaiswar
Mr. B. S. Tamankar
Mr. A. R. More
Mr. D. B. Gaikwad

Grade II
Ms. V. Tambe
Ms. K.R. Ahire
Mr. T. G.Gaikwad
Mr. J. K. Makwana
Mr. A. R. Dore
Mr. B. R. Chavan
Mr. M. P. Kotian
Mr. G. B. Kamble
Mr. A. R. Shingade
Mr. J. N. Dhanu
Mr. V. N. Ondkar
Ms. K. Jai Kishore

Grade I
Mr. S. P. Malvankar
Mr. R. N. Kamble
Ms. R. H. Chavan
Mr. G. N. Zendekar
Ms. S. J. Kolambkar
Mr. A. N. Joyashi
Mr. A. D. Sonawane
Mr. V. K. Yadav

Vessel Staff

Technical

Skipper (T-7)

Mr. K. Satyanarayana

Engineer FTV (T-8)

Mr. J. Jacob

Engine Driver (T-5)

Mr. S. K. Chodankar

Additional Engine Driver (T-6)

Mr. S. L. Kotian

Mate (T-4)

Mr. S. Maity

Deckhands (T-2)
Mr. K. V. Rajendran
Mr. S. L. Mungekar
Mr. A. P. Dhawade

Cook

Mr. S. Kamaraju

Supporting

Grade IV
Mr. B. N. Sukur
Mr. N. A. Bijali
Mr. G. G. Zendekar

Grade III
Mr. V. Patil
Mr. S. Padyal

Grade II

Mr. A. Lavande

Rohtak Centre

Scientific

Principal Scientists
Dr. U. K. Maheshwari (Officer-in-charge)
Dr. P. P. Joshi

Senior Scientists
Dr. S. Raizada
Dr. N. K. Chadha

Technical

T-7

Dr. M. Ali

T-6

Mr. Inderjit Singh

T-4
Mr. Ashok Kumar
Mr. Sanjeevan Kumar
Mr. H. Javed

T-2

Mr. Kishan Kumar

Administrative Staff

Upper Division Clerk

Mr. V. K. Sinha

Supporting

Grade I
Mr. Gyani Ram
Mr. Gyan Chand
Mr. Lavesh Kumar

Powarkheda Centre

Scientific

Senior Scientist

Dr. Somdutt (Officer-in-charge)

Scientist (Selection Grade)

Mr. S. S. H. Razvi

Technical

T-6

Mr. R. K. Upadhyay

T-5

Mr. L. P. Bamalia

T-3

Mr. Gurubachan Singh

T-2

Mr. Anup singh

T-1

Mr. Raghuvir Prasad

Administrative

Assistant

Ms. Asha Dhurve

Supporting

Grade IV

Mr. H. M. Potpose

Grade III
Mr. Hari Singh
Mr. Lallu Prasad
Mr. Vishnu Lal
Mr. Mangli Prasad

Grade II
Mr. Surendra Kumar
Mr. R. K. Prasad
Mr. S. Dayal
Mr. Manoharlal
Mr. Ram Swaroop
Mr. S. Prajapati

Kakinada Centre

Scientific

Principal Scientist

Dr. G. Venugopal (Officer-in-charge)

Technical

T-6
Mr. K. B. S. Murthy
Mr. P. Rami Reddy
Mr. J. Krishna Prasad
Mr. K. Murali Mohan
Mr. P. Srinivasa Rao
Mr. V. N. Acharyulu

T-5
Mr. K. Radha Krishna Reddy

Mr. B. Krishna Rao
Mr. R. R. S. Patnaik
Mr. P. Satyanarayan

T-I-3

Mr. Y. S. Murty

T-2

Mr. M. Satyanarayana

T-1
Mr. A. Gurraiah
Mr. K. Mallaiah

Administrative

Assistants
Mr. P. V. G. Krishnamurthy
Mr. B. Veera Raju

Upper Division Clerk

Mr. B. Laxman Rao

Lower Division Clerk

Ms. M. Rama Mani

Supporting

Grade IV
Mr. M. H. Reddy
Mr. M. Krishna
Mr. M. Ch. Appa Rao
Mr. S. Kale

Grade III
Mr. K. Satyanarayana
Mr. K. Niranjan
Mr. N. Venkata Ramana
Mr. K. Prasad

