

सिफरी समाचार CIFRINEWS

(January - June 2023)



Vol.27 No.2

ISSN : 0972-0774



Secretary, DARE and DG, ICAR inaugurating the *Mahila Matsyajibi Sammelan* at Kultali, Sundarbans



ICAR-CIFRI contingent with medals at the ICAR zonal sports 2022



Interactive workshop on 'Management of openwater fisheries of Sikkim'

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ICAR-CENTRAL INLAND FISHERIES RESEARCH INSTITUTE

(An ISO 9001 : 2015 Certified Organisation)

Barrackpore, Kolkata - 700 120

Director's Column



The institute organized *Mahila Matasyajibi Sammelan* at Kultali, Sundarbans, West Bengal in which Dr. Himanshu Pathak, Secretary, DARE, Govt. of India, and DG, ICAR, was the Chief Guest. The DG, ICAR acknowledged the excellent work carried out by the institute for the livelihood improvement of women fishers of Sundarbans. The event was also much appreciated by the fisheries fraternity and ICAR higher ups.

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

During the last six months the institute has applied for one patent, 6 copyrights and one trademark. We have signed a technology licence agreement for "CIFRI Cagegrow" floating fish feed with Glaucus Agrochem Pvt. Ltd. for non-exclusive licence for a period of five years. Our study has found new distributional records of 8 macrobenthic genera in upper and middle stretches of the River Ganga. Our research has found promising result on banana pseudostem waste-based hydrochar as a supplement for microalgae biodiesel production. First time study was carried out to investigate the microbial community composition and functionality in a constructed natural wastewater treatment wetland system.

We have been relentlessly trying to restore the biodiversity of fish species, particularly IMC in the River Ganga through ranching and awareness for the last couple of years. In this direction, we have conducted 13 ranching programmes in which over 22.5 lakh fingerlings were released into the river Ganga.

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 research station at Kochi, CIFRI has four Regional Research Centres at Allahabad, Guwahati,

We have organized several important meetings like interactive workshop on management of open water fisheries in Sikkim, national seminar on "Ecology vs. Economic Development with Special Reference to the Ganga Basin" with NGB at Prayagraj, Uttar Pradesh, advisory committee meetings of NePPA project and hilsa project. In addition to one training programme for student, 2 training programmes for officials; a total of 14 training programmes were conducted for the fishers/fish farmers during the period. I welcome Shri Kumar Vivek, who has joined the institute as Chief Administrative Officer. I congratulate all the staff who got promoted and also got awards/recognitions for the institute. I wish a happy and healthy retired life to both the two staffs who got superannuated during this period.

August 2023

Dr. B. K. Das
Director

Bengaluru and Vadodara, through which the issues of inland open water fisheries are being addressed.



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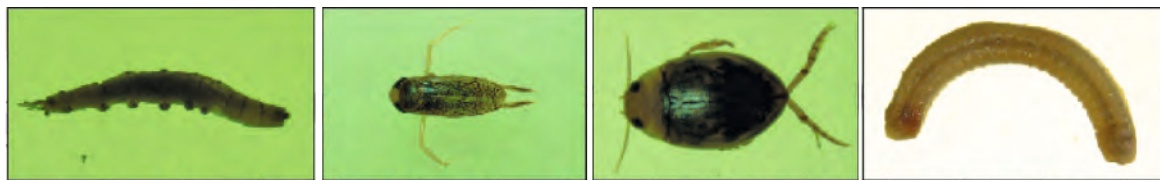
Printed at
Sailee Press Pvt. Ltd.
Kolkata



Research Highlights

New distributional records of the macrobenthos in upper and middle stretches of the river Ganga

During the winter season sampling of 2022-23, a total of 31 macrobenthic fauna belonging to 12 orders and 22 families, comprising 13 gastropods, 6 bivalves, 8 insects, 2 polychaeta, and 2 clitellata, were recorded from 13 sampling sites of the river Ganga from Harshil to Balia. Out of 31 genera, eight (08) macrobenthic genera were reported for the first time at different sampling centres. The genera are *Cybister* sp., *Sigara* sp., *Antocha* sp., *Capitella* sp. and *Caenis* sp. from Narora and Haridwar, *Segmentina calatha* and *Gyrinus sericeolimbatus* from Bijnor, *Diplonychus eques* from Ghazipur.



Antocha sp.

Sigara sp.

Cybister sp.

Capitella sp.



Gyrinus sericeolimbatus

Caenis sp.

Diplonychus eques *Segmentina calatha*

V. R. Thakur, S. K. Verma, D. N. Jha, A. Alam, J. Kumar, S. K. Mishra, D. Verma, R. Jaiswal and B. K. Das

Reproductive characteristics of *Mystus tengara* from the Brahmaputra River valley

Mystus tengara, locally known as tengara, is a small catfish belonging to the Bagridae family of the order Siluriformes. *M. tengara* (50 nos.) from the rivers and wetlands under the Brahmaputra River system was collected every month from July 2022 to June 2023. The total length and weight of the male fish ranged from 6.8–9.5 cm and 3.6–8.6 g, respectively, and those for female fish, they ranged from 6.8–10.15 cm and 3.5–11.21 g, respectively. Male dominance over female in the collected population was observed with a male to female ratio of 1.18:1. Gonadal development was observed to start in January, and maturity with gut occupancy of 80–100% was observed in the months of June and July. At the time of maturation, males are distinguished by an elongated genital papilla in front of the anal fin, while females have a fuller body. The gonado-somatic index (GSI) ranged from 0.54–1.07 in male fish and 0.45–17.84 in female fish. The absolute fecundity ranged from 10160 to 16131 ova/fish, and the relative fecundity ranged from 1231.1 to 1455.5 ova/g body weight.

