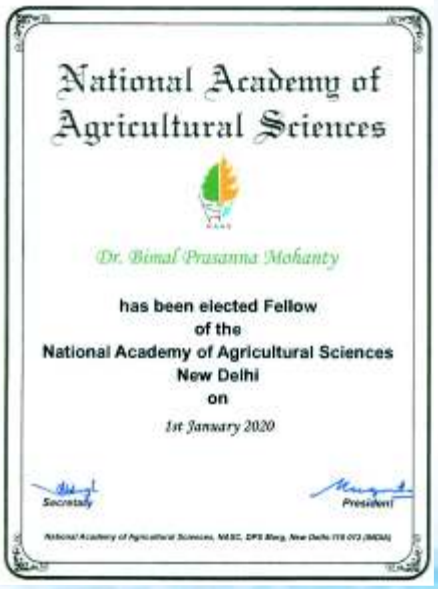
Vol. 24, No. 2
ISSN : 0972-0774

CIFRI NEWS सिफरी समाचार

(October 2019 - June 2020)

CIFRI Bagged Best ICAR Annual Report 2018-19 in Big Institute Category



**Dr. B. P. Mohanty,
Principal Scientist and
Head of Division was elected
as NAAS fellow**

**He joined as
Assistant Director General (I. Fy),
ICAR, New Delhi
being on 29.02.2020**

Inside

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CIFRI NEWS सिफरी समाचार

(October 2019 - June 2020)

Director's Column

Since last quarter of 2019 the world has witnessed an unprecedented health crisis. The COVID 19 has spread like wild fire world-wide. Millions of people were infected; hundreds of thousands of them lost their lives. There were panic, fear and anxiety in every walk of life. The Government of India has also imposed country-wide lock down in the month of March 2020 for several days to contain the virus. Many people lost their livelihood; farmers, fishers were also not exception.

The institute tried its best to lessen the impact of this pandemic on the life and livelihood of fishers. The impact of this pandemic on ecosystem and fishers livelihood was studied. The advisories for fisheries sector developed by CIFRI for securing sustainable small scale fisheries in rivers, estuaries, reservoirs and wetlands were lauded and recommended by UN Food and Agricultural Organization (FAO).

I am extremely happy to share you all that the Institute bagged best Annual Report in big institute category from ICAR. It is really a proud moment for all of us. On top of this, Dr. B.P. Mohanty, Head and Principal Scientist got NAAS fellowship. He was also selected as ADG (Inland Fisheries) in the ICAR headquarters. The institute sports persons showed a splendid performance in the ICAR- Tournament for Easter Zone 2019 (TEZ-2019). The contingent won 15 medals, including the Best Women Athlete in the tournament.

We have successfully organized international conference on “Ecosystem Health and Fisheries of Indian Inland Waters: Multiple Stressors, Management and Conservation” collaborating with GBPUAT, Inland Fisheries Society of India (IFSI), Barrackpore; Aquatic Ecosystem Health & Management Society (AEHMS), Canada and Professional Fisheries Graduate Forum (PFGF), Mumbai. Winter School, training programmes for fishers (22 in numbers), officers (10) have been organized for capacity building of the stakeholders. Besides, several mass awareness camps were conducted and exhibitions have been participated.

We have been saddened by the devastation caused by super cyclonic storms *Bulbul* and *Amphan* particularly in the Sundarbans. They caused considerable damages to the fisheries of the island. The institute distributed fisheries inputs and rendered advisory services to the victims. The staff donated Rs. 5 lakh to the Chief Minister's Relief Fund.

During the period, seven of our staff got promoted, I congratulate all of them. I also congratulate the staff who got awards/recognitions and brings laurels to the institute. Ten of our staff got superannuated. I acknowledge their contributions in institute growth and wish them very healthy and happy retired life. I inform with heavy heart that we have lost two of our in-service colleagues. Ms. Sukanya Som, Scientist and Sh. Sitaram Meena, Sr. Tech. Officer left us for their heavenly abode. The institute mourns for their tragic death and prays to God for providing enough strength to the bereaved families to bear the loss.

Barrackpore,
November 2020

Dr. B. K. Das
Director

About ICAR-CIFRI

Started as Central Inland Fisheries Research Station in March, 1947 at Barrackpore, West Bengal, ICAR-CIFRI has carved a niche in inland fisheries research. Induced fish breeding, composite fish culture and other scientific fish production practices developed during the sixties by the Institute helped in bringing the blue revolution in the country. Reservoirs and wetland fisheries management technologies developed and disseminated by the institute resulted in enhanced fish production from these resources. By the turn of the year 2000, the research and development agenda of the Institute concerning inland open waters shifted from fish as the only benefit to ecosystem health and ecological benefits with emphasis on sustainability, livelihood and nutritional security. In addition to the Headquarters at Barrackpore and two Research Stations at Kolkata and Kochi, CIFRI has four Regional Research Centres at Allahabad, Guwahati, Bengaluru and Vadodara, through which the issues of inland open water fisheries are being addressed.

Publication Team

Published by	Compiled and edited by	Hindi translation	Assistance	Photography	Printed at
Dr. B. K. Das, Director	Dr. Arun Pandit	Ms. Sunita Prasad	Sh. L. Chakraborty	Sh. Sujit Choudhury and other staff	Sailee Press Pvt. Ltd.

FAO recommends CIFRI's advisory !

The UN Food and Agricultural Organization (FAO) recommends CIFRI's advisory for fisheries sector during COVID 19 pandemic as voluntary guidelines for securing sustainable small scale fisheries involved in fishing activities in rivers, estuaries, reservoirs and wetlands for the benefit of fisheries sector across the globe. This is really a pride moment for the institute!

AEHMS International conference

International Conference on "Ecosystem Health and Fisheries of Indian Inland Waters: Multiple Stressors, Management and Conservation"

This international conference was organized at Gobind Ballabh Pant University of Agriculture and Technology (GBPUAT), Pantnagar. This conference was jointly organized by Inland Fisheries Society of India (IFSI), Barrackpore; ICAR- CIFRI; College of Fisheries, GBPUAT; Aquatic Ecosystem Health & Management Society (AEHMS), Canada and Professional Fisheries Graduate Forum (PFGF), Mumbai from 17-19 February, 2020.

The inaugural function was presided over by Dr. Tej Partap, Vice Chancellor of GBPUAT. Dr. J. K. Jena, DDG (Fishery Science) graced as Chief Guest. More than 200 researchers, academician including scientists from Canada and Bangladesh and 150 farmers of Uttarakhand, Uttar Pradesh and West Bengal participated in the conference.

This conference deliberated on latest research and development in the inland waters on important thematic areas including ecosystems of inland waters; impact of multiple stressors; ecosystem assessment; monitoring, tools and techniques; ecosystem-based management; climate change adaptations: tools & techniques and blue economy in India.Eminent experts, namely, Dr. B. K. Das, Director ICAR-CIFRI; Dr. Sandeep Behera, Chief Consultant, NMCG; Dr. Gopal Krishna, Director & VC, ICAR-CIFE, Mumbai; Dr. M. Munawar, President, AEHMS, Canada; Dr. Dilip Kumar, Former Director & VC, ICAR-CIFE, Mumbai; Dr. V.V. Sugunan, Former ADG (Inland Fisheries) and Dr. Debajit Sarma, Director, ICAR-DCFR, Bhimtal, delivered the key note and lead lectures.

Inauguration of the exhibition stalls

Technical session in progress

Valedictory session

COVID-19: Initiatives of ICAR-CIFRI

The Coronavirus (COVID-19) pandemic has created unprecedented global emergency, that has now infected more than 10 million people worldwide. The institute attempted to assess the impact of the pandemic on the life and livelihood of fishers as well as issued the timely advisories, which was much appreciated by dignitaries.

Sundarbans is one of the most vulnerable fisheries ecosystems. The fortune of the fishers in this ecosystem is dependent on the nature's mercy. Surveying three fishing villages and 3 fish markets in Gosaba block of South 24 Paraganas it was observed that, the volume of fish trade was reduced to 33% in the initial period of lock down. Only 10% boats were operating for fishing. The price of fishes was increased by 1.25 times for IMC and medium carps, where as the price of small indigenous fishes has been reduced to 25 – 50%. The decrease in price of other commercial species is due to non-availability of marketing channel and fishermen forced to sell the fish in local market at a cheaper price.

The Allahabad centre of the institute conducted an impact assessment of the lockdown period due to COVID-19 on water quality of river Ganga and Yamuna. Sampling survey on 17.04.2020, 02.05.2020 and 20.05.2020 at four locations at Prayagraj found that due to minimum activities of industrial activities, water quality was improved when compared to the data of 2019 of the same month. The ranges of carbonate and bicarbonate were lower, specific conductivity (SC) highly reduced, total dissolved solids (TDS) and total hardness (TH) was lower, silicate (SiO_2) was much higher than last year. The dissolved organic matters (DOM) did not show any significant change, suggested domestic sewage was still a major problem in rivers. Biochemical oxygen demand (BOD) decreased from the previous year. The water quality improvement of river Yamuna was more than the river Ganga.

The Bengaluru research centre found that fishing activities were affected in most of the reservoirs of Karnataka during the lock down. The restricted fishing activity caused a tremendous reduction in fish catch. However the price was high due to increased demand. This resulted in an increased income for those engaged in fishing during the lock down while others were severely affected by low or no income. During the lock down, there was a reduction in fish catch by 75% in medium reservoirs and the price of fish increased by 50%. The lockdown resulted in 58-75% reduction in fish catch from the large reservoirs and the selling price of fish was hiked by 28-65.2% with an increase in demand. Fishing was resumed from 08th May 2020 following partial lifting of the lock down and only 60-65% of the regular fishing is happening as the migrant inland fishers from adjacent districts and states have returned to their respective places. The stakeholders of the reservoirs reported an improvement in the water quality due to total shutdown of anthropogenic activities.

The institute adopted Salia Reservoir of Odisha during COVID situation for the livelihood enhancement of Schedule Caste fishers of this reservoir. The programme was initiated to improve the production from 30t to at least 60t from this reservoir. During lockdown period, the fishers were in constant touch with scientific staff of the institute. Advanced stunted fingerlings of Indian Major Carps, produced in the nursery ponds were stocked in the reservoir. The implementation of this programme will generate an additional income of Rs. 30.00 lakh for the fishers of the reservoir. Face mask and sanitizers were also distributed among the fishermen.

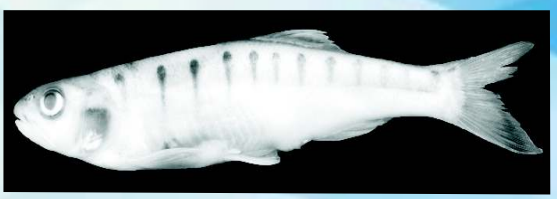
A systematic rapid assessment in floodplain wetland fisheries in India by the institute found that the fishers lost 20, 25, and 9 fishing days in Bihar, West Bengal, and Assam respectively and each fisher lost around Rs. 4500 to Rs. 12500 in those states with an average of around Rs 9000 due to lockdown 1.0. The wetland fisheries in India have the potential to contribute to the Sustainable Development Goals (SDGs), namely 'eradication of poverty'; 'zero hunger' and 'good health and well being' which have also been impacted due to this pandemic.

Sampling in river Ganga

A fish landing centre at Mandya, Karnataka during lockdown

Research Highlights

New fish species *Barilius torsai* (Teleostei: Cypriniformes: Cyprinidae) identified



Holotype of *Barilius torsai* (ZSI FF5542; 71.41 mm SL)

ICAR-CIFRI identified a new freshwater fish species *Barilius torsai* (Teleostei: Cypriniformes: Cyprinidae), from Torsa River, Brahmaputra drainage (DOI: https://doi.org/10.11609/jott.4746.11.14.14808-14815). Theses fishes are highly relished as food and fetches maximum market price (Rs. 400-600/kg) in the Dooars region of West Bengal. Many of the *Barilius* species are having ornamental value and being exported from India.

Kavita Kumari, Manas H. M, Archana Sinha, Simanku Borah and B. K. Das

Indo-European Union (EU) platform on environmental flows study

Water depth and velocity measurement (a) in river Kathajodi (Mahanadi delta) for e-flows simulation study (b)-HEC-RAS model

An initiative on estimation of environmental flows in Mahanadi Delta, river Ramganaga and river Tapi was initiated with European Union experts GIZ. The team visited Mahanadi Delta and Ramganga river for collection of biotic and abiotic parameters during different season. The e-flows estimation was made using HAC-RAS and PHABSIM model for the Mahanadi Delta, particularly for river Kali. While, for river Ramganga MESO-PHABSIM has been used. All the models have been fitted with the local river habitat and local fish species dominant in the river stretch. River Kathajodi was selected as a representative river of Mahanadi Delta for estimation of environmental flows (e-flows). Fish species representing most dominant at the selected stretch was considered for e-flows estimation. *Cirrhinus reba* for river Kathajodi was considered for simulation study and preliminary observation indicated that, a minimum of 750-800 cusec is required for its sustainability during lean season.

A.K. Sahoo, B. K. Das, K. Nayak, J. Nale, V. Brigit, Rafael Sánchez Navarro, Michael McClain

ICAR-CIFRI tagged Indian Major Carps under *Namami Gange* program

The institute tagged 100 numbers of Indian Major Carps and released in River Ganga to study migration behavior and movements of the fish under '*Namami Gange*' project. Tagging has been initiated on 16 June 2020 to monitor and develop proper sustainable management of exploited IMC fish stock in Ganga River system. Adult fish more than 500g of Indian Major Carp (*Labeo rohita*, *Labeo catla* and *Cirrhnus mrigala*) were tagged and released in the river Ganga. Floy T-bar anchor tags of standard size with printed serial numbers were inserted in muscle just below the dorsal fin. The tagged fishes were further treated with antiseptic and potassium permanganate solution before releasing into the river to identify the fundamentals of migration range. The tagged fishes were produced through artificial breeding of native fish species of River Ganga. Awareness among the local fishers was also created and requested to cooperate in prevention of catching the tagged IMC fish stock on immediate basis.

B. K. Das, H. S. Swain, Mitesh Ramteke and other members of NMCG team

First time study on fish pass efficacy evaluation in river Teesta

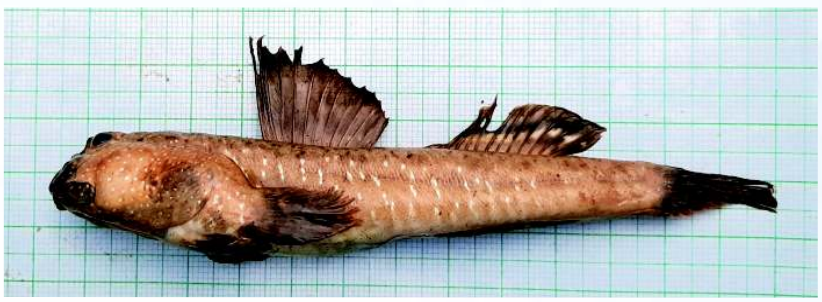
An efficacy study of existing fish passes at Teesta lower dam project III (TLDP-III) in River Teesta was done for the first time through different approaches. Initially, both at upstream and downstream of the dam and in the main channel for River Teesta, a

survey recorded three migratory fishes, which migrate upstream of the river for spawning during the breeding season. These three migratory fish species were *Neolissochilus hexagonolepis* (Chocolate Mahseer), *Schizothorax richardsonni* (Snow trout) and *Cyprinion semiplotum* (Assamese king fish). Based on their availability number Chocolate Mahseer was selected for the migration study and for evaluation of fish pass efficacy. A detailed tagging experiment was carried out in which 64 nos. of fishes were tagged with an average length of 304 mm and weight 340 g and released at different selected sites representing upstream and downstream of the dam. In the present study, floy T-bar tag was used to record the migration pattern of fish and calculation of efficacy of fish pass/ladder of TLDIII. The overall recovery of tagged fish was estimated as 6.25%. The efficacy of the fish pass/ladder was estimated. Based on the observed data as well as collected data, the efficacy of fish passes was found to be 8.33% for TLD-III PS.