Grade II
Mr. V. Shivaji
Mr. O. Veeraraju
Mr. T. Satyanarayana
Mr. P. V. K. Reddy
Mr. P. D. Reddy
Mr. S. Valisha
Mr. A. L. Reddy
Mr. S. S. Reddy
Mr. Y. Buchilingam
Mr. M. Govindu
Mr. M. A. Rao
Mr. G. V. V. Satyanarayana
Mr. S. N. Saheb

Grade I

Mr. K. Dharma Raju

Kolkata Centre

Scientific

Principal Scientists
Dr. R. C. Das (Officer-in-charge)
Dr. P. K. Ghosh

Senior Scientists

Dr. (Ms.) Archana Sinha

Scientists (Selection Grade)
Dr. P. K. Roy
Mr. B. N. Tiwari

Scientists (Senior Scale)
Dr. S. Dutta
Dr. P. Sardar

Technical

T-6
Mr. P. S. Pandey
Mr. S. K. Sharma

T-4
Mr. P. K. Patra
Mr. R. K. Mondal

T-3

Mr. S. K. Das

T-2

Mr. T. K. Ghosh

Administrative

Personal Assistant

Ms. Kaberi Biswas

Upper Division Clerks
Mr. C. N. Sahani
Mr. P. K. De

Lower Division Clerk

Mr. Ram Milan Singh

Supporting

Grade IV

Mr. B. Dhar
Mr. B. D. Mondal
Mr. T. C. Balmiki

Grade III

Ms. Manju Paul
Mr. R. N. Prasad
Mr. R. N. Das
Mr. R. Chowdhary

Promotions

Sr. No.	Name	Designation	Promoted as	Date of promotion
1.	Dr. V. K. Tiwari	Scientist (SG)	Senior Scientist	25.01.2003
2.	Dr. K. Venkateshvaran	Scientist (SG)	Senior Scientist	02.07.2004
3.	Mr. R. P. Raman	Scientist (SS)	Scientist (SG)	10.11.2004
4.	Mr. R. K. Mondal	T-I-3	T-3 & T-4	01.01.2005
5.	Mr. Ravi Kumar	T-II-3	T-4	01.01.2005
6.	Mr. H. Javed	T-II-3	T-4	13.04.2005
7.	Mr. K. Dhana Raju	T-1	T-2	24.04.2005
8.	Mr. Sanjeevan Kumar	T-II-3	T-4	26.05.2005
9.	Mr. A. S. Bisht	T-II-3	T-4	26.06.2005
10.	Mr. L. P.Bamalia	T-4	T-5	01.07.2005
11.	Mr. P. C.Jaiswar	T-1	T-2	11.07.2005
12.	Mr. Ram Bharose	T-1	T-2	11.07.2005
13.	Ms. V. D. Misale	T-1	T-2	11.07.2005
14.	Mr. A.N. Mahadik	T-1	T-2	11.07.2005
15.	Mr. V. K. Bhave	T-1	T-2	11.07.2005
16.	Mr. A. N. Sable	T-I-3	T-3	16.07.2005
17.	Mr. S. Natarajan	T-7	T-9	27.09.2005
18.	Mr. M. Baqar	T-1	T-2	09.10.2005
19.	Dr. M. Makesh	Scientist	Scientist (SS)	10.11.2005
20.	Mr. A. D. Ragabhagat	T-6	T-7-8	12.12.2005
21.	Mr. V. N. Acharyulu	T-5	T-6	01.01.2006
22.	Mr. S. P. Singh	T-5	T-6	01.01.2006
23.	Mr. B. R. Jaiswar	T-I-3	T-3	17.01.2006
24.	Ms. R. H. Khandagale	T-4	T-5	23.01.2006
25.	Dr. R. S. Rana	T-6	T-7-8	03.02.2006
26	Dr. (Ms.) Z. J. Abidi	T-6	2 adv. increments	03.02.2006
27.	Mr. S. K. Koli	T-I-3	T-3	16.02.2006
28.	Mr. B. T. Phande	T-I-3	T-3	22.02.2006
29.	Mr. A. G. Kolambkar	LDC	UDC	08.09.2006
30.	Mr. H. M. Potpose	SSGr-III	SSGr-IV	24.02.2007
31.	Mr. G. G.Zendekar	SSGr-III	SSGr-IV	24.02.2007
32.	Mr. K. Prasad	SSGr-II	SSGr-III	24.02.2007
33.	Mr. Mangli Prasad	SSGr-II	SSGr-III	24.02.2007
34.	Mr. G. V. V. Satyanarayan	SSGr-I	SSGr-II	24.02.2007
35.	Mr. V. N. Ondkar	SSGr.I	SSGr-II	24.02.2007
36.	Mr. A. M. Lavande	SSGr.I	SSGr-II	24.02.2007