(a)

(b)

(c)



(a) Fully matured female gonad, (b) male specimen of *M. tengara* and (c) female specimen of *M. tengara*

Sona Yengkokpam, N. Sharma, B. C. Ray, D. Bordoloi and B. K. Das

Illegal act of fishing endangering aquatic wildlife ecosystems in the Mahanadi River

The dangerous and illegal act of fishing by dynamiting, poisoning water bodies, and electric fishing were reported by the fishermen in the middle and lower stretch of the Mahanadi River during a recent survey in Odisha. The use of explosives not only endangered some rare species but also polluted the water. The local fishermen opined that they resort to illegal fishing methods as getting a decent catch with conventional netting techniques is difficult. Such fishing methods destroy aquatic wildlife habitats, killing animals indiscriminately and reducing catches.



Canciya Johnson, Mitesh Ramteke and B. K. Das

Survey at a fishing village of river Mahanadi

Occurrence of vermiculated sailfin catfish at upper stretches of Hooghly-Matlah estuarine system



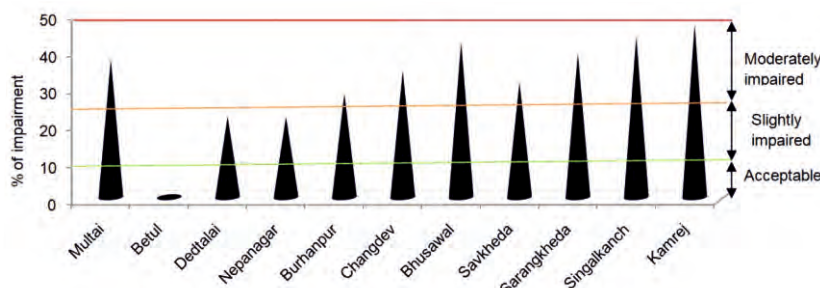
Juveniles of *P. disjunctivus* collected from upper stretches of Hooghly-Matlah estuary

Juveniles of vermiculated sailfin catfish, *Pterygoplichthys disjunctivus* (Weber, 1991), were found in good numbers from Nabadwip to Balagarh stretch during a recent monsoon survey of the Hooghly-Matlah estuarine system (upper stretches of the estuary). This invasive catfish is reportedly having a considerable impact on the aquatic food base and, as a result, severely affecting native invertebrate and vertebrate species. The salinity values from Nabadwip and Balagarh, which are 0.01 and 0.29 ppt, respectively, clearly show their salinity tolerance limitations. Because of its resilience and propensity for many spawns, this species is increasingly displacing local fish germplasm in other aquatic ecosystems, as reported. To stop the entry of such foreign invasive species, an adequate legislative framework, community involvement, and strong management measures must be put in place.

Dibakar Bhakta, R. K. Manna, S. M. Nair, S. Samanta and B. K. Das

Health of River Tapti based on fish-based Index of biotic integrity (IBI)

An assessment using a fish-based index of biotic integrity (IBI) was carried out to probe the health status of river Tapti based on the fish assemblage data. River health was estimated by adopting twelve metrics under five categories, such as taxonomic richness, habitat composition, tolerance indicators, species resilience, and trophic composition. The IBI score based on the pooled fish abundance data in the river Tapti ranged from 33 to 60. The study revealed that three-fourths of the river stretch was moderately impaired (25–50% impairment), and the most deteriorated site was Kamrej with 45% impairment.



IBI score and corresponding integrity class of various sampling sites in river Tapti

Sangeetha M. Nair, Sajina A. M., Dibakar Bhakta, Pranab Gogoi, B. K. Das and S. Samanta



Accidental catch of endangered turtles at Ken River within Panna National Park Complex