Fish pass structure at TLDPIII, Teesta

B. K. Das, A. K. Sahoo, D. K. Meena, N. Chanu, R. K. Raman, A. R. Choudhury, Sunita Prasad

First record of Walton's mudskipper *Periophthalmus waltoni* Koumans, 1941 from Narmada estuarine region of Gujarat



Walton's mudskipper *Periophthalmus waltoni* Koumans, 1941 collected from the estuarine stretch of river Narmada

Periophthalmus waltoni Koumans, 1941 commonly known as Walton's mudskipper of the order Perciformes under the family Gobiidae, recorded for the first time from Narmada estuary, West Coast of India. The species is distributed in the Northwestern Indian Ocean: the Persian Gulf and Gulf of Oman east to Pakistan. The species was collected from the Ambetha and Jageshwar fishing areas during the low tides by handpicking through stick traps from the mudskipper holes and by fallen gill nets (10-20 mm mesh size) during the monsoon period. A total of 21 specimens were collected with the size ranged from 124-145 mm and 10.7-26.2 g, respectively. The species was identified with the taxonomic keys of FishBase with dorsal spine 13; dorsal soft rays 14, anal spine 1, anal soft rays 11 with longitudinal scale count 115. Dorsal fin was not connected by membranes, head width 20.56% standard length (SL), pelvic fin length 12.14% SL, length of anal fin base 19.63% SL, length of second dorsal base 23.36% SL.

As per IUCN Red List, the species was kept under 'Not Evaluated' (NE) group. Three species of mudskipper so far were reported from Narmada estuarine stretch. Occurrence of *Periophthalmus waltoni* confirmed the four mudskipper diversity in the Narmada estuarine stretch.

Dibakar Bhakta, S. P. Kamble, W. A. Meetei, A. K. Sahoo, Arun Pandit, S. Samanta and B. K. Das

Growth overfishing in River Cauvery at Grand Anicut

At Grand Anicut (dam) on River Cauvery in Tamil Nadu, a form of bag net with stakes, locally known as *kaccha valai* to harvest the juvenile fishes swimming against the water flow was found to be operated. The outlet of the dam is cascaded and the water flows over it, frenzying the juvenile fishes to swim against the current. The behaviour of fish is exploited to harvest the fishes using this gear. In total, about 30 fishermen are involved in operating this gear. Fishermen disturb the attached fishes by walking roughly and rubbing their feet on the steps manually driving the fishes into the gear which are transferred to *hapa*, until marketed. The harvested fishes were juveniles of *Labeo bata*, *Labeo boggut* and *Cirrhinus reba*. About 250-300 kg of fish juveniles is harvested every day

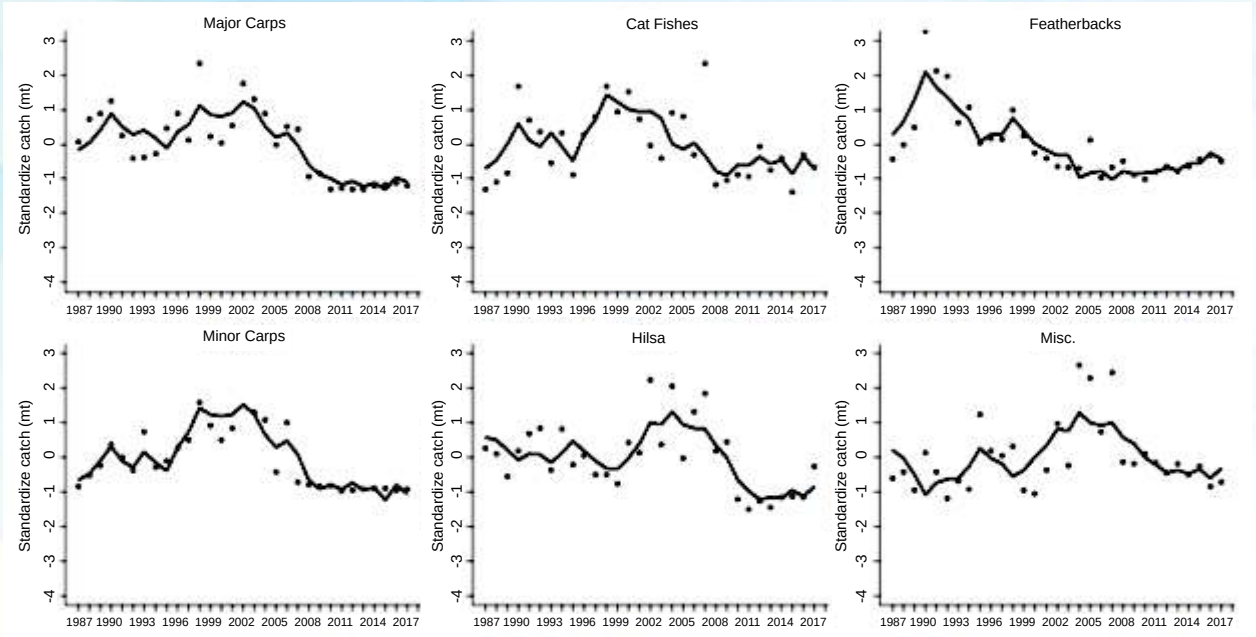
using this gear. Length range of the juvenile fishes ranged from 6.7 to 12.8 mm with a corresponding weight of 2.3 to 15.7 gm, respectively. Juvenile fishing at Grand Anicut will adversely impact on the fish stocks.

Lohith Kumar K, R. K. Manna, Roshith C. M., Sibina Mol, Vijay Kumar M. E. and B. K. Das

(a). Setting of gear (b). Harvested fish being transferred to *hapa*

Influence of rainfall on commercial fish landings in River Brahmaputra: A multi-species modelling approach

An attempt was made to assess effect of rainfall on fish landings in the middle stretch of R. Brahmaputra using multi-species modelling approach. Dynamic Factor Analysis (DFA) approach was used to identify the common trends, and quantify the effect of rainfall on six multiple commercial fish groups/species (i.e., Indian major carps, minor carps, catfishes, featherbacks, hilsa and miscellaneous fishes). Annual rainfall and multispecies landing data of R. Brahmaputra at Guwahati during 1987 to 2017 was used for the purpose. Based on Akaike Information Criterion (AIC) values, DFA approach identified three common trends with unconstrained covariance matrix. Trend 1 represented mainly the commercial fish landings of minor carps, major carps and catfishes; Trend 2 represented featherbacks and miscellaneous fishes and Trend 3 represented the hilsa landings. There was a fair agreement between standardized observed catch and the predicted landings (lines) of six commercial fish groups/ species presented here in above figure.

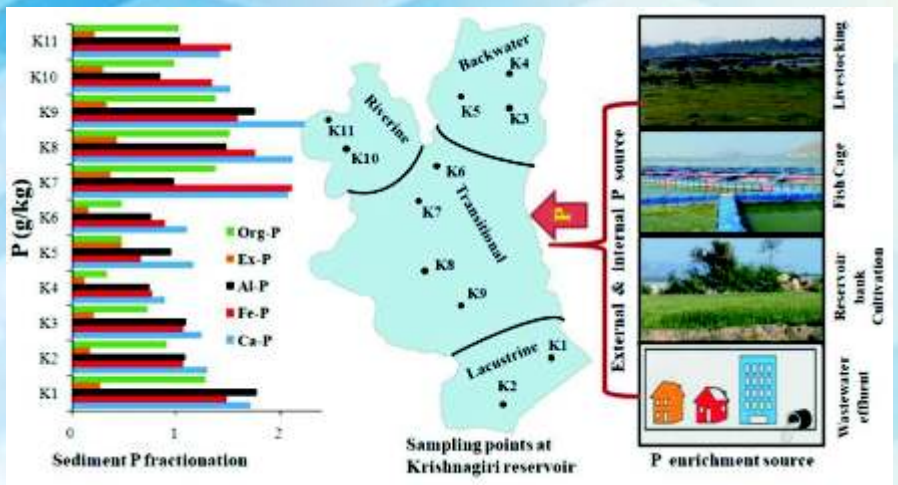


Prediction of DFA model of fisheries of River Brahmaputra for six commercial fish groups/species during 1987 to 2017

In order to establish fish landings vis-à-vis climatic factors, rainfall was incorporated in the optimally selected DFA model. The annual rainfall significantly influenced commercial landings of hilsa, catfishes, featherbacks and miscellaneous fishes. Rainfall had positive regression coefficient for landings of miscellaneous fishes (0.10, $p<0.05$) whereas negative regression coefficient for landings of hilsa (- 0.19, $p<0.05$), catfishes (- 0.09, $p<0.05$) and featherbacks(- 0.05, $p<0.05$).This analytical approach was effective in understanding the common trends in commercial fish landings and the influence of rainfall on them in R. Brahmaputra.

A. K. Yadav, R. K. Raman, M. Naskar, S. Borah and B. K. Das

Phosphorus fractionation in sediments of a tropical reservoir, India: Implications for pollution source identification for its sustainable management

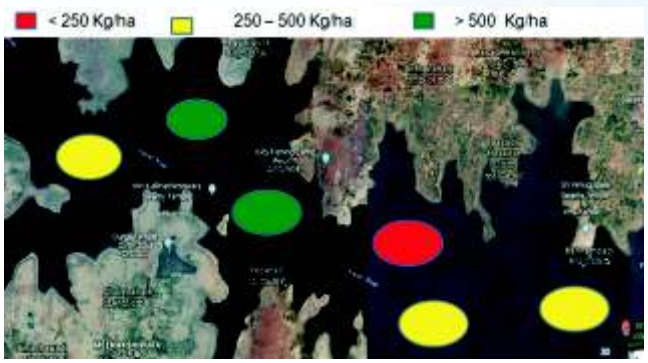


Characterization of phosphorus pollution in hyper-eutrophic Krishnagiri reservoir, India

Investigation was carried out in hyper-eutrophic Krishnagiri reservoir, Tamil Nadu for determining the availability and sources of sediment P and eutrophication status. Sediment Total P (TP) content ranged from 4.62g to 5.64 g/kg. Main phosphorus form was the inorganic P (IP), and it took 73.4-87.7% of TP. Among the different P fraction viz., calcium bound (Ca-P), iron bound (Fe-P), aluminium bound (Al-P), exchangeable (Ex-P) and Organic-P (Org-P), Ca-P was the major dominating fraction in both IP and TP. Overall the trend was as follows Ca-P>Fe-P>Al-P>Org-P>Ex-P. The dominant sources of P pollution in Krishnagiri reservoir are due to both external P influx and internal P sources from cage-aquaculture activities. The observed variation in sediment P fractionation indicates the differences in source and characterization of P which is very helpful for implementation of effective management practices in controlling pollution arises due to phosphorus in this eutrophic reservoir.

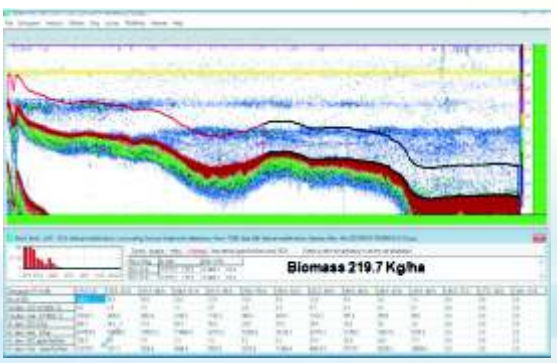
Ajoy Saha, Jesna P. K., V. L. Ramya, Sibina Mol., Preetha Panikkar, M. E. Vijay kumar, U. K. Sarkar and B. K. Das

Mapping of Krishnarajasagar reservoir using Hydroacoustics



Potential fishing zone in KRS

Hydroacoustic surveys were conducted at the lotic, intermediate and lentic zones of Krishnarajasagar reservoir in Mandya district of Karnataka to enumerate fish and identify potential fishing zones. Split-beam echosounder EK 60 was used for the surveys. Data generated were computed by echo counting and echo integration. The water quality parameters, dissolved oxygen, temperature, conductivity were measured at surface using a portable multiparameter probe and from conductivity, salinity was estimated and incorporated in SIMRAD ER60 software. The received histograms were de-convoluted to account for random aspect of fish distribution and then used for scaling the integrator values. Different transects were selected in each zone and acoustic runs were made in and Potential Fishing Zones (PFZs) were identified. The intermediate zone showed high concentration of fish followed by lotic (Medium concentration) and lentic zones (Low concentration). This survey will help fishermen to realize where to fish for more catch. The biomass estimated varied from 152 to 822 Kg/ha in different transects of KRS Reservoir.



Echogram showing the fish distributions and biomass values estimated by Sonar X software

M. Feroz Khan, S. Sibina Mol and M. E. Vijayakumar

Species diversification in cage culture

Various fish species with different feeding habits were stocked in monoculture and polyculture to study their growth performance, survival, compatibility and production in inland cage system. One such study was conducted to evaluate the feasibility, growth

performance and survival of *L. rohita* (Jayanti) in rectangular floating cages (6x4x4 m^3) in Salia reservoir, Odisha. Fingerlings of *L. rohita* were stocked at three stocking densities viz. 10, 20 and 30 no./m^3 were fed twice a day with commercial floating feed @ 5 - 3% of the total biomass. After 240 days of culture, significantly ($P<0.05$) higher growth was observed in T1 (598.23± 32.76 g) with high survival (85 ± 6.58%). while highest biomass was noted in T3. Similar result trend was observed in Timbi reservoir, near Vadodara, Gujarat.

Culture of *L. rohita*

Culture of *P. hypophthalmus* in inland cages

Another cage culture experiment of *P. hypophthalmus* was carried out for finding out the optimum stocking densities in Salia reservoir of Odisha. Advanced fingerlings of pangas with an average weight of about 48.24±1.45 g were stocked in six different stocking densities viz. 20, 30, 40, 50 and 60 nos./m^3 designated as T1, T2, T3, T4 and T5 respectively. The experimental treatments were conducted in duplicate for a period of 240 days. The final weight (1225.12 ± 40.533 g), specific growth rate (1.35 ± 0.016) and survival (91.00 ± 2.646 %) were highest in lowest stocking density (20 nos./m3). However, total fish biomass production was significantly ($p<0.05$) higher at the stocking density 30 to 40 nos./m3 and FCR was found lower in these two stocking densities. Therefore, the study suggest that the culture of pangas in lower stocking densities (30 to 40 nos./m^3) can be considerd as an optimum for inland fresh water cage culture to reduce the feed and seed cost with higher growth and survival for maximization of economic return.

Haul of *Ompok bimaculatus* from cage at Maithon reservoir, Jharkhand

H. S. Swain, B. K. Das, Mitesh Ramteke, Suman kumari, Abhijita Sengupta and Y. Ali

Another attempt was made by the institute to study the feasibility of commercially important indigenous fish species *Ompok bimaculatus*. Stunted fingerlings *of O. bimaculatus* (11.44±22cm; 8.05±0.56g) were reared at three stocking densities of $15m^{-3}$, $25m^{-3}$ and $35m^{-3}$ in GI cages (Effective Volume: 30 m^{-3}) in triplicates at Maithon reservoir, Jharkhand. Average size of 50-62g was achieved with more than 80% survival in six months of culture period. The growth was significantly higher at lowest stocking density. The growth of the fish was comparable to that in ponds.