Financial Upgradation

1. Mr. J. N. Tiwari, SSGr-I
2. Mr. Mahesh Chandra, SSGr-I
3. Mr. A. M. Lavande, SSGr-I
4. Mr. Anwar, SSGr-I

Clearance of Probation

1. Mr. A. Gurraiah, T-1
2. Mr. K. Mallaiah, T-1

Transfers

Sr. No.	Name	Designation	From	To
1.	Dr. Krishna Chandra	Principal Scientist	CIFE, Kolkata	CIFRI, Kolkata
2.	Dr. P. P. Joshi	Principal Scientist	CIFE, Mumbai	CIFE, Rohtak
3.	Dr. Alok Kumar Jain	Senior Scientist	CIFE, Lucknow	ICAR RCER, Patna
4.	Dr. P. M. Sherry	Senior Scientist	CIFE, Lucknow	ICAR RCER, Patna
5.	Dr. P. K. Varshney	Senior Scientist	CIFE, Lucknow	NBFGR, Lucknow
6.	Dr. C. S. Chaturvedi	T-7-8	CIFE, Mumbai	CARI, Port Blair
7.	Dr. P. P. Srivastava	T-7-8	CIFE, Mumbai	NBFGR, Lucknow
8.	Mr. A. K. Yadav	T-6	CIFE, Lucknow	NBFGR, Lucknow
9.	Mr. S. P.Singh	T-6	CIFE, Lucknow	NBFGR, Lucknow
10.	Mr. M. Gyas	T-5	CIFE, Lucknow	NBFGR, Lucknow
11.	Mr. A. S. Bisht	T-4	CIFE, Lucknow	NBFGR, Lucknow
12.	Mr. S. K. Upadhyay	T-4	CIFE, Lucknow	NBFGR, Lucknow
13.	Mr. Ravi Kumar	T-4	CIFE, Lucknow	NBFGR, Lucknow
14.	Mr. S. K. Singh	T-II-3	CIFE, Lucknow	NBFGR, Lucknow
15.	Mr. P. C. Jaiswar	T-2	CIFE, Lucknow	NBFGR, Lucknow
16.	Mr. Ram Bharose	T-2	CIFE, Lucknow	NBFGR, Lucknow
17.	Mr. Om Prakash	T-2	CIFE, Lucknow	NBFGR, Lucknow
18.	Mr. Jogendra Singh	Assistant	CIFE, Lucknow	NBFGR, Lucknow
19.	Mr. P. K. Awasthi	UDC	CIFE, Lucknow	NBFGR, Lucknow
20.	Mr. P. C. Verma	LDC	CIFE, Lucknow	NBFGR, Lucknow
21.	Mr. Sajivan Lal	LDC	CIFE, Lucknow	NBFGR, Lucknow
22.	Mr. K.Narayan	SSGr-IV	CIFE, Lucknow	NBFGR, Lucknow
23.	Mr. Ram Lakhan	SSGr-II	CIFE, Lucknow	NBFGR, Lucknow
24.	Mr. Dush Raj	SSGr-II	CIFE, Lucknow	NBFGR, Lucknow
25.	Ms. K. Jai Kishore	SSGr-II	CIFE, Lucknow	CIFE, Mumbai
26.	Mr. Mahesh Chandra	SSG-.I	CIFE, Lucknow	NBFGR, Lucknow
27.	Mr. Anwar	SSGr-I	CIFE, Lucknow	NBFGR, Lucknow
28.	Mr. Suneet Kumar	SSGr-I	CIFE, Lucknow	NBFGR, Lucknow
29.	Mr. Jai Narayan Tiwari	SSGr-I	CIFE, Lucknow	NBFGR, Lucknow
30.	Mr. V. K. Yadav	SSGr-I	CIFE, Lucknow	CIFE, Mumbai