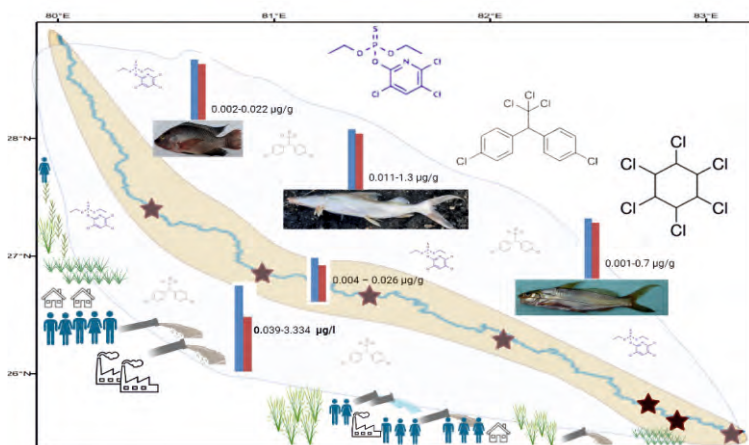
The IUCN Red List categorizes the Ganges softshell turtle, *Nilssonia gangetica* (Cuvier, 1825), and the crowned river turtle, *Hardella thurjii* (Grey, 1831), as Endangered. Two *N. gangetica* and one *H. thurjii* specimens were discovered during monsoon sampling along the Ken River in the Panna National Park Complex in Madhya Pradesh. The specimen of *N. gangetica* could be identified based on the structure of the carapace and plastron, with a low and oval carapace of grey-black, green, or grey colour. Typical black reticulations are present on the carapace. The juvenile had 3–6 dark circular spots on the carapace. The carapace is considerably depressed with a weak vertebral keel, or a vertebral and two weak pleural keels are characteristics of *Hardella thurjii*. *N. Gangetica* is one of the species that is most heavily used for its oil and flesh. *N. gangetica* may reach a length of 940 mm, while *H. thurjii* may reach 650 mm. In the sampling sites, freshwater turtle conservation knowledge is lacking. Since it is illegal to possess this turtle, as given in Part II of Schedule I of the Wildlife (Protection) Act of 1972, local fisheries, including stakeholders, should be made aware of this fact.



Ganges softshell turtle from river Ken

Dibakar Bhakta and R. K. Manna

Benchmarking of pesticide contamination in river Gomti and its mediated health risk estimate



Pesticide pollution status in river Gomti, India

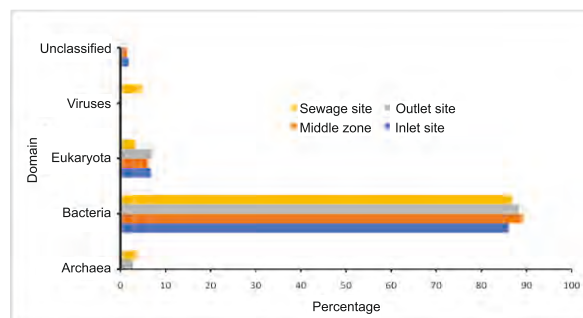
would not pose any direct risk to the consumers.

S. K. Nag, Soma Das Sarkar, S. K. Sahu and Sajina A. M.

Metagenomic characterization of the sediment microbiome from east-Kolkata wetland

A metagenomic study was conducted in Sardar Bherry, situated in the East Kolkata wetland to investigate the functionality of constructed wetlands receiving urban wastewater. Bioinformatics analysis revealed a total of 57 phyla and 117 different classes of microorganisms in the east-Kolkata wetland.

Pesticide residues mainly originate from anthropogenic activities, and they are quite often detected in the aquatic environment, including rivers. The study revealed organochlorine (OC) contamination to the extent of 52% of water, 30% of sediment, and 43% of fish samples, while organophosphate (OP) contamination was present in 33%, 25%, and 39% of samples, respectively in the Gomti, a tributary of the Ganga. The synthetic pyrethroids (SPs) were not detected in any of the matrices. The concentrations of pesticides in the water indicate stress conditions to some extent for aquatic life. The hazard index (HI) was less than 0.1, indicating chances of low to no risk for continuous exposure to adults and children. Thus, the present study states that consumption of fish from the river contaminated with different OC or OP residues

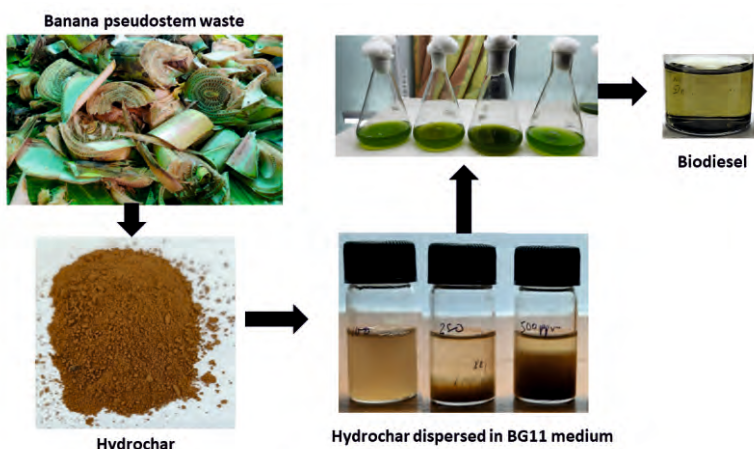


Taxonomic abundance of the microbial community of East-Kolkata wetland at domain level

Taxonomical profiling of the sediment microbiome revealed that the highest occurrence of microorganisms was observed in sewage site sediment, followed by the inlet site, middle zone, and outlet site, respectively. Taxonomical classification confirmed that domain bacteria predominated, ranging from 86.05 to 89.15%, followed by Eukaryota and Archaea; however, the existence of viruses was only found in sewage sites. Proteobacteria were the most abundant phylum of the bacterial community in Sardar Bherry East-Kolkata wetland, representing, *i.e.*, the sewage site (63.12%), the inlet site (44.03%), the middle zone (45.28%), and the outlet site (44.66%). Functional classification through COG (Clusters of Orthologous Genes) categories revealed that most of the genes-nearly 50%-were involved in metabolism, followed by cellular processes and signalling, and information storage and processing. This is the first study to investigate the microbial community composition and functionality in a constructed natural wastewater treatment wetland system.