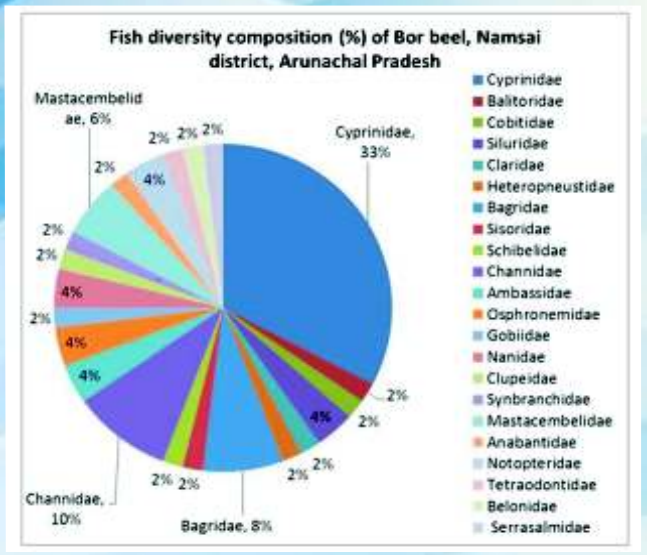
G. Karnatak, B. K. Das, U. K. Sarkar, Mishal P, T. Tayung, A. K. Das, Y. Ali

Ichthyofaunal diversity of an unexplored floodplain wetland of Arunachal Pradesh

Borbeel is an open beel (with a water-spread area of 234 ha) located (N 27° 44' 37"; E 95° 49' 81") at Namsai district, Arunachal Pradesh. The beel is connected to the River Dihing and it is an open access water body under the administrative control of the Department of Fisheries, Govt. of Arunachal Pradesh and is being managed as capture fisheries. The Institute has made an attempt to document the fish diversity of the unexplored wetland for the first time during 2019-20. A total of 52 fish species were recorded from the beel belonging to 22 families and 8 orders across the seasons. Order Cypriniformes (19 species) contributed highest number of species followed by Perciformes (12 species), Siluriformes (10 species) and

View of Bor beel, Namsai district, A.P.

others. Among family Cyprinidae (17 species) contributed highest number of species followed by Channidae (5 species), Bagridae (4 species), Mastacembelidae (3 species) and so on. Besides indigenous species, four exotic fishes (Cyrpinus carpio, Ctenopharyngodon idella, Hypophthalmichthys molitrix and Piaractus brachypomus) were also recorded from the beel.



Fish diversity composition (%) of Borbeel, Namsai district, Arunachal Pradesh

Pronob Das, B.K. Bhattacharjya, S. Borah, S.C.S. Das, S. Yengkokpam, A.K. Yadav, N. Sharma, B.C. Ray, A. Kakatiand B. K. Das

Enhancing fishers' livelihood through wetland fisheries management at Kothiamaun in East Chamapran, Bihar

The institute initiated development project at Kothiamaun in August 2018 for implementation of scientific management norms developed by it in a participatory mode. This programme under Central Sector Scheme (CSS) Blue Revolution with financial assistance from NFDB Hyderabad adopted three pronged strategy; input, infrastructure and information dissemination to implement fisheries enhancement protocol. CIFRI technological interventions during the last one and half years Kothiamaun have increased the fishing days from 30 days to 90 days and fish yield from 55 to 160 Kg/ha.

During the challenging time of lockdown due to COVID-19, the livelihood of fishers of Kothiamaun of East Champaran district of Bihar was enhanced through increase in production and productivity and increase in fishing days. 200 fishers' families are earning their livelihood through fishing in this maun. After getting permission from the civic authorities, fishing harvest operation during the lockdown period was initiated at this wetland in May 2020. Fishing was done in the wetland following the COVID-19 guidelines issued by ICAR-CIFRI. In 10 fishing days 3.6 tonnes of fish were harvested by the fishers, which were sold at the wetland site only. The fish catch include Indian Major carps Rohu, Catla, Mrigal, Exotic carps Amur carp, Grass carp and small fishes like *Gudusia chapra*. During the lockdown period, the fisherman cooperative society had an earning of Rs. 4 lacs through open water fisheries.

B. K. Das, Ganesh Chandra and Raju Baitha

Utilization of fish scales opens a new avenue of livelihood in Hogenakkal, Tamil Nadu

Hogenakkal, a village located on the banks of River Cauvery in Tamil Nadu, is popular for fish-based food tourism. As a result, a huge quantity of fish waste is generated, which is simply dumped causing pollution and foul smell. With the increasing demand for scales of freshwater fish in the market, a new business avenue of fish scale procurement has changed the scenario in this place.

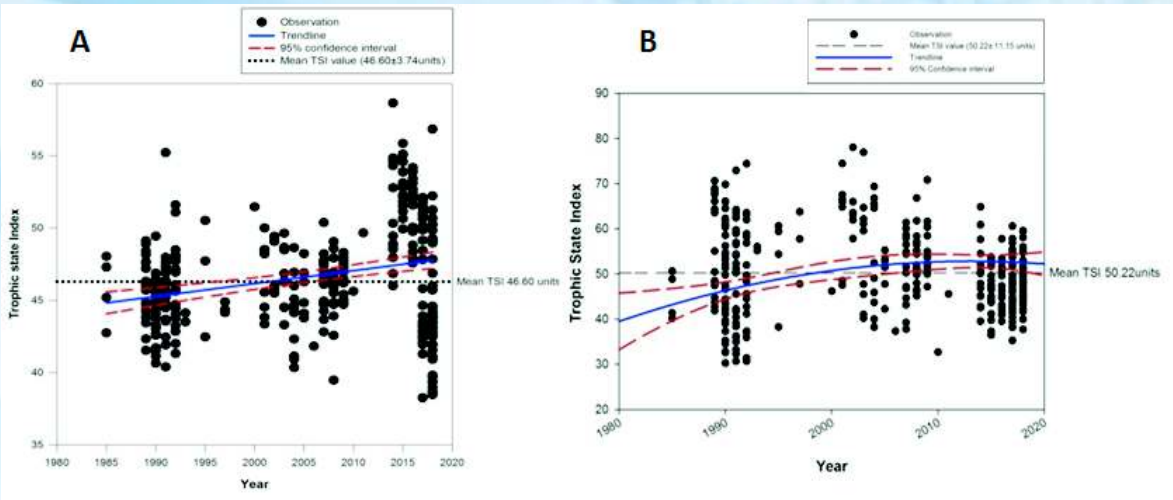

Heap of cleaned and dried fish scales in store room

The fish scales are collected free of cost from the cleaning section in the fish market of Hogenakkal. The collected scales are washed, dried in sun and stored in the gunny bags in the

storeroom. Then it is sent to the market where it is powdered and used in poultry feed. This activity was started in Hogenakkal in July' 2019. During weekdays, about 15-20 kg of dry fish scale is collected whereas on weekends and holidays the quantity increases to about 30-35 kg. This recently started activity has provided livelihood to three women who earn Rs 9000/- each per month. Similar activities are known to be happening in fish markets near Stanley and Perumpalam reservoirs in Tamil Nadu. Other large freshwater fish markets across our country can initiate such activity to maximize the economic yield from the fish, reduce pollution and generate employments.

Lohith Kumar K, R. K. Manna, Roshith C. M, Vijay Kumar M. E. and B. K. Das

Assessment of trophic scores in tropical floodplain wetlands using comparative models



Comparative evaluation of eutrophication status based upon Carlson's (A) and Lamparelli's (B) trophic state index of tropical floodplain wetlands of Indo-gangetic region

Distribution of trophic state provides a baseline to measure biotic integrity with a monitoring mechanism for nutrient based states (oligotrophy, mesotrophy, eutrophy and hypereutrophy). The scoring index is an integrative approach including physical (degree of water transparency), chemical parameters (nutrients) and, biological (planktonic chlorophyll) as key determinant of trophic state indices. Implementation of TSI tool for ecosystem vulnerability assessment vis-a-vis eutrophication state of wetlands stands first and unique which will serve as foundation for impacted and semi-impacted tropical floodplain wetlands. We unveil the region-specific pattern of trophic state index (TSI) of the 27 floodplain wetlands in West Bengal, India using Carlson's TSI (A) and Lamparelli's (B) TSI methods with a motif in search of a better approach for assessing the ecosystem vulnerability. It was found that although Carlson index has wider acceptance in temperate waters, we suggest the comparative evaluation using Lamparelli index as an evident tool for assessing tropical inland resources. In addition, the study also enriches knowledge fact that eutrophication state is influenced by wetland habitat types, land use pattern and management types at various geographical locations.

Soma Das Sarkar, Bandana Das Ghosh, Uttam Kumar Sarkar, B. K. Das

Activities under NEH Programme

Establishment of Aquatic Biodiversity Laboratory at ICAR-CIFRI Regional Centre, Guwahati

An aquatic biodiversity laboratory was established in the ICAR-CIFRI Regional Centre, Guwahati. A total of 130 fish species from different locations of Northeast India mainly from rivers, wetlands, fish market, etc. were collected, preserved and show-cased in the laboratory.

Fish stock enhancement in Samaguri beel, Nagaon district of Assam

Release of cage-reared indigenous fish species in Samaguribeel, Assam

Sixteen cage units (individual cage dimension: 5 x 5 x 2 m^3) installed in Samaguribeel (floodplain wetland) of Nagaon district, Assam, India were used as rearing units for raising *L. gonius*, *Labeo catla*, *L. rohita*, *L. calbasu*, *Cirrhinus mrigala* and *C. reba* from small fingerling to advanced fingerling size. Fish were stocked @ 50 fingerlings/m^3 and reared for 6 months. Approximately 20,000 advanced fingerlings of *L. gonius*, *Labeo catla*, *L. rohita*, *L. calbasu*, *Cirrhinus mrigala* and *C. reba* were released in the beel with a major share of *L. gonius*. The beel fishers and lessee expressed their happiness as it will help them to improve their income.

B. K. Bhattacharjya, S. Yengkokpam, D. Debnath, Pronob Das, A. K. Yadav, S. Borah, N. Sharma, S. C. S. Das, N. S. Singh, B. C. Ray and A. Kakati

Ranching Programme for Restoration of Fish Stock in River Ganga

With the aim to restore prized Indian Major Carp (IMC) the institute performed a river ranching programme at Law College Ghat, Patna , Bihar on 20.11.2019.The programme was graced by the Director and Joint Director of Fisheries, Govt of Bihar and Director (Students' Welfare), BASU, Patna. Around 40,000 of IMC seeds were ranched in the river. Dr. B.K. Das, Director, ICAR- CIFRI informed that more than 19 lakhs fish seed have already been stocked by ICAR-CIFRI in different parts of river Ganga through 25 programmes during last 2 years. The event was attended by more than 50 no. of local fishermen.

Another ranching programme was organized at Gandhi Ghat, Barrackpore in River Ganga on the occasion of 71st republic day wherein 50,000 of fingerlings of Indian Major Craps wee released. Shri Deepankar Bhattacharya, IPS and DIG of Vivekananda State Police Academy graced the event as a guest of honour. Dr. B. K. Das, Director, ICAR-CIFRI and Principal Investigator, CIFRI-NMCG project highlighted the need of ranching in the river Ganga. More than 150 officials of VSPA, NMCG project staffs and ICAR-CIFRI members were present during the river ranching.

At Sangam Nose, Prayagraj, 20000, fingerling seeds of Indian Major Carp (IMC) were released in the Ganga river on 11 February 2020 during Magh Mela. Mr. Atharvraj from NMCG Delhi was the chief guest on the occasion. A leaflet titled as Matsya Jaiv Vividhata was released. The event was attended by Dr D. N. Jha, Scientist in-charge of Centre, officials from Ganga Taskforce, Ganga Prahari, Ganga Vichar Manch Ganga, the pilgrimage of Magh Mela, students of university, WII, Fisheries Dept. Uttrar Pradesh, NGOs etc. fishers of nearby villages, fish traders and local people living on the bank of the Ganga and staff of the Prayagraj centre.

The Institute conducted a series of five consecutive river ranching program and Dolphin Awareness from 11-16 June 2020 as a part of '*NAMAMI GANGE*' programme during the post lockdown situation. As a part of the campaign, a total of 2.0 Lakh number advance fingerlings have been released during the entire ranching week at different stretches of river Ganga namely Nabadwip, Kalna, Balagarh, Tribeni and Barrackpore. Local fishermen and stakeholders present in the program were sensitized about the various factors behind declining fish biodiversity as well as total fish catch from river Ganga and also asking for their active cooperation towards success of river ranching program. The awareness programme was also carried out on Dolphin conservation along the Ganga coast from Nabadwip to Barrackpore. Dr. B. K. Das, Director, ICAR-CIFRI and PI, CIFRI-NMCG project highlighted the importance of celebration of the day as it calls for sustainable fishery of open waters, conservation of aquatic biodiversity, restoration of fish habitat, etc.

Technology Demonstration

Demonstration on cage culture involving high value fish species in reservoirs of Odisha and Jharkhand

Haul of pabda

Haul of bata

High value butter catfish, *Ompok bimaculatus*, commonly known as pabda, and minor carp *Labeo bata*, locally known as *bata*, were successfully cultured to market size in cages at Maithon reservoir, Jharkhand. Stunted fingerlings of *O. bimaculatus* (8.05±1.56) were cultured in varying stocking densities in cages (4 x 4 x 2 m^3). Average size of 50-62g was achieved with more than 80% survival in seven months of culture period. Total 150kg of fishes were harvested. Similarly *Labeo bata* (6.18±1.32g) was cultured in varying densities in cages (5 x 5 x 3 m^3). After 6 months of culture period, average weight of 45-52g with survival of more than 85% was achieved and a total 430kg fish was harvested.

Similarly high value medium carp, *Puntius sarana*, commonly known as *puti*, was undertaken in cages (6 x 4 x4 m^3) at Salia Dam, Ganjam district, Odisha. Advance fingerlings (25±3.6g) were stocked and after 3 months of culture period average weight of 150g

and survival rate of more than 90% was achieved. Total 460 kg of fishes were harvested. Cages were devoid of biofouling organisms due to scavenging nature of the fish. Incorporation of sarana with other fish species like pangasius can enhance production efficiency besides controlling biofouling organisms.

Demonstration of pen culture at Harangi reservoir, Karnataka

Bangalore Research Centre of the Institute, successfully organised demonstration of pen culture for fingerling raising at Harangi reservoir, Karnataka for tribal fishermen under the Tribal Sub Plan (TSP). On 11th December, 2019, CIFRI HDPE pen installation, seed stocking, pre - and post stocking management and feed management strategies were detailed to fisher folks. The species stocked was *Labeo rohita*. The fingerlings when they attain the size of about 100 mm, will be stocked in the reservoir. The program was attended by Assistant Director of fisheries, Department of Fisheries, Govt. of Karnataka and office bearers of Cauvery Fishermen Cooperative Society.