Deputation

Sr. No.	Name and Designation	From	Deputed to	Date of relieving
1.	Dr. (Ms.) Z. J. Abidi, T-6	CIFE, Lucknow	UP Water Sector Restructuring Project, Lucknow	11.09.2006
2.	Dr. M. Ali, T-7	CIFE, Lucknow	Ministry of Agriculture, New Delhi	03.10.2006

Retirements

Sr. No.	Name	Designation	Retired on	Place of posting
1.	Mr. J. D. Chandramore	UDC	30.04.2006	CIFE, Mumbai
2.	Dr. Atul Kumar Jain	Senior Scientist	01.05.2006	CIFE, Mumbai
3.	Mr. K. Pothuraju	SSGr-IV	31.05.2006	CIFE, Kakinada
4.	Ms. Suman M. Supat	SSGr-IV	31.05.2006	CIFE, Mumbai
5.	Mr. S. L. Mungekar	T-2	31.05.2006	CIFE, Mumbai
6.	Ms. T. Krishnan	T-5	01.11.2006	CIFE, Mumbai

Demise

Mr. K. Dharma Raju, SSGr-III of Kakainada Centre, left for his heavenly abode on 06 July 2006. May his soul rest in peace!

14 कार्यकारी सारांश

केन्द्रीय मात्स्यिकी शिक्षा संस्थान, मुंबई के वर्ष 2006-07 का कार्यकाल बहुत महत्वपूर्ण रहा है । इस वर्ष दिनांक 6 फरवरी 2007 को संस्थान का द्विवर्षीय दीक्षांत समारोह सम्पन्न हुआ । इस अवसर पर मत्स्य जगत के दो महान वैज्ञानिकों, डा.वी.आर.पी.सिन्हा एवं डा.एम.वी.गुप्ता को डी.एस.सी. (मानद) की उपाधि से विभूषित किया गया । इसी के साथ 33 छात्रों को पी.एच.डी., 83 छात्रों को एम.एफ.एस.सी. की डिग्री तथा दो छात्रों को स्नातकोत्तर उपाधि प्रदान की गई । इस वर्ष मत्स्य विकास नीति से संबंधित कार्यशालाएं भी सम्पन्न की गई । इसके तहत पहली क्षेत्रीय कार्यशाला **भारत के उत्तर-पूर्वी राज्यों में मात्स्यिकी एवं जलकृषि की नीति तथा मानव संसाधन विकास** पर दिनांक 7-8 दिसम्बर 2006 को गुवाहाटी में आयोजित की गई । दूसरी क्षेत्रीय कार्यशाला **राष्ट्रीय कृषि विस्तार प्रबंध संस्थान, हैदराबाद** में **मात्स्यिकी एवं जलकृषि नीति : पूर्वी तटीय राज्यों की पारिस्थितिकी एवं आजीविका परिदृश्य** पर दिनांक 22-24 मार्च को आयोजित की गई । अगली कार्यशाला **मात्स्यिकी शिक्षा नीति - मुद्दे एवं चुनौतियां** विषय पर दिनांक 7 फरवरी 2007 को इसी संस्थान में सम्पन्न हुई । इसी के साथ दिनांक 6 दिसम्बर 2006 को गुवाहाटी में **भारत के उत्तर-पूर्वी राज्यों की मात्स्यिकी** विषय पर हिन्दी में राष्ट्रीय संगोष्ठी आयोजित की गई ।