Suvra Roy, Vikash Kumar, Tanushree Banerjee, B. K. Behera and B. K. Das

Banana pseudostem waste-based hydrochar as a supplement for microalgae biodiesel production



Around 80 million metric tons of banana stem waste are being generated in India, which remains unutilized. In the present study, the effect of hydrochar derived from hydrothermal carbonization (HTC) of banana pseudostem as a supplement was investigated on the growth performance of microalgae, *Graesiella emersonii* MN877773, for biodiesel production. The result revealed that the addition of hydrochar at the exponential growth phase of microalgae decreased the pH of the culture medium and maintained it near neutral. It also showed two times higher biomass productivity, lipid accumulation, and productivity in microalgae when compared to the control. The occurrence of desirable fatty acids for biodiesel like methyl palmitate was also 56% higher than the control. The produced biodiesel also

complied with the national and international standards for biodiesel.

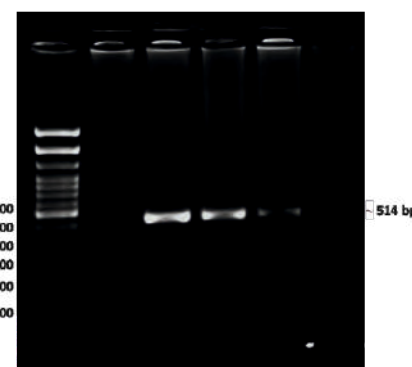
Santhana Kumar V., D. J. Sarkar, Tanushree Banerjee and B. K. Das

Detection of microsporidian parasite, *Enterocytozoon hepatopenaei* (EHP) associated with White Feces Syndrome in cultured Pacific White shrimp (West Bengal, India)

Enterocytozoon hepatopenaei (EHP), a microsporidian parasite, was detected at Contai, Chandipur, and Morghat in East Midnapore district, West Bengal, in shrimp farms. Floating white feces were observed on the surface of the pond's water. It was also discovered that shrimp were having growth retardation, increased size variability, and were in more advanced stages. The infected shrimp have soft shells and exhibit lethargy, reduced feeding, and empty midguts. The shrimp samples were collected and aseptically brought to the ICAR-CIFRI laboratory for molecular confirmation. The nested PCR assay has been used to screen shrimp tissue, feces, feed, and environmental samples for the possible presence of the *Enterocytozoon*



White feces observed in the cultured water



Molecular detection of *Enterocytozoon hepatopenaei* (EHP) using specific primers

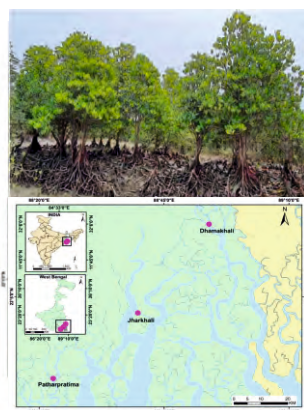


hepatopenaei parasite. The results confirm that most shrimp samples were positive for EHP. The findings also indicated the widespread occurrence of EHP in shrimp farming systems in West Bengal. Currently, there is no effective method to treat EHP. Once infection is confirmed, very often it will stay, and the only way to deal with it is epidemic control and the implementation of biological preventive measures from breeding to farming.

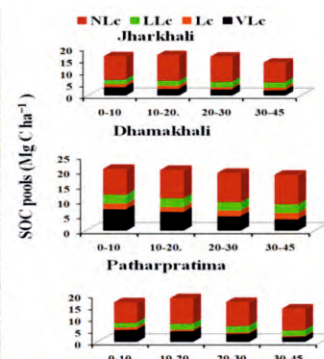
Vikash Kumar and B. K. Das

Variability and fractionation study of carbon stored in the Sundarbans mangrove sediment to predict its role in climate change mitigation

Sediment depth profiles (0-10 cm, 10-20 cm, 20-30 cm, and 30-45 cm) were sampled from Jharkhali, Dhamakhali, and Pathar Pratima stations of the Indian Sundarbans. Results showed that the mean value of SOC considering all the stations and seasons decreases with depth. Temporal patterns of C stock showed that pre-monsoon



Collection of sediment depth profiles



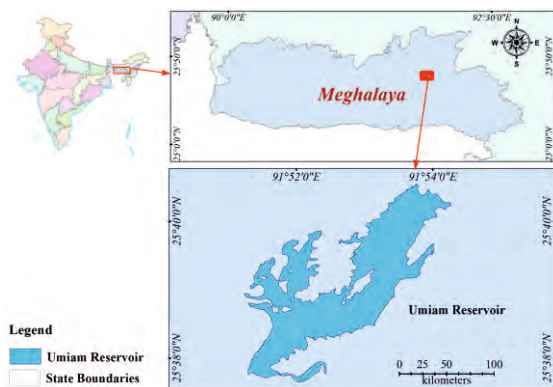
Variation in soil organic carbon fractions

and post-monsoon seasons have high levels of carbon as compared to monsoon seasons. The highest total sediment carbon stock was found in Dhamakhali, which is under constant anthropogenic pressure. A substantial quantity of carbon is predominantly associated with the non-labile carbon since most of the C is stored as resistant pools in mangrove sediment. Thus, this carbon fraction is sequestered into the sediment of the Indian Sundarbans. Overall, the Indian Sundarbans mangroves act as a natural carbon sink but can be a significant source of greenhouse gases if the mangrove vegetation is not protected.