Demonstration of cage culture in Umiam reservoir, Meghalaya using CIFRI-GI cage

The cage culture in the reservoir was initiated by Guwahati Centre of ICAR-CIFRI in collaboration with the ICAR Research Complex for NEH Region, Umiam, Meghalaya and Directorate of Fisheries (DoF), Govt. of Meghalaya. A battery of six CIFRI-GI cages with an area of 100m^3 per cage (6x4x4 m^3 per cage) was installed in the reservoir. Fingerlings of Gonius (avg. 12.01 cm, 18.31g), Amur carp (avg. 11.09 cm, 20.4g) and Koi carp (avg. 10.88cm, 19.8g) were stocked in September 24, 2019. Fishes were fed twice daily with CIFRI-CAGEGROW floating feed @3-5% of their body weight. After five months of rearing, the average growth of Gonius, Amur carp and Koi carp were recorded as 93.05g, 339.48g and 258.40g, respectively. Highest survival was observed in case of Amur carp (80%) followed by Koi carp and Gonius. No disease incidence was reported during the culture period. The Amur common carp was found to be the most suitable for cage culture in the Umiam reservoir in terms of survival and growth. The programme directly benefited 50 fishers/farmers families of the Ri-Bhoi Farmers' Union. The community also deposited a part of the income generated through the sale of fish in the bank account.

Trainings and Capacity Buildings

ICAR Winter School

The Institute organised ICAR-sponsored Winter School on "Advances in Management of Inland Open-water Ecosystem Health" during 21 January to 10 February 2020. A total of 30 lectures and 11 laboratory sessions on different topics related to inland open waters like recent approaches in aquatic ecosystem health assessment, heavy metal and other emerging contaminants, fish health management, geospatial technology, metagenomics, impact assessment of barge movement, nanotechnology in ecosystem health assessment, nutrigenomics, AI, Big data and IoT in aquaculture and fisheries, policy options in wetland fisheries management, economic valuation of ecosystem services were covered by the CIFRI scientists and outside experts. Scientists, University Faculties and Subject Matter Specialists of Krishi Vigyaan Kendras (KVKs) were the participants. Dr. B. C. Mal, Vice Chancellor, JIS University, Kolkata was the Chief Guest of the valedictory session.

Valedictory ceremony of the winter school

Capacity building programmes for the fishers/fish farmers

Sl. No.	Name of the training	Date	Participants	Venue
1.	Inland open water fisheries management & development sponsored by DoF, Govt of Bihar	15-21 Oct 2019	30 farmers and one official of East Champaran Bihar	ICAR-CIFRI, H.Q. Barrackpore
2.	Inland open water fisheries management & development, sponsored by DoF, Govt of Bihar	03-09 Dec 2019	30 farmers and one official of Saran, Bihar	ICAR-CIFRI, H.Q. Barrackpore
3.	Inland fisheries management (under Tribal Sub-Plan)	07-11 Nov 2019	25 nos. of tribal farmers from KVK, Maldah under RRS, ICAR-CISH	ICAR-CIFRI, H.Q. Barrackpore
4.	Inland fisheries management for livelihood improvement sponsored by NFDB	10-12 Dec 2019	50 fishers/fish farmers	ICAR-CIFRI, Kochi centre
5.	Inland open water fisheries management & development, sponsored by DoF, Govt of Bihar	17-23 Dec 2019	30 farmers and one official of Gopalgunj, Bihar	ICAR-CIFRI, H.Q. Barrackpore
6.	Inland open water fisheries management & development, sponsored by DoF, Govt of Bihar	03-09 Jan 2020	30 farmers and one official of Darbhanga, Bihar	ICAR-CIFRI, H.Q. Barrackpore
7.	Ornamental fish culture for the SC community of the remote villages of Sundarbans (SCSP)	09-11 Jan 2020	27 nos. farmers from Amtali and Kochukhali, Sundarbans.	ICAR-CIFRI, H.Q. Barrackpore
8.	Inland open water fisheries management & development, sponsored by DoF, Govt of Bihar	17-23 Jan 2020	30 farmers and one official of Samastipur, Bihar	ICAR-CIFRI, H.Q. Barrackpore
9.	Inland open water fisheries management & development, sponsored by DoF, Govt of Bihar	04-10 Feb 2020	30 farmers and one official of Katihar, Bihar	ICAR-CIFRI, H.Q. Barrackpore
10.	Inland fisheries management for livelihood improvement by NFDB	6-9 Feb 2020	50 farmers from Amtali, Sundarbans	Amtali South 24 Parganas
11.	Inland Ornamental fisheries management for income generation NFDB	6-9 Feb 2020	50 farmers from Kochukhali, Sundarbans	Kochukhali South 24 Parganas
12.	Skilled development training programme on "Wetland fisheries management of Manipur for livelihood improvement" sponsored by NFDB.	10-12 Feb 2020	50 fish farmers of Manipur	Directorate of Fisheries, Govt. of Manipur, Imphal West.
13.	Inland open water fisheries management & development, sponsored by DoF, Govt of Bihar	11-17 Feb 2020	28 farmers and one official of Nawada, Bihar	ICAR-CIFRI, H.Q. Barrackpore
14.	NFDB Sponsored SDP on 'Enclosure culture for doubling fisher's income'	12-14 Feb 2020	50 fishers/fish farmers of Manipur	APMC Hall, Vadodara
15.	Inland open water fisheries management & development, sponsored by DoF, Govt of Bihar	18-24 Feb 2020	31 nos. farmers Bhagalpur, Bihar	ICAR-CIFRI, H.Q. Barrackpore
16.	Development & management of cage & pen culture in Tripura	25-29 Feb 2020	44 nos. farmers from Tripura	ICAR-CIFRI, H.Q. Barrackpore
17.	Inland open water fisheries management & development, sponsored by DoF, Govt of Bihar	28 Feb to 05 Mar 2020	32 nos. farmers Munger, Bihar	ICAR-CIFRI, H.Q. Barrackpore
18.	Wetland & reservoir fisheries Management for livelihood improvement under SCSP	12-14 Mar 2020	45 nos. farmers from Odisha	ICAR-CIFRI, H.Q. Barrackpore
19.	Inland open water fisheries management & development	12-16 Mar 2020	34 nos. farmers under ATMA from Mayurbhanj District, Odisha.	ICAR-CIFRI, H.Q. Barrackpore
20.	Culture based fisheries for improving livelihood of inland fishers sponsored by NFDB	17-19 Mar 20 20	50 fishers/fish farmers	ICAR -CIFRI, H.Q. Barrackpore
21.	Cage culture in beels	17-21 Mar 2020	50 fish farmers/ beel fishers/ beel lessees/ entrepreneurs of Assam	ICAR -CIFRI Regional Centre, Guwahati
22.	Canal fisheries development for income generation of fishers sponsored by NFDB	19- 21 Mar 2020	50 fishers/fish farmers	Gosaba, Sundarbans, West Bengal

Skill develpoment training programme at Manipur

Ecosystem modelling training at Bangalore centre

Capacity building programmes for Faculty members, Scientists and Fisheries Officials

Sr. No.	Name of the training	Date	Venue	Participants
1.	Ecosystem modelling: Towards management of inland fisheries	21 - 25 Oct 2019	ICAR- NBAIR, Hebbal; conducted by Bengaluru centre	Scientists, Faculty from SAUs, Technical officers, Students
2.	Reservoir fishery management for employment generation	23-27 Nov 2019	ICAR-CIFRI, H.Q. Barrackpore	20 nos. of Officials from various sates
3.	CCS NIAM sponsored training programme on 'Contract farming and linking fish farmers to market'	28 Nov-01 Dec 2019	ICAR-CIFRI, H.Q. Barrackpore	39 members of various FPOs / FPCs from the districts Nadia, Purba Medinipur, Burdwan and Murshidabad of West Bengal
4.	Fish health management in inland cultured fishes for doubling farmer's income	02-06 Dec 2019	ICAR-CIFRI, H.Q. Barrackpore	25 nos. of Officials from various states
5.	Advances in enumeration and taxonomic identification of plankton community in inland open waters	9-13 Dec 2019	ICAR-CIFRI, H.Q. Barrackpore	Scientists, Research scholars
6.	Enclosure culture (cage & pen) towards livelihood and nutritional security	14-18 Jan 2020	ICAR-CIFRI, H.Q. Barrackpore	25 nos. of Officials from various sates
7.	Training of Trainers programme on "Ornamental fisheries management of NE Region" sponsored by NFDB	20-24 Jan 2020	ICAR-CIFRI Regional Centre, Guwahati	26 participants including Fishery Officers and Entrepreneurs from states of Assam, Manipur andTripura
8.	ICAR- Summer/Winter School on "Advances in management of inland open-water ecosystem health"	21 Jan-10 Feb 2020	ICAR-CIFRI, H.Q. Barrackpore	Scientists, University Faculty and Subject Matter Specialist of Krishi Vigyaan Kendras (KVKs) and Post-docs
9.	Inland fisheries management	03-05 Feb 2020	CIFRI, H.Q. Barrackpore	20 nos. of Officials from Madhya Pradesh
10.	Field Experience Training (FET) for 110 FOCARS ARS Scientist Probationers	25 Feb – 16 Mar 2020	CIFRI, H.Q. Barrackpore	Scientist Probationers of ICAR-NAARM, Hyderabad

ToT on ornamental fishes at Guwahati

Dr. Jie Huang, Director General, NACA during the validictory session

Exposure / Educational Visits

Sl. No.	Particulars of visitors	Date of visit	Venue
1.	31 nos. of farmers & 4 nos. officials from (Under ATMA) Rangailunda & Belaguntha, Odisha	23 Oct 2019	ICAR-CIFRI, H.Q. Barrackpore
2.	26 nos. of students of 1st year B.F.Sc. of the Neotia University, Diamond Harbour	31 Oct 2019	ICAR-CIFRI, H.Q. Barrackpore
3.	7 nos. of Officials from DoF Telangana	29-31 Oct 2019	ICAR-CIFRI, H.Q. Barrackpore
4.	12 nos. of students & 2 nos. of faculty In-charges from CoF GADVASU, Ludhiana	01 Nov 2019	ICAR-CIFRI, H.Q. Barrackpore
5.	12 nos. of B.F.Sc. students & 2 nos. of faculty members from GB Pant University, Panthnagar	11 Nov 2019	ICAR-CIFRI, H.Q. Barrackpore
6.	38 nos. of B.F.Sc. students from CoF, Ratnagiri	02 Dec 2019	ICAR-CIFRI, H.Q. Barrackpore
7.	47 nos. of trainee farmers from DDF, FFRTC, Kulia, Kalyani	05 Dec 2019	ICAR-CIFRI, H.Q. Barrackpore
8.	70 nos. of B.F.Sc. 2nd year students from CoF, Chhattisgarh Kamdhenu University	08 Jan 2020	ICAR-CIFRI, H.Q. Barrackpore
9.	28 nos. of B.F. Sc. students from CoF, CAU, Lembuchera, Tripura	09 Jan 2020	ICAR-CIFRI, H.Q. Barrackpore
10.	48 nos. of trainee farmers from DDF, FFRTC, Kulia, Kalyani	16 Jan 2020	ICAR-CIFRI, H.Q. Barrackpore
11.	89 nos. of students (class VII to XI) from Bhatpara Taraknath Balika Vidyamandir, Bhatpara, 24 PGS (N).	17 Jan 2020	ICAR-CIFRI, H.Q. Barrackpore
12.	28 nos. of students (UG & PG) & 2 nos. of faculty In-charges from Vidyasagar College, Kolkata	28 Jan 2020	ICAR-CIFRI, H.Q. Barrackpore
13	19 nos. of farmers from Digapahandi block, Ganjam district, Odisha	29 Jan 2020	ICAR-CIFRI, H.Q. Barrackpore
14	24 nos. of trainees from WBUAFS, Belgachia, Kolkata under Skill Development Certificate course on “Aqua clinics & Aquapreneurship Development Program (AC & ABC).	07 Feb 2020	ICAR-CIFRI, H.Q. Barrackpore
15	114 nos. of students (Class VII to XI) from Umasashi High School, Barrackpore	13 Feb 2020	ICAR-CIFRI, H.Q. Barrackpore
16	30 nos. of B.Sc. students from Anandaram Baruah College, Barpeta, Assam	02 Mar 2020	ICAR-CIFRI, H.Q. Barrackpore

Mass Awareness Camps

Name of the Camp	Purpose	Date	Venue	Participants
Community based management of pen culture under TSP	To create awareness among the fishers on low-cost CIFRI HDPE net pen for additional income generation	02 Dec 2019	Bezera, Kamrup (R), Assam	35 fishers of Bamuni beel, Kamrup, Assam
Reservoir fisheries management and demonstration of pen culture	Under Tribal sub plan	11-12 Dec 2019	Harangi, Karnataka	70 fishers of Harangi reservoir, Karnataka

Exhibitions / Mela

Sl. No.	Date	Particulars	Place
1.	21-25 Oct 2019	10th Krishi Fair – 2019 (A National Level Agricultural Exhibition), organized by Shree Shrikshetra Soochana	Jagannath Dham, Puri.
2.	24-27 Oct 2019	Krishimela-2019, GKVK campus	University of Agricultural Sciences, GKVK Campus, Bangalore
3.	15-17 Nov 2019	4th Pillay Aquaculture Foundation (PAF) congress	ICAR-CIFA, Bhubaneswar
4.	18 Nov 2019	66th All India Cooperative Week Celebration organized by Odisha Fisheries Cooperative Corporation Ltd. (FISHFED)	Rabindra Mandap, Bhubaneswar
5.	14-16 Nov 2019	Kisan Mela - Buyers-Sellers Meet 2019, organised by ICAR-CMFRI	Kochi, Kerala
6.	28-30 Nov 2019	International Conference "AQUABE 2019- Aquatic Resources & Blue Economy" organised by KUFOS, Kochi	Kochi, Kerala
7.	29-30 Nov 2019	Conference One Health & Ecosystem (OHES-2019), organised by Aquatic Biodiversity Conservation Society	NBFGR, Lucknow
8.	13-15 Dec 2019	International Conference-cum-Exhibition "Smart Aqua India 2019" organized by Smart Agripost	New Digha, WB
9.	15-22 Dec 2019	Monomohan Mela O Lokosanskriti Utsav organised by Srijani Sanstha	Chhotojagulia, North 24 Pgs, WB
10.	22-31 Dec 2019	Sunderban Yuba Mela -2019, organised by Taldi Bahurupi Sangha	Taldi, South 24 Pgs, WB
11.	27 Dec 2019 - 03 Jan 2020	Naihati Utsav organised by Naihati Utsav Welfare Samity	Naihati, North 24 Pgs, WB
12.	15-17 Jan 2020	*Bajarpur gramin prodarshani O mela* organised by Alukaranbarh Seva Sangha	Purba Medinipur, WB
13.	11-14 Feb 2020	International Conference (ClimFishCon 2020) organized by CUST-School of Industrial Fisheries, Kochi & DoF, Govt. of Kerala	Kochi, Kerala
14.	17-19 Feb 2020	National Conference on Ecosystem Health & Fisheries of Indian Inland Waters: Multiple Stressor, Management & Conservation	GBPUAT, Pantnag ar, Uttarakhand
15.	26-27 Feb, 2020	National Agri Fair, 2020	ICAR-CPCRI RC Campus, Kahikuchi

Hon'ble Minister of State, AH, Dairying & Fisheries and MSME Govt. of India, Sh Pratap Ch. Sarangi visiting the CIFRI stall

Hon'ble Minister of Agriculture, Govt. of Assam, Sjt. Atul Bora at the CIFRI stall

Awards / Recognitions

CIFRI bagged best ICAR Annual Report 2018-19 in big institute category

ICAR-CIFRI Regional Centre, Guwahati bagged the 3rd best stall award in the exhibition during National Agri Fair at Guwahati during January 26-27, 2020 by ICAR-ATARI, Zone VI

Individual Awards/Recognitions

Name	Award/ Recognition	Awarding authority	For which contribution
B. P. Mohanty	Elected as NAAS Fellow on 1 Jan 2020	NAAS India	Outstanding contribution in fisheries
Soma Das Sarkar	The International Research Leadership Award for the year 2020 (RULA Awards)	International Journal for Research Under Literal Access (IJRULA) and the World Research Council (WRC)	Environmental Pollution Research
B. K. Bhattacharjya	Member, Technical Expert Committee	Assam Fisheries Development Corporation Ltd., Guwahati	To render technical advice to the Corporation
	Expert member (Fisheries)	Assam State Wetlands Authority, Environment & Forest Department, Govt. of Assam	To render technical advice on Fisheries
	Selection committee member	Assam Public Service Commission, Govt. of Assam	For selection of Fisheries Development Officer
Dipesh Debnath	Selection committee member	Assam Public Service Commission, Govt. of Assam	For selection of Fisheries Development Officer
Pronob Das	Selection committee member	Assam Public Service Commission, Govt. of Assam	For selection of Fisheries Development Officer
Simanku Borah	Best oral presentation	AEHMS, Canada; IFSI, Barrackpore	For presentation of a paper on "Impact of fish stock enhancement through supplementary stocking on fish production in floodplain wetlands of Assam" during the AEHMS conference at Pantnagar

Dr. B. P. Mohanty receiving the ZSI Fellowship

ICAR-CIFRI Sports Contingent with medals

ICAR-CIFRI Bagged 15 Medals in ICAR Zonal Sports 2019

The institute sports persons showed a splendid performance in the ICAR- Tournament for Easter Zone 2019 (TEZ-2019) organized by ICAR-NRRI, Cuttack during 18-22 November, 2019. Ms. Ankita Ghosh was adjudged the Best Women Athlete in the tournament. She won 5 gold medals including 100m and 200m race, high jump, long jump and javelin throw. Dr. Suman Kumari got one gold medal for Shot put and a bronze in discus throw. Ms. Sibina Mol S. bagged one gold in discus throw and a bronze in shot put. The Table Tennis (TT) team also won silver medal both individual and team events. The TT team comprises Sh. Sukumar Sarkar, Sh. Debasish Singha, Sh. P. R. Mahata, Sh. Somnath Benerjee, Sh. Swapan Das. Altogether the Institute bagged 7 gold, 6 silver and 2 bronze medals.