इस संस्थान को प्राप्त बाहरी वित्तीय परियोजनाएं सिद्व करती हैं कि इस संस्थान का वैज्ञानिक अनुसंधान गुणवत्ता कितना उच्चस्तरीय है । वर्तमान में इस संस्थान में राष्ट्रीय महत्व के 19 बाहरी वित्तीय परियोजनाएं तथा 22 संस्थागत परियोजनाएं कार्यरत हैं, जो कि चार मुख्य उद्देश्यों के अन्तर्गत वर्गीकृत हैं । सभी अनुसंधान परियोजनाएं नवीनतम व महत्वपूर्ण विषयों से संबंधित हैं, जो कि कृषकों को केन्द्र में रखते हुए सामाजिक व बहुपयोगी हैं । दो अन्तरराष्ट्रीय अनुसंधान परियोजनाएं भी इस संस्थान में चल रही हैं । इनमें से एक भारत नार्वे कार्यक्रम संस्थागत सहकारिता का, काकिनाडा (आंध्र प्रदेश) केन्द्र में तथा दूसरी परियोजना अंतरराष्ट्रीय कृषि अनुसंधान पर आस्ट्रेलियन केन्द्र के साथ रोहतक केन्द्र (हरयाणा) में कार्यरत है । दोनों परियोजनाएं अत्यंत उपयोगी सिद्व हो रही हैं । अन्तरस्थलीय लवणीय जल से संबंधित परियोजना ने महत्वपूर्ण उपलब्धियां प्राप्त की हैं । इन क्षेत्रों में सी वीड, श्रिंप महाझींगा व मछलियों के उत्पादन के अच्छे परिणाम सामने आ रहे हैं । यह संस्थान परिषद के शैक्षणिक संस्थानों के मध्य अनुभवों पर आधारित शिक्षा के कारण अपनी विशिष्ट छाप छोड़ रहा है । यहां आधुनिक आधारभूत सुविधाएं उपलब्ध कराई जा रही हैं । जिनमें से शीत गृह, मोडयुलर रसोई, विक्रय केन्द्र तथा फूड-ग्रेड निकास आदि हैं । यह विचार किया जा रहा है कि इस संस्थान के एम.एफ.एस.सी. के छात्र इस सुविधा का उपयोग अन्य कृषि विश्वविद्यालयों के छात्रों के साथ आर.ए.डब्ल्यू.ई. कार्यक्रम के तहत कार्यान्वित करें ।

इस संस्थान ने डिम्बे जलाशय में उत्पादन को बढ़ाकर एक महत्वपूर्ण उपलब्धि प्राप्त की है । समूहों की सहभागिता के साथ भारतीय मेजर कार्प के 1,25,000 फिंगरलिंग तैरते हुए पिंजड़े में संवर्धित कर जलाशय में छोडे गए ।

प्रग्रहण के दौरान यह देखने में आया कि कम मूल्य वाली मछलियों का स्तर धीरे-धीरे अधिक मूल्य वाली मछली की तरह होने लगा । मात्स्यिकी क्षेत्र में बौद्धिक संपदा एवं मत्स्य व्यवसाय में नन टैरिफ बैरियर से संबंधित दो अध्ययन किए गए । ये दो अध्ययन छात्रों की गतिविधियों से संबंधित हैं तथा भविष्य में अध्ययन हेतु उपयोगी होंगे ।