Ajoy Saha, Pranab Gogoi, B. K. Das and Pritijyoti Majhi

Fish diversity of Umiyam reservoir, Meghalaya

A study in the Umiyam reservoir, located in Ri-Bhoi District of Meghalaya showed that the common carp (*Cyprinus carpio*) has established in the reservoir and dominates fish catches, with the indigenous chocolate mahseer (*Neolissocheilus hexagonolepis*) occurring in low numbers. Five varieties or strains of *Cyprinus carpio* were recorded viz., *Cyprinus carpio* var. *communis* (Scale carp), *Cyprinus carpio* var. *specularis* (Mirror carp), *Cyprinus carpio* var. *nudus* (Leather carp), *Cyprinus carpio* var. *koi* (Koi carp), and *Cyprinus carpio* var. *haematopterus* (Amur carp). Among all species, scale carp were recorded most frequently. We recorded the Leather and Amur carp



Map of Umiyam reservoir, Meghalaya



Cyprinus carpio var. *koi* (Koi carp) caught from Umiyam reservoir

in the reservoir for the first time. A total of 38 fish species have been documented from primary and secondary sources. Highly carnivorous, *Clarias gariepinus* is also recorded from the reservoir, which is a major threat to the ichthyofaunal diversity of the reservoir.

Pronob Das, B. K. Bhattacharjya, S. Borah, S. Yengkokpam and D. K. Meena

Evaluation of common carp, *Cyprinus carpio*, silver barb, *Barbonymus gonionotus* and Rohu, *Labeo rohita* in mid-altitude cages



Feeding of fish in cage by fisherwomen



Cleaned net due to silver barb in cages

A battery of six CIFRI-GI cages with an area of 100 m³ per cage (5 × 5 × 4 m³ per cage) was installed in the Umiam reservoir, Meghalaya with a total cage water volume of 540 m³ (90 m³/cage). Fingerlings of Rohu, *Labeo rohita* (20%), Common carp, *Cyprinus carpio* (60%) and silver barb, *Barbonymus gonionotus* (20%) were stocked in the cages with 3 stocking densities. Fishes were fed

twice daily with CIFRI-CAGEGROW (crude protein, 28%) floating feed at 2-5% of their body weight. After six months of rearing, a total fish production of 500 kg/cage (average) was achieved. Common carp appear to be the best-performing species in cages in the mid-altitude region. Silver barb also performs well in terms of growth and acts as a cleaner of cages. So, silver barbs can be used for summer culture. Common carp in combination with silver barb can be a model for mid-altitude cages in Northeast India as a summer crop.

Pronob Das, B. K. Bhattacharjya, S. Borah, S. Yengkokpam and D. K. Meena

Eutrophication due to high organic pollution in Ramgarh tal, Gorakhpur, Uttar Pradesh

A study during winter of 2023 in Ramgarh tal (wetland) recorded a total of 22 phytoplankton species, belonging to Bacillariophyta (8 spp.), Chlorophyta (8 spp.), and Cyanobacteria (6 spp.). The top ten species contributed about 85%, of which four filamentous Cyanobacteria (*Chroococcus* sp., *Phormidium* sp., *Geitlerinema* sp., and *Aphanocapsa* sp.) together contributed more than 61% in total abundance. The density of phytoplankton was recorded at more than fifty lakh per litre, confirming eutrophication in Ramgarh Tal. It is also confirmed by the Palmer Index (25), which confirms high organic pollution. Therefore, stocking suitable fish species that can feed on filamentous Cyanobacteria is recommended.

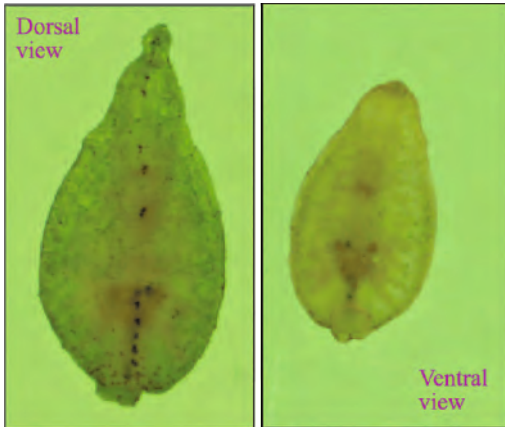


Ramgarh tal, Gorakhpur, Uttar Pradesh

Jeetendra Kumar, A. Alam, V. R. Thakur, S. K. Srivastava, Vijay Kumar, B. K. Das and A. K. Das



Accidental record of a zoonotic trematode, *Fasciola* sp. in the Parvati wetland of Arga Parvati Bird sanctuary, Gonda, Uttar Pradesh

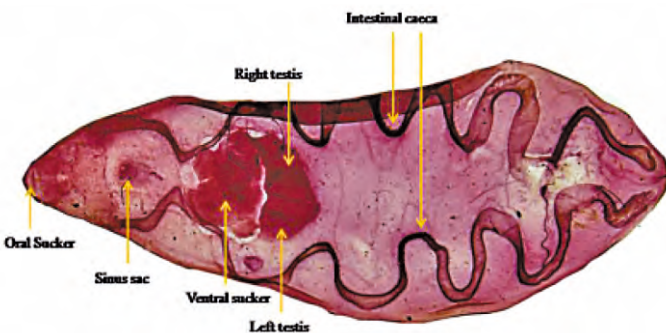


View of the wet mount of *Fasciola* sp.