Staff Corner

Promotion

Sl. No.	Name of the staff		w.e.f.
1	Shri Roshith C.M., Scientist	Scientist with RGP ` 7000	15 Dec 2014
2	Dr. Pronob Das, Scientist	Scientist with RGP ` 7000	15 Sep 2015
3	Shri S.C. Sukla Das, Scientist	Scientist with RGP ` 7000	15 Sep 2016
4	Dr. T.T. Paul, Scientist	Scientist with RGP ` 7000	15 Dec 2016
5	Dr. Kavita Kumari, Scientist	Scientist with RGP ` 7000	01 Jan 2018
6	Dr. Suman Kumari, Scientist	Scientist with RGP ` 7000	04 Jun 2018
7	Shri Kishore Shaw	Assistant Administrative Officer	02 Dec 2019

Transfer

Sl. No.	Name of the staff	From	To
Inter-institutional transfer			
1	Dr. V. R. Suresh, Principal Scientist	ICAR-CIFRI Barrackpore	ICAR-CMFRI, Kochi
2	Dr. Rohan Kumar Raman, Scientist	ICAR-CIFRI Barrackpore	ICAR-RCER, Patna
3	Dr. S. Dam Roy, Principal Scientist	ICAR-CIARI, Port Blair	ICAR-CIFRI, Barrackpore
Intra-institutional transfer			
1	Mrs. Kalyani Biswas, SSS	ICAR-CIFRI, Barrackpore	ICAR-CIFRI Research Station, Kolkata
2	Dr. Dibakar Bhakta, Scientist	ICAR-CIFRI Regional Centre, Vadodara	ICAR-CIFRI, Barrackpore
3	Dr. S. Dam Roy, Principal Scientist	ICAR-CIFRI, Barrackpore	ICAR-CIFRI Research Station, Kolkata
4	Dr. Sanjoy Kumar Das, Principal Scientist	ICAR-CIFRI Research Station, Kolkata	ICAR-CIFRI, Barrackpore
5	Shri Shravan Kumar Sharma, Scientist	ICAR-CIFRI, Barrackpore	ICAR-CIFRI Regional Centre, Allahabad

Superannuation

Sl. No.	Name of the staff	Last place of posting	Date of Superannuation
1	Shri Anil Chandra Das, SSS	Barrackpore	31 Oct 2019
2	Shri C.N. Mukherjee, CTO	Barrackpore	30 Nov 2019
3	Shri Sujit Ghosh, AAO	Barrackpore	30 Nov 2019
4	Dr. Rani Palaniswamy, Principal Scientist	Kochi	01 Dec 2019 (VR)
5	Dr. R.S. Srivastava, Senior Scientist	Allahabad	09 Dec 2019 (VR)
6	Shri Sukumar Sarkar, Assistant	Barrackpore	31 Dec 2019
7	Shri Dilip Kumar Das, SSS	Barrackpore	31 Dec 2019
8	Shri T.V. Velayudhan, SSS	Kochi	01 Jan 2020 (VR)
9	Shri N. Deka, SSS	Guwahati	31 Jan 2020
10	Mrs. Usha Unnithan, CTO	Kochi	31 May 2020

Superannuation of Shri Dilip Kumar Das, SSS

Superannuation of Shri Anil Chandra Das, SSS

Obituary

ICAR-CIFRI mourns to the untimely demise of **Shri Sitaram Meena**, Sr. Technical Officer (Allahabad) and **Ms. Sukanya Som**, Scientist (Barrackpore) who passed away on 20 March 2020 and on17 May 2020 respectively. The Director and all the staff expressed heartfelt condolences to the bereaved families and wished the Great Souls may rest in peace.

Meetings

Meeting with Delegates from RMIT University and South East Water at ICAR-CIFRI

Professor Andy Ball, Director, Centre for Environmental Sustainability and Bioremediation, RMIT University, Dr. Sarvesh Kumar Soni, Research Scientist, Department of Biosciences and Food Technology, RMIT University and Dr. Aravind Surapaneni, Senior Research Scientist, South East Water, Melbourne visited ICAR-CIFRI on 12 October 2019 to discuss about possible collaboration. Treatment of water of River Ganga, purification of East Kolkata Wetland, eradication of microplastics in water system were some of the discussion points in the meeting.

Participants of the workshop

Workshop on "Prioritization of Inland Fisheries in India" Towards Marine Stewardship Council (MSC) Certification

A one day workshop on Marine Stewardship Council (MSC) certification of fishery resources was conducted at the Bengaluru Research Centre on 19 October 2019. Dr. Preetha Panikkar, Dr. Ranjit Suseelan, India

consultant, MSC, Dr. K. Sunil Mohamed, CMFRI, Kochi, Dr. B. K. Das and staff of Dakshin Foundation (NGO) were among the dignitaries attended the workshop. Dr. B. K. Das emphasised on selecting some of the important fisheries of inland sector for MSC certification.

Workshop on Management of Wetland Fisheries of Bihar

One day workshop cum training programme was organized at the Bihar Veterinary College, Patna by the institute in collaboration with Bihar Animal Science University (BASU), Patna on 20 November 2019. Dr. Prem Kumar, Hon'ble minister of Agriculture, Animal and Fisheries Resources, Government of Bihar was the chief guest of the programme. In the workshop, Hon'ble minister emphasized that there are enormous possibilities of increasing the productivity of these wetlands. Dr. B.K. Das, Director, ICAR-CIFRI, Barackpore remarked that the fish yield (kg/ha/yr) increased from 180 to 675 in Kararia Maun; 190 to 320 in Sirsa Maun; 70 to 140 in Rulhi Maun and 60 to 120 in Majharia Maun which has proved that through technological intervention the production and productivity of the wetland can be enhanced.

Smt N. Vijayalakshmi, IAS, Principal Secretary, Animal and Fisheries Resources, Government of Bihar stressed on the replication of ICAR-CIFRI model of wetland fisheries development in other districts of Bihar. Dr. Rameshwar Singh, Vice Chancellor, BASU, Shri Nishad Ahmad, Joint Director, Department of Fisheries, Dr. Raman Trivedi, Director, students Welfare, BASU; Shri Suman Kumar, Joint Director, DoF, Bihar, Dr. M. A. Hassan, Dr. Ganesh Chandra and Dr. Raju Baitha from ICAR-CIFRI, Dr. Kamal Sharma from ICAR-RCER, Patna and Shri Abhas Kumar Mandal also addressed the gathering.

Inception Workshop of NSO Funded Project

An inception workshop cum training programme was organized at the institute headquarters during Dec 18-19, 2019 under the National Accounts Division (NAD), National Statistical Organization, Ministry of Statistics and Programme Implementation funded project. All the project staff including the Young Professionals attended the programme. Dr. P.K. Jana and Shri Suman Kumar, Joint Directors, Fisheries Govt. of West Bengal and Bihar, respectively were present. Dr. B.K. Das, Director and Coordinator of the project elaborated the importance of this project. Dr. Arun Pandit, Principal Investigator elaborated the project information including background, objectives, draft sampling plan, plan of work, survey schedules. The CoPIs of the project presented their experiences of pilot surveys conducted at their respective places. All the CoPIs together with Young Professional were trained regarding how to conduct surveys and how to use the survey schedules.

World Fish Project Review Meeting

A review meeting under the World Fish Window-3 project was held on 4 January 2020 at the institute headquarters, Barrackpore. Dr. J.K. Jena, DDG (Fy.Sc.), ICAR, New Delhi chaired the meeting. He gave a brief overview of the project, following which detail achievements were presented by the respective institute. Dr. Bindu R. Pillai and Dr. P.C. Das from ICAR-CIFA, Bhubaneswar; Dr. Suseela Mathew and Dr. A. K. Mohanty from ICAR-CIFT Cochin and Dr. B.K. Das and other staff from ICAR-CIFRI attended the meeting.

Workshop on Pen Aquaculture at Namsai District, Arunachal Pradesh

A workshop on 'Pen aquaculture technology for improved livelihood' was organized by the Guwahati Regional Centre, in collaboration with the Directorate of Fisheries, Govt. of Arunachal Pradesh at Jona III village on the banks of Bor Beel on 04 Feb

2020. It was organized for capacity building of the local beel users community on various aspects of pen aquaculture technology. Fish culture in pen enclosures has been initiated in Bor Beel by ICAR-CIFRI RC, Guwahati under the project sponsored by the National Mission on Himalayan Studies (NMHS), G.B. Pant National Institute of Himalayan Environment and Sustainable Development (GBPNIHESD), Almora, Uttarakhand. A total of 35 fishers from the village (including 6 women and 4 youth) participated in the day-long programme. Shri BijayTalukdar, Deputy Commissioner, Namsai district, District Officers of Fishery, Agriculture; Veterinary, Horticulture, Textile & Handicrafts and staff of Krishi Vigyan Kendra and ICAR-CIFRI were present in the workshop. The Heads of agriculture and allied departments also discussed various Govt. schemes and urged the participants to avail them.


Workshop on at Borbeel, Namsai district, Arunachal Pradesh

Workshop on e-Office

A training-cum-workshop on e-Office was conducted by ICAR at ICAR-CIFRI, Barrackpore during 11-12 Feb, 2020. A total of 23 Administrative and Technical staff of ICAR-CIFRI, Barrackpore and its' Regional Centres participated in the workshop. Staff of ICAR-ATARI, Kolkata Regional Centre and ICAR-NBSS&LUP, Kolkata Regional Centre also attended the training programme. Shri S.K.Sahu, Scientist & In-Charge, AKMU, ICAR-CIFRI was the Nodal Officer of the said training programme. Shri Rakesh Kr. Saini, Chief Technical Officer (IT), ICAR-IASRI, Pusa, New Delhi along with his team trained the staff. This training workshop was co-ordinated by Shri Rajeev Lal, CAO, ICAR-CIFRI.

Research Advisory Committee (RAC) Meeting

The Research Advisory Committee (RAC) Meeting of the Institute was held on 18 May 2020 in video conferencing mode. This is the first meeting of newly constituted RAC (2020-2022) of the Institute. The Chairman Prof. (Dr) Baskaran Manimaran along with other RAC Members viz. Dr. K.G. Padmakumar, Dr. Sharad Kumar Jain, Dr. S. C. Pathak and Dr. B. P. Mohanty (ADG, I. Fy.), ICAR participated in the meeting. Dr. J. K. Jena, DDG (Fy. Sc.), ICAR took special interest and participated in the meeting and requested the committee to recommend advisories for the progress of research activities of the Institute. Dr. B.K. Das, Director requested the RAC to guide the research activities of the Institute so as to deliver and translate research into actionable recommendations to address food, livelihood and nutritional security of this country. Heads of Divisions/sections, Head of the Regional Centres and Stations presented their respective research and other achievements.

IRC Meeting

Institute Research Committee Meeting for the year 2019-20 started on 8th June 2020 at the Institute headquarters both in on-line and off-line mode. The meeting was started with a welcome address by Dr. Arun Pandit, Member Secretary IRC. Dr. B.P. Mohanty, newly joined ADG (I. Fishery) also joined the meeting. The IRC mourned to the untimely death of Ms. Sukanya Som, Scientist and observed 2 minutes silence in honour of the departed Soul. Following this Scientists presented their achievements and future work plan. New project proposals were also presented in the IRC.

Events / Day Celebrated

Gandhi Jayanti

ICAR-CIFRI celebrated the Gandhi Jayanti on 2nd of October 2019 with great pomp and splendor. The program started with the members of CIFRI family paying homage to Mahatma Gandhi with flowers and having a discussion on the teachings and thoughts of Gandhiji. An outreach cleaning program and distribution of pamphlets and sticking leaflets was also undertaken in the local Sheoraphuly Ghat and the bus stand. Prizes were distributed to the children who had participated in the Swachhata theme drawing competition held previously. A program on kavita path followed, in which the CIFRI staff members took part. The Director then delivered a presentation on the topic of plastic pollution.

Vigilance Awareness Week

The Institute observed the vigilance awareness week during 28 October to 02 November 2019 focusing on the theme area 'Integrity - A way of Life'. The week long observance was started with administration of pledge to the officials and staff on 28 October by the Director. Large numbers of posters, banners, placards were displayed at the campus premises showing the ill effects of corruption and the commitment of CIFRI toward zero tolerance on corruption. Human chain, walkathon, drawing, extempore, essay writing were some of the events organized on the occasion. The week-long celebration was culminated through a concluding ceremony on 02 November in which Shri Dipankar Bhattacharjee, IPS, DIG (Training) and Principal of Swami Vivekananda State Police Academy, Barrackpore was the Chief Guest. The observance was coordinated by Dr. Arun Pandit, Vigilance Officer of the institute.

Concluding programme of Vigilance Awareness Week

World Antimicrobial Awareness Week (WAAW) 2019

World Antimicrobial Awareness Week (WAAW-2019) was observed at the institute during 18-24 November 2019 to create awareness among farmer, Govt. officials, staff, scholars students and general public through lectures, leaflets and posters on “Antimicrobial resistance” in fishes, animals and human. As an outreach activity, a seminar on “Antimicrobial resistance and its impact on life” was organized at Rastraguru Surendranath College, Barrackpore in presence of sixty five students and faculties. Pledge was taken by the participants to take action to stop over use and misuse of antibiotics and to prevent the spread of infection.