संस्थान की शैक्षणिक गतिविधियां अत्यंत संतोषजनक रुप से चल रही हैं । इस वर्ष 44 छात्रों ने एम.एफ.एस.सी. की उपाधि, पांच छात्रों ने पी.एच.डी. तथा 23 छात्रों ने अन्तरस्थलीय मात्स्यिकी में स्नातकोत्तर उपाधि प्राप्त की है । इस वर्ष 45 छात्रों ने एम.एफ.एस.सी. व 26 छात्रों ने पी.एच.डी. में प्रवेश लिया । मछली की आनुवंशिक विकास - एक जैव प्रौद्योगिकी पहल पर मत्स्य विज्ञान का आधुनिक अध्ययन का योजना केन्द्र तथा फिन फिश व शैल फिश की पौष्टिक रणनीति एवं आहार प्रबंध पर दो प्रशिक्षण आयोजित किए गए । इसी के साथ दिनांक 12 अप्रैल 2006 को जलकृषि में जैव रसायन एवं मोलेक्युलर तकनीकी की आधुनिक स्थिति तथा उसका अनुप्रयोग पर भी एक प्रशिक्षण आयोजित किया गया । इस वर्ष संस्थान ने नौ कार्यशालाएं/राइट शाप वैचारिक बैठकें आयोजित की । इसी के साथ इस संस्थान के वैज्ञानिकों ने 9 प्रशिक्षण कार्यक्रमों व 24 सम्मेलनों/कार्यशालाओं आदि में भाग लिया ।

इस संस्थान की हिन्दी प्रगति को देखते हुए इस वर्ष सांस्कृतिक व साहित्यिक संस्था आशीर्वाद ने इस संस्थान के निदेशक डा.दिलीप कुमार को आशीर्वाद स्मृति चिन्ह प्रदान किया । इसी के साथ आपको जूलोजिकल सोसाइटी आफ इंडिया ने स्वर्ण पदक प्रदान कर सम्मानित किया । डा.ए.के.पाल, प्रधान वैज्ञानिक को मत्स्य विज्ञान में उत्कृष्ट शिक्षक हेतु वर्ष 2004-05 का भारत रत्न डा.सी.सुब्रहमण्यम अवार्ड से सम्मानित किया गया । इसी के साथ आपको लिनने सोसायटी, लंदन का फैलो भी प्रदान किया गया ।

विस्तार कार्यक्रमों के तहत यह संस्थान बिहार राज्य के प्रशिक्षणार्थियों को प्रशिक्षित कर रहा है । इस वर्ष बिहार राज्य के 576 प्रशिक्षणार्थियों को काकिनाडा केन्द्र में, 61 प्रशिक्षणार्थियों को कोलकाता केन्द्र में, 203 प्रशिक्षणार्थियों के पवारखेड़ा केन्द्र में तथा 41 प्रशिक्षणार्थियों को रोहतक केन्द्र में प्रशिक्षित किया गया । क्षेत्र प्रदर्शन के अंतर्गत मणिपुर में ट्रिकल डाउन विस्तार कार्यक्रम काफी सफल सिद्ध हो रहा है । मत्स्य विभाग अपने सभी कार्यक्रमों में इस संस्थान की भागीदारी चाहती है । इसी प्रकार की उपलब्धि त्रिपुरा से भी प्राप्त हुई है । वहां इस संस्थान ने 28 अल्पकालीन प्रशिक्षण संचालित किए । इस संस्थान ने इस वर्ष भारत के विभिन्न शहरों मे नौ प्रदर्शनियां आयोजित की । संस्थान के वैज्ञानिकों ने दो दूरदर्शन कार्यक्रम व चार रेडियो वार्ता में भाग लिया तथा 351 कृषकों/मछुआरों व उद्यमियों को मत्स्य सलाह सेवा दी । केन्द्रीय शुष्क क्षेत्र अनुसंधान संस्थान, जोधपुर में परिषद की क्षेत्रीय खेल-कूद प्रतियोगिता में इस संस्थान के 45 सदस्यों ने भाग लिया । इस संस्थान को कबड्डी व बेटमिंटन (पुरुष) में रजत पदक तथा 13 व्यक्तिगत पुरस्कार प्राप्त हुए ।