A survey conducted in the Parvati wetland in Parvati Arga Bird sanctuary of Gonda district of Uttar Pradesh during the February 2023 resulted in the accidental finding of the common liver fluke, *Fasciola* sp. It is a flat worm documented as a parasite of ruminant livestock globally in all the continents except Antarctica. It belongs to the Phylum Platyhelminthes and Class Trematoda. It causes the infection in the liver called fascioliasis which is a foodborne infection and is of zoonotic important. The life cycle of *Fasciola* involves with the defecation of eggs in the stool by the final host (ruminant cattle), which infects an intermediate host (snail, Family Lymnaeidae), particularly species in the genera *Lymnaea*, *Galba*, *Fossaria*, and *Pseudosuccinea*.

Absar Alam, Jeetendra Kumar, Dharm Nath Jha, Raju Baitha, Sushil Kumar Verma, Suman Kumari and R. K. Manna

Severe infestation of *Isoparorchis hypselobagri* in cage cultured *Ompok bimaculatus* in Maithon reservoir, Jharkhand



Microscopic view of *Isoparorchis hypselobagri* obtained from cage cultured *Ompok bimaculatus*

Infestation of *Ompok bimaculatus* with *Isoparorchis hypselobagri* was estimated at 42.2% (July), 42.2% (August), 51.11% (September), 60% (October), 68.89% (November), and 88.89% (December) of 2022. The intensity of infection ranged from 1 to 10, and the mean intensity was calculated as 1.68 (July), 2.26 (Aug), 2.73 (Sept), 2.93 (Oct), 3.10 (Nov), and 3.175 (Dec). The metacercarial form of *I. hypselobagri* was spread throughout the body of the fish host, with more concentration in vital organs like the kidney and near kidney areas. Further, this investigation also traces the possible source of cercariae to the snails found attached

d to the cage fouling. The occurrence of this parasite has made the appearance of *O. bimaculatus* undesirable for consumption and may affect consumer preference. To protect against such infestations, the control of snail vectors is necessary. Further cage culture site selection and species selection should also consider the potential of parasitic infestation.



Infestation of *I. hypselobagri* in *O. bimaculatus*. A metacercaria is embedded under skin at base of anal fin of fish host

Manoharmayum Shaya Devi, Gunjan Karnatak, Asit Kumar Bera and B. K. Das

Zero-mesh net in indigenous fish trap 'Dhol': A concern for sustainable fishery in River Kulik, Uttar Dinajpur, West Bengal

'Dhol' is an indigenous fish trap, popularly used by the fishers in the river Kulik, flowing through the Uttar Dinajpur district of West Bengal. Circular iron frames are used at both ends of the trap, and these frames are horizontally connected by around 10 bamboo splitters. The metal frames and bamboo splitters form the main skeleton of the trap and prevent it from losing its shape during fishing.

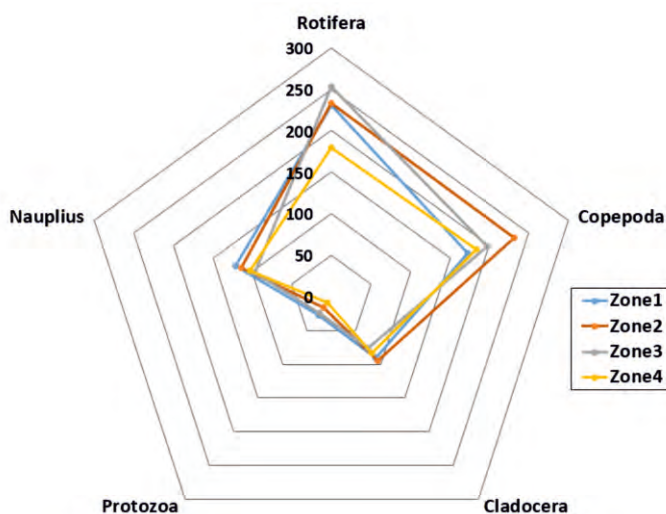
The outer covering of the trap is fine mesh netting made of nylon. There is a long wall of zero-mesh netting with a length of 3.5-4 m tied perpendicular to the open side of the trap that helps in driving the fish towards the trap and improving the catch. The local fishermen employ this traditional fishing gear to catch mostly prawns, spiny eels, and other native fish. If the mesh size of the netting can be increased suitably to allow the small fish juveniles to pass through, these traps can be used for sustainable fishery in the region.