Staff are taking oath on Constitution Day

Constitution Day

The Constitution Day was observed at the institute on 26 November 2019. The year 2019 marks the 70th year of adoption of our constitution. Different activities were organized to make aware the fundamental duties enshrined in the Constitution of India. The Director and Chief Adm. Officer gave speech on the evolution and the essence of our constitution.

Flag Day

The National Foundation for Communal Harmony (NFCH) observes Communal week campaign week every year from 19th to 25th November. The last working day of the week is celebrated as Flag Day of the Foundation. Accordingly the same was observed at ICAR-CIFRI, Barrackpore. The inaugural day saw the assembly of all staff to take the pledge of communal harmony. Dr. B. K. Das, Director mentioned in his address the importance of maintaining communal harmony to be successful as a nation. Badges depicting the integration and unity were worn by all staff. An essay writing competition and quiz contest was also organized concentrating on the subject.


World Fishery Day

World Fishery Day

The super cyclone *Bulbul* had devastated larger part of Sundarbans including Frasergunj, Bakkhali and Sagar Island. Showing solidarity, the institute observed the 34th World Fisheries Day on 21st November 2019 at Frasergunj. Local Gram Panchayet leaders, Institute scientists were present on the occasion. Immediate requirement of liming materials and bleaching powder were distributed to disinfect the affected areas and aqua resources. Sediment and water samples of the affected ponds and other fishery resources were analysed at the site and need based suggestions were provided for improving the qualities of pond and other aquatic ecosystems to support their livelihood.


Field day at Samaguribeel, Assam

Field Day on Cage Aquaculture at Samaguribeel of Assam

A field day was organized at Samaguribeel on 21 Dec 2019 on the occasion of final harvesting of fishes (*Labio gonius*) reared in the cages. Senior Fishery Development Officer, Shri A. H. Siddique, Dept. of Fisheries, Nagaon district, Assam; Mr. Kaustauv Bhagawati, Asst. Professor, College of Fisheries, AAU, Raha; Ms. Jyotirmoyee Das, Technical Expert, APART; Shri Bhumidhar Das, Beel lessee of Samaguribeel; Scientists, Technical staff and Research scholar of ICAR-CIFRI RC, Guwahati and more than 30 fishers were present on the occasion. Shri Siddique requested the beel fishers to adopt the enclosure culture technologies as these technologies have immense potential in enhancing productivity of the waterbody.

Annual Sports

ICAR-CIFRI organized Annual Sports on 25 and 27 January 2020 at Barrackpore

Head Quarter. In the inauguration, Dr. B.K. Das, Director urged all the staff including contractual and research scholar to involve in the two days different sports events with true sportsman spirit and develop kinship among others. The staff participated enthusiastically in various events like 100 m race, kick the football, hit the wicket, cricket, volleyball, tug of war, in addition to various indoor games like TT, carom, chess, badminton.

Republic Day

The Institute celebrated the Republic Day with great enthusiasm on 26 January 2020. Dr. B. K. Das, Director hoisted the tri-colour and paid rich tribute to the nation. He remarked that India gained freedom after lot of struggle by the freedom fighters. Hence, preserving the unity of our nation is our sacred duty. In his speech, he also recounted the achievements of CIFRI during the last one year. He remarked that a good working atmosphere and team spirit are the key to success. All the CIFRI staff and their family members were present on the occasion.

Fish Harvest Mela at Rulhi Wetland, Bihar

The institute organized a fish harvest mela at Rulhi maun, a seasonally open Ox-bow lake with 80 ha water spread area at Motihari, East Champaran, Bihar on 9 February 2020. The mela was attended by the District Fisheries Officer, local officials along with different stakeholders and more than 100 fishers. This is one of the wetlands where the Central Sector Scheme (CSS) Blue Revolution is being successfully demonstrated employing the ICAR-CIFRI's technologies for sustainable exploitation of under-exploited wetlands of Bihar with financial assistance from NFDB Hyderabad.CIFRI technological interventions during the last two years at Rulhi maun have led to increase in fishing days from 35 days to 93 days and fish yield from 60 to 153 kg/ha. Prolonged fishing days also reduced migration of fishers for non-fishing jobs to other cities.

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International Womens' Day

International Women's Day (IWD) is a global day celebrating the social, economic, cultural and political achievements of women - while also marking a call to action for accelerating gender equality. The institute celebrated the International Women's Day on 7 March 2020 at the headquarters, Barrackpore. The theme of this year's IWD was “I am Generation Equality: Realizing Women's Rights” by the UNO. Gender equality is essential for economies and communities to thrive. A gender equal world can be healthier, wealthier and more harmonious. On the occasion Dr. B.P.Mohanty, ADG (Inland Fy) and Dr. B.K. Das, Director and few women staff spoke about women's contribution in our nation building. Cultural programme and food court were also arranged on the occasion.

74th Foundation Day of the Institute

The institute celebrated the 74th foundation day on 17 March 2020. On the occasion Dr. B. K. Das, Director remembered the contributions of CIFRIANs in achieving the blue revolution in the country. Dr. Jiban Mitra, former Director, ICAR-CRIJAF; Dr. Vijay Laxmi Saxena, the President, Indian Science Congress Association (ISCA); Dr. A. K. Saxena, Former President, ISCA were among the dignitaries graced the occasion. The dignitaries congratulated the staff of the institute on this occasion and lauded the contribution of the institute in nation bulding. One book 'Eurihaline fishes of river Ganga' and the magazine 'Nilanjali' were released on this occasion. One hundred fishermen being trained in the institute on skill development programme also took part in the interaction programme. The dignitaries released 50,000 advanced fingerlings of IMC in the Ganga.

Other Major Events

ICAR-CIFRI stood by the Amphan victims

The Institute donated Rs. 5 lakh to the Chief Minister's Relief Find for the victim of super cyclone Amphan

International Men's Day

MoU with Satluj Jal Vidyut Nigam Limited

FET Training
Six scientist probationers of ICAR-NAARM underwent Field Experience Training under the guidance of ICAR-CIFRI

Ganga rafting team visited CIFRI

New Year and Makar Sankranti celebration

Art of living session

Diwali celebration

Important Visitors

Mr. V. Srinivas, Jt. Director, DoF, Telangana (29 Oct 2019)

Prof. Andy Ball, RMIT, Australia (12 Oct 2019)

Dr.R.Selvarajan, ICAR-NRC for Banana (04 Feb 2020)

Prof. Yi Sun, Group Leader & Associate Professor
Technical University, Denmark (23 Dec 2019)

Jie Huang, DG, NACA (12 Dec 2019)

Prof. P. Biswas, VC, WBUAFS (2nd from left)
Dr. G. H. Pailan,I/C CIFE, Kolkata centre (3rd from left)(21.12.20)

ICAR-CIFRI stood by the super cyclone affected fishers

The cyclone "Bulbul" had devastated a large part of Sagar Island and Gosaba during February, 2020. Most of the waterbodies got severely affected due to leaf litter decomposed in these ponds, making them unsuitable for fish culture. Mass mortality of fishes occurred. ICAR-CIFRI took steps to reduce their loss by providing lime for the affected ponds and also fish seeds to all the TSP beneficiaries. 500 kg of lime was distributed to all the beneficiaries affected by cyclone "Bulbul" in Gosaba and fish seeds (450 kg) and 800 kg of lime was distributed among the all the beneficiaries at Sagar Island. 5 ton fish feed was also distributed to the affected tribals of Sagar island. On the spot water quality analysis was done for the cyclone affected ponds.

Similarly at Fresergunj area of Sundarbans ICAR-CIFRI extended all possible support to rejuvenate the fisheries and aquaculture resources. Immediate requirements of liming materials and bleaching powder were served to disinfect the affected areas including eco-health of their aqua resources.

Disaster Assessment

The super cyclone "Amphan" made its landfall between Sagar Island, Sundarbans, and Kakdwip, West Bengal on 20th May 2020 afternoon. It ravaged the Sundarbans and mauled telecommunication systems, uprooted trees and electric poles, destroyed thousands of dwellings and ravaged roads, bridges and river embankments across North and south 24 Parganas of West Bengal. A large number of mud houses in the areas of Gosaba, Sagar Island, Kalitala, and Amtoli in Sundarbans were damaged. The jetty on the Buriganga River at Kachuberia (Sagar Island) was collapsed. Several river embankments in Sundarbans have been washed away or breached and several areas flooded. In the North 24 Parganas, the coastal areas of Sandeskhali, Hingalganj, Hemnagar, and Kalitala were severely damaged. High tidal waves damaged several dams over the Ichamati, Raimangal, and Sahebkhali rivers on the coastal belt close to Sundarbans. The devastation was so intense at Sagar Island, Kalitala, and Gosaba of Sundarbans that, many areas remained inaccessible 48 hours after the cyclone, making it difficult to distribute relief materials. In Gosaba, the river embankment at Jotirampurghat, Rangabelia has washed away, inundating vast areas of houses, ponds, and agricultural fields.

Activities under Tribal Sub Plan (TSP)

The ICAR-CIFRI utilizes the TSP as an avenue for socio-economic upliftment of the tribal populace through inland fisheries management. In the Mayurbhanj district of Odisha, several activities were undertaken for fish production enhancement in Ranibandha and Kalo reservoirs. During October 2019, about one lakh major carp fingerlings were stocked in pens installed in the reservoirs. Similarly 3000 Amur carp seeds were stocked in 100 hapas in Ranibandha. A capacity building programme on ornamental fish was conducted for 40 tribal women of the district at the institute. 40 ornamental fish units were also distributed to tribal women of Talapada Nalagaja village, Mayurbanj on 14 November 2019 along with a sensitization programme on development of ornamental fisheries in the villages.

ICAR-CIFRI team with the fishers of Bamunibeel Development Committee

An awareness programme on 'Community based management of pen culture using CIFRI-HDPE net pen' was organized by the Guwahati Regional Centre in collaboration with Bamuni Beel Development Committee, Bezera on 02 Dec 2019. A total of 35 fishers of the beel participated in the programme. On this occasion, site selection has been made for installation of 2 CIFRI-HDPE net pens (0.1ha/pen) in the beel.

Demonstration on cage culture at Umiam

Demonstration on pen culture at Harangi

The Bangalore Research Centre organised a mass awareness programme on reservoir fisheries management at Harangi reservoir, Karnataka. A demonstration of CIFRI HDPE pen for fingerling raising of *Labeo rohita* was held on 11 December 2019. The seed stocking, pre and post stocking management and feed management strategies were detailed to the tribal fisher folks.

An awareness program on 'Importance of small indigenous fishes for livelihood improvement' was organized at Baghala Bandh situated in the Bundelkhand region on 27 Feb 2020 by the Allahabad Centre. More than 40 tribal fishermen participated in the program who were made aware about importance of SIFs in nutrition and livelihood. Another awareness programme was conducted on 'Reservoir Fisheries: Scope and Opportunities for livelihood and Nutritional Security' for tribal fishermen of Narmada district, Gujarat on 25 January 2020 by the Vadodara Research Centre.

Activities under the Scheduled Caste Sub Plan (SCSP)

Demonstration of ornamental fish culture in Sundarbans

The Institute implemented SCSP programme in the wetlands of West Bengal and Odisha in association with 7 fishermen cooperative societies. Five and two fishermen cooperative societies from West Bengal and Odisha, respectively were selected for demonstration of wetland fisheries management through seed raising in nursery and pen culture for stocking in wetlands through co-management mode. The fish fingerlings produced in the pens were stocked in the wetlands for the enhancement of fish production in the wetland. Fisheries implements including HDPE pen, feed, fish seed, fishing nets, fishing boats, coracles, etc. were given to the selected fishermen cooperative societies. A total of 3500 kg, 600 kg, 900 kg and 550 kg of advanced fingerlings of IMC, bata and sarana respectively, were raised through pen and nursery pond and stocked in 4 wetlands.

Two mass awareness programmes in West Bengal and Odisha was carried out to sensitize the SC fishers for livelihood development through inland fisheries management. Similarly, two training programmes on ornamental fish culture and one training programme on wetland and reservoir fisheries management were carried out in Sundarbans and Odisha, respectively. On-field training on inland fisheries development was also conducted for the fishers of Bhadrak, Odisha.

Capacity building programme on ornamental fish culture

Seventy ornamental fish culture kits and FRP tanks were distributed among the fishers in Amatali and Kochukali villages of Sundarbans. The ornamental fish culture technique was also demonstrated in these villages. In addition, the fishers of Khalsi wetland, West Bengal and Bhadrak, Odisha were also provided with 25 ornamental culture kit and FRP tanks each. The institute distributed 4.2 tons of fish feed and fishing boat to Beledanga FCS and 4.5 tons feed to the Chamta FCS (both in West Bengal) as a token of relief for Amphan cyclone which destroyed the pens and caused flooding on 20 May 2020.

Fish seed stocking in Salia reservoir, Odisha

During the COVID 19 pandemic, 25,000 nos. of advance stunted fingerlings of Indian Major Carps harvested from the nursery, were stocked in Salia reservoir. Another 50,000 numbers of fish seeds were also relaeased in the reservoir for enhacement of fish production, which will benefit more than 200 SC fishers of the reservoir. Similarly the institute has installed pen of 0.5 ha area in Baghua reservoir, Odisha with community participation during the pandemic. Three lakh fish seed were released in the pen for *in situ* raising of fish seed as the stocking material for the reservoir. A speed boat with outboard engine was provided to the fishers. The activities benefit 52 SC fishers of the reservoir.

Swachh Bharat Abhiyan Activities

Closing ceremony of the Swachhata Pakhwada, started on 11 Sept 2019, was held on 02 October 2019 both at headquarters and research centres. The program was conducted in a befitting manner by paying homage to the Mahatma. A fortnight of Swachhata Pakhwada was conducted on 16-31 December 2019 by conducting indoor cleaning and outreach awareness programs. In addition, several more cleaning and sanitization programs were conducted in the Institute campus, including cleaning of debris post cyclone Amphan, drive for mosquito control.

Closing ceremony of *Swachhata Hi Seva* at Barrackpore

Awareness campaign at the Barrackpore Debiprasad High School

Campus cleaning post "*Amphan*"

Outreach awareness activity at Barrackpore Gola Ghat

Digitization of office records

Fumigation drive at Office headquarters

Drawing competition at a local school by Bangalore centre on 20 December 2019

Awareness generation among the villagers on Swachh Bharat Mission at Harohallipalaya, Karnataka on 28 Dec 2019

Swachhta drive by the Staff at Guwahati Centre

Swachhta drive by the staff of Kochi centre

Newsletter, Vol. 24, No. 2 (October 2019 - June 2020) ISSN : 0972-0774

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dforK dekjh] ekul ,p- ,e-] vpuk flUgk] lhekd ckjkg vkj fc- d- nkl

i;koj.kh; çokg ij bMk&;jkfi;u ;fu;u ¼bl;½ dk v/;;u

egkunh MYVk] jkexxk vkj rkih unh e i;koj.kh; çokg d vkdyu ij ;jkih; l?k d fo'k"kK thvkbtM ¼GIZ½ }kjk ,d igy 'k: dh xb A bl fo'k"kK ny u fofHkUu ekl e d nkjku tfod vkj vtfod ekinMk d lxg d fy, egkunh MYVk vkj jkexxk unh dk nkjk fd;kA egkunh MYVk] fo'k"k :i l dkyh unh d fy, ,p,lh&vkj,lh ¼HAC & RAS½ vkj ih,p,ch,lvkb,e ¼PHABSIM½ e,My dk mi;kx dj b&¶yk dk vueku yxk;k x;k Fkk tcfd] jkexxk unh d fy, elk Qcfle ¼MESO & PHABSIM½ dk ç;kx fd;k x;k gA lHkh e,Myk dk unh e mifLFkr çe[k eRL; çtkfr;k vkj mud vkokl LFkyk d ifji{; e v/;;u fd;k x;kA egkunh MYVk d i;koj.kh; çokg ¼b&¶yk½ d vkdyu dkB tkMh unh dk çfrfuf/k unh d :i e dk puk x;kA p;fur ty foLrkj Hkkx e lcl çe[k eNyh çtkfr;k dk b&¶yk vueku d fy, ekuk x;kA dkB tkMh unh d fy, flfjugl jck dk vudj.kh; ¼fley'ku½ v/;;u d fy, fy;k x;kA çkjfHkd voykdu ;g ldr nr g fd ekulu jfgr eghuk e bl unh dh ty fLFkjrk d fy, U;ure ty 750&800 D;ld dh vko';drk gkrh gA

,- d- lkg] fc- d- nkl] d- uk;d] t- uy- oh- fcfxV] jkQy lpt uokjk vkj ekbdy edDyu

lLFkku dh uekfe xxk dk;Øe dh rgr bfM;u eTtj dki çtkfr;k dh Vfxx

lLFkku u *uekfe xx* ifj;kstuk d rgr eNfy;k d vc vfHkxeu vkj çokl ekx dk v/;;u dju d fy, xxk unh e bfM;u eTtj dki d 100 eNfy;k dk Vx fd;k x;kA xxk unh e bfM;u eTtj dki d lpf;r eNyh d mfpr LFkk;h çc/ku dh fuxjkuh vkj fodkl d fy, 16 tu 2020 l fu;fer rkj ij Vfxx dh 'k:vkr dh xb gA Hkkjrh; eTtj dki d jkg ¼ychvk jkfgrk½] dryk ¼ychvk dryk½ vkj exy ¼flfjghuk exyk½ dh 500 xke l vf/kd Hkkj okyh o;Ld eNyh dk Vx djd xxk unh e NkMk x;kA efær lhfj;y ucjk d lkFk ekud vkdkj d ¶yk Vh&ckj ,dj Vx dk eNyh d i"Bh; i[k d Bhd uhp dh ekli'kh e yxk;k x;k FkkA Vx dh xb eNfy;k dk unh e NkM tku l igy dhVk.k jk/kd vkj ikVf'k;e ijexuV d ?kky l mipkfjr fd;k tkrk gA Vx dh xb eNfy;k dk unh e NkMu dk mí'; bud vfHkxeu çofÙk vkj fl)krk dk v/;;u djuk gA bu Vx dh xb eNfy;k dk xxk unh dh n'kh eNyh çtkfr;k d lkFk —f=e çtuu d ek/;e l mRikfnr fd;k x;k FkkA lLFkku u LFkkuh; eNvkjk d chp Hkkjrh; eTtj dki çtkfr;k d Vfxx vkj vfHkxeu d lc/k e tkx:drk vfHk;ku pyk;k gA bu eNvkjk dk fpfàr eNfy;k dk dk idMu l jkdu d fy, vujk/k fd;k x;kA

ch- d- nkl] ,p- ,l- Lou] fer'k jkeVd vkj ,u,e lh th Vhe d vU; lnL;

rhLrk unh e fQ'k ikl çHkkodkfjrk eY;kdu ij v/;;u

rhLrk unh e rhLrk ykvj ck/k ifj;kstuk] Vh,yMhih&III e miyC/k eNfy;k d vfHkxeu d fy; fufer fQ'k ikl dh çHkkodkfjrk dk eY;kdu vyx&vyx rjhdk l igyh ckj fd;k x;k FkkA çkjfEHkd lo{k.k e] ck/k d Åijh vkj fupyh Hkkx vkj rhLrk unh d e[; ugj e rhu çokl h eNfy;k dk nt fd;k x;k tk çtuu dky d nkjku unh d Åijh {k= dh vkj iyk;u djr gA ; rhu çoklh eNyh çtkfr;k g& fu;kfydyl gDlkxkukyfil ¼p,dyV egklhj½] lkbtkFkkjDl fjpMlkuh ¼LukVkmV½ vkj lkbfçfu;u lfelykVe ¼vlfet fdxfQ'k½A bu çtkfr;k dh miyC/k tul[;k d vk/kkj ij p,dyV egklhj dk vfHkxeu v/;;u d fy, vkj fQ'k ikl dh çHkkodkfjrk d eY;kdu d fy, puk x;k FkkA ,d foLrr Vfxx ç;kx fd;k x;k

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ftle 64 eNfy;k ¼vklr yckb & 304 feeh vkj otu &340 xke½ dk Vx fd;k x;k vkj ck/k d Åijh vkj fupyh Hkkx d fofHkUu p;fur LFkyk ij çokfgr fd;k x;kA oreku v/;;u e] ¶yk Vh&ckj Vx dk mi;ksx eNyh dh vfHkxeu ç–fr vkj Vh,yMhih&III d fQ'k ikl dh çHkkodkfjrk d vkdyu d fy, fd;k x;k FkkA vuekur% Vx dh xb eNyh dh lex iuhçkflr 6-25 çfr'kr n[kk x;k rFkk fQ'k ikl dh çHkkodkfjrk dk vkdyu fd;k x;kA çkIr vkdMk d vk/kkj ij Vh,yMhih&III d fy, fQ'k ikl dh çHkkodkfjrk 8-33 çfr'kr ikb xbA

fc- d- nkl] ,- d- lkg] Mh- d- ehuk] ,u- pku] vkj- d- jeu] ,- vkj- pk/kjh vkj Iuhrk çlkn

xqtjkr dh uenk egkuk {k= l okYVu dh eMfLdij] ijhvkFkkYel okYVu dkmeu 1941dk iFke ckj ik;k tkuk

ijhvkFkkYel okYVu dkmeu] 1941 ¼okYd,u d eMfLdij d uke l çpfyr½ dk ij Hkkjr d if'peh rV uenk egkuk l igyh ckj nt fd;k x;kA xkfcM Qfeyh d rgr iflQ,e v,Mj d vrxr ;g çtkfr mÙkj&if'peh fgn egklkxj] Qkjl dh [kkMh vkj vkeku io dh [kkMh] ikfdLrku e ik;h tkrh gA bl çtkfr dk ekulu d nkjku ,chBk vkj tkx'oj eRL;;u {k= l fuEu Tokj d le; fxy tky ¼10&20 feeh tky vkdkj½ }kjk idMk x;k FkkA bl eNyh dh dy 21 ueuk dk ¼vkdkj ¼ 124&145 feyhehVj vkj otu ¼ 10-7&26-2 xke½ dk ,d= fd;k x;kA bl çtkfr dh igpku fpUg e i"B Hkkx e 13 e#nM] 14 i"Bh; uje i[kj 1 xnk e#nM] yEcor ieku ij fLFkr 11 i"Bh; uje i[k rFkk i"B i[k tk fdlh f>Yyh l ;ä ugh gkrk gA eNyh d flj dh pkMkb bldh ekud yckb dk 20-56 çfr'kr] v/kjh; i[k dh yckb 12-44 çfr'kr] xnk i[k dh yckb 19-63 çfr'kr rFkk nlj i"Bh; vk/kkj dh yckb 23-36 çfr'kr gkrk g A

vkb;lh,u ¼IUCN½ jM fyLV d vulkj] bl çtkfr dk v/;;u lph d vrxr nt ugh fd;k x;k gA eMfLdij dh rhu çtkfr;k vc rd uenk Tokjune[k {k= l fjikV dh xb g] ftue ifjQkFkkYel okYVkuh dh mifLFkfr uenk Tokjune[k e pkj eMfLdij çtkfr;k dh if"V djr g A

fnckdj Hkä] ,l- ih- dkcy] MCY;- ,- ehrb] ,- d- lkg] v#.k ifMr] ,l- lker vkj fc- d- nkl

dkojh unh dh xM ,uhdV ck/k e eNfy;k dk vR;f/kd nkgu

rfeyukM e dkojh unh ij cu xM ,uhdV ¼ck/k½ e cxuV dk ,d tky çdkj] ftl LFkkuh; rkj ij Þdppk oyk;hß d uke l tkuk tkrk g] l fd'kkj vkj vifjiDo eNfy;k dk idMk tkrk gA bl ck/k l ty çokg uhp dh rjQ mPp ox l tyçikr d leku fxjrk gA pfd eNfy;k dh ç–fr /kkjk ox d foijhr rju dh gkrh g blfy, vifjiDo eNfy;k ck/k d uhp cu lhf<;k l Åij p<u dk ç;Ru djrh g ij /kkjk dk ox vf/kd gku d dkj.k Åij ugh igp ikrh gA eNvkj bu eNfy;k dk ijk l uhp dh rjQ <dyr jgr g ftll ;g eNfy;k lhf<;k ij yxk, x, fx;j tky e Ql tkrh gA bld ckn budk gkik e ,d= dj ckt kj e Hkt fn;k tkrk gA yxHkx 30 eNvkj bl fx;j dk lpkfyr djr gA idMh gb eNfy;k e yfc;k ckVk] yfc;k ckxV vkj fljfgul jck çtkfr dh vifjiDo eNfy;k nt dh xbA bl fx;j l çfrfnu yxHkx 250&300 fdykxke vifjiDo eNfy;k dk idMk tkrk gA bu eNfy;k dh yckb 6-7 l 12-8 feeh rFkk otu 2-3 l 15-7 xke n[kk x;kA bl xM ,uhdV e vifjiDo eNfy;k d vR;f/kd nkgu l ty{k= d eNyh lp;u vkj bud lj{k.k ij çfrdy çHkko iM jgk g vkj dkykrj e bldh ekfRL;dh e Hkh ºkl dh lHkkouk c< tkrh g A

ykfgr dekj d] vkj- d- eUuk] jkf'kFk lh- ,e-] flfcuk eky] fot ; dekj ,e- b- vkj fc- d- nkl

cãi= unh e 0;kolkf;d eRL; yfMx ij o"kk dk çHkko ¼ ,d cg&çtkfr e,Mfyx i)fr

cãi= unh d e/; Hkkx e eRL; yfMx ij o"kk d çHkko dk vkdyu cg&çtkfr e,Mfyx i)fr }kjk dju dk ç;kl fd;k x;k FkkA ;g ,d çdkj dk Mk;ufed QDVj ,ukfyfll i)fr g ftll Ng cg okf.kfT;d eRL; legk @ çtkfr;k ¼Hkkjh; etj dki] ekbuj dki l] dVfQ'kj QnjcDl] fgYlk vkj vU; fofo/k çtkfr;k½ e mifLFkr leku ç–fr dh igpku dju vkj o"kk d çHkko dk vkdyu dju d fy, fd;k x;k FkkA o"k 1987 l 2017 d nkjku xokgkVh e gku okyh ckfj'k d okf"kd vkdMk vkj cãi= unh d vkj cgmí'kh; yfMx MVk dk mi;ksx bld fy, fd;k x;k FkkA ,dd lpuk ekunM ¼Akaike Information Criterion½ d vk/kkj ij] Mk;ufed QDVj ,ukfyfll i)fr }kjk vudkUlVM dkfofj;u efVDl ¼unconstrained covariance matrix½ dh lgk;rk l rhu leku ç–fr dh igpku dh xbA VM 1 e e[;:i l ekbuj dki] etj dki vkj dVfQ'k dh eRL; yfMx 'kkfey g] VM 2 Qnjcd vkj fofo/k eNfy;k dk fn[kkrk g rFkk VM 3 u fgyk eNyh d yfMx dk ldr nrk gA fp= 1 e çLrr Ng okf.kfT;d eRL; legk @ çtkfr;k d ekud idM vkj yfMx dk fn[kk;k x;k gA

eNfy;k d yfMx dk tyok; lc/kh dkjdk d ifji{;e fn[kku dju d fy,] p;fur Mk;ufed QDVj ,ukfyfll i)fr e,My e o"kk d vkdMk dk

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'kkfey fd;k x;k FkkA okf"kd o"kk d vkdMk l fgyl k] dVfQ'k] QnjcDl vkj fofo/k eNfy;k dh okf.kfT;d yfMx ij dkQh çHkko n[kk x;kA o"kk dk fofo/k eNfy;k ¼0-10] ih <0-05½ dh yfMx d fy, ldkjkRed çfrxeu x.kd Fkk] tcfd fgyl k ¼- 0-19] ih <0-05½ dVfQ'k ¼- 0-09] ih <0-05½ vkj QnjcDl ¼- 0-05] ih < 0-05½ d fy, udkjkRed çfrxeu x.kd nt fd;k x;kA bl fo'y"k.kRed –f"Vdk.k l cãi= unh d okf.kfT;d eRL; ij yfMx ij o"kk d çHkko dk le>u e vk lkuh jgh gA

,- d- ;kno] vkj- d- jeu] ,e- uLdj] ,l- ckjkg vkj fc- d- nkl

Hkkjr dh ,d m".kdfVca/kh; tyk'k; dh ryNV e QkLQkjl dk foHkktu@ LFkk;h çca/ku dh fy, çn"k.k lkr igpku dh igyh

rfeyukM e gkbij&;VkfQd –".kfxjh tyk'k; e ryNV e QkLQkjl vkj ;VkfQd'ku dh miyC/krk vkj lkr fu/kkj.k dh tkp dh xbA ryNV e dy QkLQkjl 4-62 xke l 5-64 xke çfr fdxk rd ikb xbA e[; QkLQkjl vdkcfud : i e ik;k x;k vkj ;g dy QkLQkjl dk 73-4&87-7 çfr'kr FkkA fofHkUu QkLQkjl d v'kk e dfY'k;e ckm.M ¼Ca-P½] ykg ckm.M ¼Fe-P½] ,Y;eh fu;e ckmM ¼Al-P½] fofue; ¼Ex-P½ vkj dkcfud&P ¼Org-P½ Ca-P rRo to dkcu ¼IP½ vkj dy QkLQkjl ¼TP½ nkuk e çe[k rkj ij ik;k x;kA dy feykdj ;g çofÙk bl çdkj Fkh & Ca-P> Fe-P> Al-P> Org-P> Ex-PA –".kfxfj tyk'k; e QkLQkjl çn"k.k d çe[k lkr fitjk e eNyh ikyu l ckgjh QkLQkjl dk çokg gkuk gA ryNV e QkLQkjl fHkUurk ;g bfxr djrk g fd ;VkfQd tyk'k; e QkLQkjl d dkj.k mRiUu gku oky çn"k.k dk fu;f=r dju d fy, çHkkoh çc/ku rduhdk dk dk;kZo;u cgr mi;kxh gA

vt; lkgk] tluk ih- d-] oh- ,y- jkE;k] flchuk eky ,l] çhFkk if.kDdj] ,e- b- fot;dekj] ;- d- ljdkj vkj fc- d- nkl

ty&ofud foKku dh mi;kx lh –".kjkt lkxj tyk'k; dk ekufp=.k

dukVd d ekMîk fty e –".kjkt lkxj tyk'k; d y,fVd] e/;orh vkj yfVd tku e tyfoHkkftr lo{k.k fd, x, rkfd lHkkfor eRL;;u {k=k dh igpku dh tk ldA bl lo{k.k d fy, fLlyV&che bdk lkmMj bd 60 dk mi;kx fd;k x;k FkkA çkIr vkdMk dh x.kuk bdk dkmfVx vkj bdk bVhx'ku }kjk dh xbA ikuh dh x.koÙkk d ekinM tl ?kfyr v,Dlhtu] rkieku] pkydrk dk ,d ikVcy eYVhijehVj tkp dk mi;kx djd lrg ij ekik x;k Fkk vkj pkydrk dh yo.krk l flejkM b vkj 60 ¼SIMRAD ER60½ l,¶Vo;j }kjk fd;k x;k FkkA çkIr fgLVkxke dk eNyh forj.k d crjrhc igy d fy, Mh&dUoDV fd;k x;k vkj fQj bVhxVj eku dk ekiu d fy, mi;kx fd;k x;kA çR;d {k= e vyx&vyx çdkjk dk p;u fd;k x;k Fkk vkj /ofud ç;kx l lHkkfor eRL; ikyu {k= ¼PFZ½ dh igpku fd xbA e/;orh {k= e eNyh dh lkærk mPp n[kh xb tcfd ykfVd {k= e ;g lkærk e/;e vkj yfVd tku de FkhA bl lo{k.k l eNvkjk dk ;g irk pyk fd fdl Hkkx l vf/kd l vf/kd eNyh idMh tk ldrh gA bl tyk'k; d fofHkUu fgLlk e ck;kekl 152 l 822 fdykxke çfr gDV;j vueku fd;k x;kA