Dhol trap used in river Kulik

Sajina A. M., Suman Kumari, Ali Y. and R. K. Manna

Ecological niche characterization of the zooplankton community of a tropical small reservoir in India



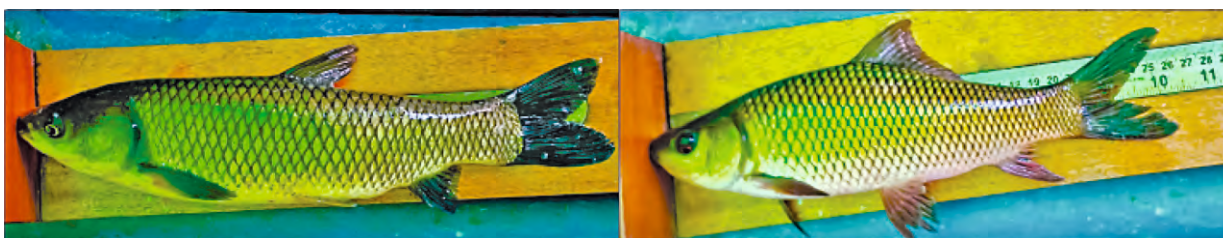
Radar chart showing the horizontal distribution of zooplankton in studied reservoir

A study in Derjang reservoir of Odisha revealed that the density of Rotifera (*Keratella tropica* and *Brachionus falcatus*) and Cladocera (*Diaphanosoma* sp.) was predominant in the lotic zone. However, the groups Copepoda and Crustacean nauplii were abundant in the transitional zone of the reservoir. Overall, the total zooplankton abundance was significantly different spatially ($p < 0.05$) between the dam area and lotic zone. The minimum zooplankton density was recorded in the dam area or downstream of the reservoir due to regular water discharge from the dam. A horizontally clumped mode of dispersion was found spatially for each zooplankton group and niche separation among the groups to avoid competition. The information on this spatial dispersion of zooplankton will be useful to state reservoir health and sustainable management.

Pritijyoti Majhi, Pranab Gogoi, Lianthuamluaia, C. Jana, B. K. Das and R. K. Manna

Activities Under NEH Projects

Demonstration of pen culture of small indigenous fishes with carps at Takmu Lake of Manipur



Fish harvested from pens in Takmu lake of Manipur

the Department of Fisheries, Govt. of Manipur. Six rectangular pens (individual dimensions 25 m x 20 m) were constructed using HDPE nets, FRP poles, bamboos, and macrophyte mass (Phumdi) as floating structures. The pens were stocked with the SIF *A. mola*

Pen culture of small indigenous fish (SIF) *Amblypharyngodon mola*, with major carps was demonstrated in Takmu Lake, Manipur, in collaboration with



Vol.27 No.2
ISSN : 0972-0774

सिफरी समाचार CIFRINEWS

(January - June 2023)

(mola), major carps *Ctenopharyngodon idella* (grass carp), and *Labeo rohita* (rohu). The initial length and weight of the stocked fish were: 0.5 g and 3.86 cm for mola, 206.7 g and 25.6 cm for grass carp, and 61.9 g and 17.33 cm for rohu. Partial harvesting of fish weighing more than 1 kg was conducted after 5 months of culture. A total of 341 kg of grass carp fish with an average length and weight of 52.24 cm and 2.27 kg were harvested. The fish were sold at Rs. 280 per kg at the local market, generating a revenue of Rs. 95,480.



Fish harvested from pens in Takmu Lake of Manipur

Sona Yengkokpam, T. N. Chanu, D. Debnath, W. A. Meetei, N. Sharma, B. K. Bhattacharjya and B. K. Das

Demonstration of cage culture technology in Dumbur reservoir of Tripura



Director, ICAR-CIFRI visiting the cage site

The institute, in collaboration with the Department of Fisheries, Govt. of Tripura, conducted two demonstrations of cage culture in the Dumbur reservoir: one with common carp (*Cyprinus carpio*) and another with Grass carp (*Ctenopharyngodon idella*). In the first demonstration, 20,000 fingerlings of *C. carpio* were stocked in 10 cages (effective water volume in each cage: 84 m³). After one year of culture, the average weight of common carp was 557.55±3.32 g with an estimated fish production of 900-1000 kg per cage. In the second demonstration, a total of 7,000 fingerlings of *C. idella* were stocked in 10 cages. After 10 months of culture, the average weight of grass carp was 790.73±18.75 g, with an estimated fish production of 500-550 kg per cage. Both demonstrations showed the suitability of cage culture technology for culturing common carp and grass carp in Dumbur reservoir.

D. Debnath, S. C. S. Das, A. K. Yadav, B. C. Ray, B. K. Bhattacharjya and B. K. Das

Interactive workshop on 'Management of Openwater Fisheries of Sikkim'



Interactive workshop on 'Management of open water fisheries in Sikkim'

The Institute organized an interactive workshop on 'Management of Open Water Fisheries in Sikkim' at Gangtok in collaboration with the Directorate of Fisheries (DoF), Govt. of Sikkim, on 29 May 2023. The major objectives of the workshop were to apprise the DoF, Sikkim, about the recent activities of ICAR-CIFRI in open water fisheries in Northeastern (NE) India, to understand research support requirements in the state, and to explore collaborative work programs with the DoF, Sikkim. Altogether, 40 participants, including the Director, ICAR-CIFRI, Director of Fisheries, Sikkim; DoF officers; Scientists of ICAR-CIFRI, Guwahati Regional Centre; Professors and M.Sc. students of Zoology, SRM University; fishers, fish farmers, members of the Sikkim Anglers' Association; and representatives from local print and media, participated in the day-long workshop.