,e- fQjkt [kku] ,l- flchuk eky vkj ,e- b- fot;dekj

fitjh e eNyh ikyu e çtkfr fofo/krk

vkfM'kk d lfy;k tyk'k; e vyx&vyx Hkktu çofÙk okyh fofHkUu eNyh çtkfr;k dk vrlFkyh; ty e fitj e mud fodkl] vfrthfork] vudyrk vkj mRiknu dk v/;;u dju d fy, ,dy vkj cgikyu gr lpf;r fd;k x;kA bl tyk'k; e vk;rkdkj vkj rjr fitjk ¼6x 4 x 4 ?ku ehVj½ e ,y- jkfgrk ¼t;rh jkg½ dh lHkk0;rk] of) vkj mUkjthfork d eY;kdu d fy, ,d v/;;u fd;k x;kA ,y- jkfgrk d vxfydkvk dk rhu lp;u ?kuRo e j[kk x;k Fkk & 10 vxfydk çfr ?ku ehVj ¼fitjk&1½] 20 vxfydk çfr ?ku ehVj ¼fitjk&2½ vkj 30 vxfydk çfr ?ku ehVj ¼fitjk&3½A bl vxfydkvk dk fnu e nk ckj ¶ykfVx QhM mud 'kkjhjd otu d 5 l 3 çfr'kr dh nj l f[kyk;k x;kA lp;u d 240 fnuk d ckn budh mUkjthfork lcl mPp fitjk&1 ¼85 ± 6.58 ifr'kr½ vkj of) nj ¼598.23± 32.76 xke½ n[kk x;k] tcfd fitjk&3 e mPpre ck;kekl nt fd;k x;k FkkA xtjkr d oMknjk d fudV fVEch tyk'k; e Hkh bl rjg d ifj.kke çkIr g, gA

blh çdkj] vkfM'kk d lkfy;k tyk'k; e b"Vre lp;u ?kuRok dk irk yxku d fy, ih- gkbikFkkYel dk Hkh fitj e ikyu fd;k x;kA bld fy, ih- gkbikFkkYel d cMh vxfydkvk ¼yxHkx 48-24±1-45 xke½ dk ikp vyx&vyx lp;u ?kuRo e j[kk x;k Fkk& 20 vxfydk çfr ?ku ehVj ¼fitjk&1½] 30 vxfydk çfr ?ku ehVj ¼fitjk&2½] 40 vxfydk çfr ?ku ehVj ¼fitjk&3½] 50 vxfydk çfr ?ku ehVj ¼fitjk&4½ vkj 60 vxfydk çfr ?ku ehVj ¼fitjk&5½A çfr fitj d nk çk: ify, x, FkA bl çk;kfxd ikyu e lp;u d 240 fnuk dh vof/k d ckn vfre otu ¼1225.12 ± 40.533

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xke½] fof'k"V fodkl nj ¼1.35 ± 0.016½ vkj mÙkjthfork ¼91.00 ± 2.646 çfr'kr½ lcl de LV,fdx ?kuRo oky fitjk&1 ¼20 vxfydk çfr ?ku ehVj½ e mPpre n[kk x;k A gkykfd] dy eNyh ck;kekl mRiknu fitjk 2 vkj 3 e cgr vf/kd ¼p<0-05½ Fkk ij bu nkuk fitjk e FCR de ik;k x;kA vr% bl v/;;u d vulkj de lp;u ?kuRo ¼30 l 40 vxfydk çfr ?ku ehVj½ oky ikyu rduhd vr lFkyh; ehBk ty e fitjk ikyu d fy, ,d ekud d :i e fy;k tk ldrk g rkfd QhM vkj cht dh ykxr dk de fd;k tk ld vkj ykHk vf/kd çkIr gkA

,p- ,l- Lou

eFku tyk'k; e th vkbl dt e eNyh ikyu

lLFkku }kjk 0;kolkf;d :i l egRoi.k Lon'kh eNyh çtkfr;k dh lHkk0;rk dk v/;;u fd;k x;kA bld fy, >kj[kM d eFku tyk'k; e vkeikd fcekdyVl dh NkVh vxfydkvk ¼vkdkj % 11-44±22 lVehVj; otu % 8.05 ± 0.56 xke½ dk fitjk ¼thvkb dt½ e rhu lp;u ?kuRo ¼15 vxfydk çfr ?ku ehVj] 25 vxfydk çfr ?ku ehVj vkj 35 vxfydk çfr ?ku ehVj dh nj l lpf;r fd;k x;kA çfr vkdkj d fitjk d rhu çk:i fy, x,A Ng eghu dh ikyu vof/k d ckn budk vkIr vkdkj 50&62 xke vkj mÙkjthfork nj 80 çfr'kr nt dh xbA lcl de lp;u ?kuRo oky fitj e fodkl nj lcl vf/kd n[kk x;kA rkykck dh ryuk e bu fitjk e eNyh dh of) vf/kd ik;h x;hA

th- dukVd] fc- d- nkl] ;- d- ljdkj fe'kkyy ih-] Vh- rk;x] ,- d- nkl vkj okb- vyh

v#.kkpy çn'k dh ,d fuf'Ø; ck<+r e nkuh {k= e eRL; çtkfr fofo/krk

v#.kkpy çn'k d ukelkb e fLFkr ckjchy ,d [kyk chy ½234 gDV;j½ g tk fMfgx unh l tMk gvk g vkj v#.kkpy çn'k ljdkj d eRL; foHkkx }kjk lpkfyr gkrk gA bldk ç;kx çxg.k ekfRL;dh d fy, gkrk gA lLFkku u 2019&20 d nkjku igyh ckj bl fuf'Ø; vknHkfe dh eNyh fofo/krk ij çy[k r;kj dju dk ç;kl fd;k gA bl ç;kl e bl chy l 22 Qfeyh vkj 8 v,Mj dh dy 52 eRL; çtkfr;k nt dh xbA lcl vf/kd lkbfçuQ,e v,Mj ¼19 çtkfr;k½ dh eRL; çtkfr;k nf[k xbA bld ckn ikflQ,fel ¼12 çtkfr;k½ flY;fjQke ¼10 çtkfr½ vkj vU; vkr gA eRL; Qfeyh e lkbfçfuM ¼17 çtkfr;k½ ox dh eNfy;k lcl vf/kd nt dh x;hA bld ckn pkfuM ¼5 çtkfr;k½ ckxhM ¼4 çtkfr;k½ ekLVlecfyM ¼3 çtkfr;k½ çtkfr;k 'kkfey gA Lon'kh çtkfr;k d vykok] pkj fon'kh eRL; çtkfr;k ¼lkbfçul dkfi;k] VukQjhxkMku vkbMyk] gkbikFkkfYe l ekfyfVDl vkj ikbjDVl cdhikel½ Hkh chy l nt dh xb FkhA

çuc nkl] ch- d- Hkêkpk;] ,l- ckjkg] ,l-lh-,l- nkl] ,l- ;kxdkde] ,- d- ;kno] ,u- 'kek] ch- lh- j] ,- ddkrh vkj fc- d- nkl

fcgkj dh ioh pikj.k dh dkfB;k eu e vknf{k= e eRL; çc/ku }kjk eNvkjk dh vkthfodk dk fodkl

lLFkku u vxLr 2018 e dkfB;k eu e ekfRL;dh fodkl ifj;ktuk dh 'k#vkr dh] ftle ,d Hkkxhnkjh ekM e bld }kjk fodflr oKkfud çc/ku ekunMk dk ykx fd;k x;kA jk"Vh; ekfRL;dh fodkl ckM ¼NFDB½] gnjkckn l foÙkh; lgk;rk d lkFk dæh; lDVj ;ktuk ¼lh,l,l½ uhyh Økfr d rgr bl dk;Øe u rhu çe[k ;ktuk, cukb xb & eRL; ikyu of) çkVkd,y dk ykx dju d fy, fuo'k] eyHkr lfo/kkvk dh 0;oLFkk vkj lpuk dk çlkjA fiNy M< lky d nkjku lLFkku }kjk çnÙk rduhdh lfo/kkvk d dkj.k dkfB;k eu e eNyh idMu dh vof/k dk 30 fnuk l 90 fnuk rd c<k fn;k xb ftll eNyh mRiknu e 55 l 160 fdykxke çfr gDV;j dh of) nt dh x;h gA

dkfoM&19 d le; y,dMkmu d nkjku] fcgkj d ioh pikj.k fty d dkfB;k eu d eNvkjk dh vkthfodk dk mRiknu vkj mRikndrk e of) vkj eRL;;u vof/k e of) djd c<k x;k FkkA bl eu l 200 eNvkjk ifjokj viuh vkthfodk dek jg gA bl vkn{k= e fcgkj ç'kklu l vuefr d ckn] y,dMkmu vof/k d nkjku eRL;;u dk; eb 2020 e lLFkku }kjk tkjh fd, x, dkfoM&19 fn'kkfun'kk d vulkj 'k: fd;k x;k FkkA doy 10 fnuk e 3-6 Vu eNfy;k dk idMk x;k ftug doy LFkkuh; ckt kjk e gh cpk x;kA idMh x;h eNfy;k e bfM;u etj dki çtkfr;k tl jkg] dryk] exy] fon'kh dki] vej dki] xkl dki vkj NkVh eNfy;k tl xMfl;k pijk vkfn 'kkfey gA y,dMkmu vof/k d nkjku] bl [kyk ty vkn{k= e eRL; ikyu l eNvkjk lgdkjh lfefr dk yxHkx 4 yk[k #i; dh vk; gb gA

fc- d- nkl] x.k'k pæ vkj jkt cBk

Newsletter, Vol. 24, No. 2 (October 2019-June 2020) ISSN : 0972-0774

सिफरी समाचार

rfeyukM dh gkxuDdy e eNfy;k dh 'kYdk dh mi;ksx lh vkthfodk dk ,d u;k volj

rfeyukM e dkojh unh d fdukj fLFkr ,d xko gktuDdy] eRL;k [kk| inkFkk d fy, ykdfç; gA ifj.kkerh bl vf/kd ek=k e dpjk mRiUu gkrk g] tk çn"k.k vkj nx/k dk dkj.k gA ckt kj e ehBk ty eNfy;k dh 'kYdk dh ekx c<u d lkFk ;g ,d u, 0;olk; d :i e iui jgk gA

gktuDdy d eNyh ckt kj l eNfy;k d 'kYd fuh"kYd ,d= fd, tkr gA ,df=r 'kYdk dk /kkdj /ki e l[kk;k tkrk g vkj lykfLVd d cx e j[k fn;k tkrk gA bld ckn bl ml ckt kj e Hkt k tkrk g tgk bldk ikmMj fd;k tkrk g vkj exh ikyu e mi;ksx fd;k tkrk gA gktuDdy e ;g xfrfof/k tykb 2019 l 'k: dh xbA ,d llrkg d nkjku] yxHkx 15&20 fdykxke l[kh eNyh d 'kYdk dk ,d= fd;k tkrk g] tcfd llrkgkr vkj Nfê;k ij ek=k yxHkx 30&35 fdykxke rd c< tkrh gA bl xfrfof/k u efgykvk dk vkthfodk çnku dh g tk gj eghu yxHkx 9000/& #i; dh vk; djrh gA blh rjg dh xfrfof/k;k dk rfeyukM e LVuyh vkj ijEiye tyk'k;k d ikl d eNyh ckt kj e Hkh gku yxk gA gekj n'k e d cM rkt ikuh d eNyh ckt kj eNyh l vkfFkd mit dk vf/kdre dju] çn"k.k dk de dju vkj jktxkj ink dju d fy, bl rjg dh xfrfof/k dk 'k: dj ldr gA

ykfgr dekj d] vkj- d- eUuk] jkf'kFk lh- ,e-] fot ; dekj ,e- b- vkj fc- d- nkl

ryukRed e,My }kjk m".kdfVca/kh; ck<—r enkuk e V;fQd Ldkj dk vkdyu

vkkn{k=k e ik"kd rRok dh fLFkfr ¼v,fyxkV,Qh] elkV,Qh] ;V,Qh vkj gkbi :VkQh½ e V,fQd Lrj dk forj.k ck;kfVd lexrk dk ekiu d fy, ,d vk/kkj j[kk çnku djrk gA Ldkfjx bMDl ,d ,dh—r –f"Vdk.k g ftle Hkkfrd ¼ty ikjnf'krk dh rhork½] jklk;fud çkpy ¼ik"kd rRo½ vkj tfod ¼lyod Dykjkfyy½ V,fQd fLFkfr lpdkdk d çe[k fu/kkjd d :i e dk; djrk gA ikfjfLFkfrd r= Hk|rk eY;kdu d fy, Vh,lvkb midj.k dk dk;kUo;u vknHkfe dh ;VkfQd'ku fLFkfr mÙke g tk çHkkfor vkj v/k&çHkkfor m".kdfVc/kh; ck< d enkuk d fy, ,d ekud d :i e dke djxkA bld fy, if'pe cxky d 27 ck<—r vkn{k=k e dkylu dk Vh,lvkb ¼,½ vkj yikjYyh dk ¼ch½ Vh,lvkb i)fr;k dk mi;ksx ikfjfLFkfrdh r= d vkdyu d fy, fd;k x;k tk V,fQd LVV bMDl ¼Vh,lvkb½ {k=&fof'k"V Lo:lk dk irk yxku d fy, mi;ä gA gkykfd dkylu bMDl d fy; le'khrk".k tyok; mi;Dr g] blfy; m".kdfVc/kh; vrLFkyh; ty llk/kuk d vkdyu d fy, yEijy bMDl dk mi;ksx }kjk ,d ryukRed v/;;u fd;k tk ldrk gA bld vyokk] ;g v/;;u bl rF; dh Hkh if'V djrk g fd ty {k= dk V,fQd Lrj fofHkUu Hkkxkfyd LFkkuk e vknHkfe vkokl LFky] Hkfe mi;ksx dk rjhdk vkj çc/ku çdkjk l çHkkfor gkrk gA

lkek nkl ljdkj] cnuk nkl ?kk"k] mÙke dekj ljdkj] fc- d- nkl

FISH FACT

ICAR-CIFRI study indicated that in 16% sediment samples of Mahanadi River, Chromium and Copper concentrations exceeded the threshold level. However, overall, the metal contaminations were below the Effect Range Low (ERL) indicating mild to no effect to the biotic community.

Paper published in Environment Monitoring and Assessment (2020) 192(Suppl 1): 810.
https://doi.org/10.1007/s10661-020-08708-1