Niti Sharma, B. K. Bhattacharjya and B. K. Das

Field visit to Dikchu reservoir, Sikkim

A joint field visit, represented by staff of ICAR-CIFRI and the Directorate of Fisheries, Sikkim, was undertaken to Dikchu reservoir, Sikkim, on 30 May 2023, to explore the possibility of initiating enclosure culture in the reservoir. The Director of ICAR-CIFRI, the Director of Fisheries, Sikkim, along with the scientific team of ICAR-CIFRI and DoF officers, visited possible sites in the reservoir. The joint team also visited two commercial trout farms in the locality, which were supported by the Directorate.

Niti Sharma, B. K. Bhattacharjya and B. K. Das



Field visit to Dikchu reservoir, Sikkim

Technology Management News

Patent filed

- A patent application entitled "Synergistic Immunity Enhancer Compositions of Natural Origin for Fish and Method of Preparation Thereof" has been filed with the Indian Patent Office, Kolkata, on 13 May 2023, in the name of the Indian Council of Agricultural Research. Patent application No. is 20233103379.

Copyright filed

- Copyright application no. 6642/2023-CO/SW "eMatsya-an innovative data acquisition system to collect fish catch data from inland water bodies" on 13 March 2023
- Copyright application no. 7869/2023-CO/L, "Mapping of Inland Water Bodies of Telangana" on 24 March 2023
- Copyright application no. 7873/2023-CO/L, "A Guide to Ornamental Fish Farming" was filed on 24 March 2023
- Copyright application no. 7877/2023-CO/L, "Rangeen Maach Chaaser Pustika" was filed on 24 March 2023
- Copyright application no. 7893/2023-CO/L, "Alankari Machhli Palan par Sandarshika" on 24 March 2023
- Copyright application no. 7878/2023-CO/L, "Rangeen Maach Chass Margdarshika" on 24 March 2023

Trademark filed

- The trademark application entitled "CIFRI HDPE Circular Cage™" has been filed on 30 November 2022, under class 22 in the name of the Indian Council of Agricultural Research. Trademark application No. 5703691



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Commercialization and licensing of technologies

Technology license transfer of "CIFRI Cagegrow feed" to Glaucus Agrochem Pvt. Ltd., Kolkata

The Institute signed a technology licence agreement for "CIFRI Cagegrow" floating fish feed with Glaucus Agrochem Pvt. Ltd. On 27 April 2023. ICAR-CIFRI grants a non-exclusive licence for a period of five years for the manufacturing and sale of ICAR-CIFRI Cagegrow floating fish feed in the territory of India.



MoU signed

MoU with Department of fisheries, Government of West Bengal

The institute signed a memorandum of Understanding (MoU) with the Directorate of Fisheries, Government of West Bengal, on 01 March 2023 for cage culture in Kangsabati reservoir, Bankura, West Bengal. The MoU was signed in the presence of Shri Biplab Roy Choudhury, Hon'ble Minister in Charge, Fisheries, Government of West Bengal, at Meen Bhavan, Kolkata, by Dr. B. K. Das, Director, ICAR-CIFRI, and Dr. Vishwanath, IAS, Director, Department of Fisheries, Government of West Bengal.



MoU with Glaucus Agrochem Ltd.

- A MoU signed between Glaucus Agrochem Ltd., Agrinnovate India (AgIn), and ICAR-CIFRI, Barrackpore, on 27 April 2023, for a non-exclusive licence agreement of "CIFRI Cagegrow Feed Technology".

Contract agreement with Scatec ASA

- The agreement was made on 09 January 2023 for "Assessment of fisheries and ecology in Kameng basin of Arunachal Pradesh in relation to proposed hydro-power projects at Gongri and Dinchang". The Scatec ASA is a Norwegian company which specialises in renewable energy systems.

Success Story

CIFRI pen culture technology package enhanced the livelihood of displaced tribal fishers

Mapithel reservoir located in Kamjong district of Manipur, is a medium reservoir and the largest in the state, with a water spread area of 1100 hectares. The dam has displaced over 12,000 people. All the population affected by the reservoir belong to the *Tangkhul* tribe. Fishing is the primary source of livelihood for the displaced people. To support the livelihood of the displaced tribal populace of the reservoir, ICAR-CIFRI has given two pens (0.1 ha) along with 50,000 fish seeds and 2 tonnes of CIFRI CAGEGROW feed for raising fish as stocking material for reservoir fisheries enhancement to the society "The Mapithel Dam Affected Fishery Co-operative Society". Additionally, a motorised FRP boat of 10 m OAL was also given to the society by the institute. The tribal fishers were also trained at the Institute headquarters and a mass awareness programme was also conducted at Ramrei village, Mapithel reservoir site, to raise awareness among the fishers on reservoir fisheries management.

Labeo catla (18.28 ± 0.23 g), *Labeo rohita* (5.2 ± 0.12 g), and *Cirrhinus mrigala* (5.5 ± 0.08 g) were stocked in the ratio 2:1:1 at the rate of 250 nos./m² in duplicate. The fishes were fed with CIFRI CAGEGROW feed twice a day at a rate of 2–3% of body weight. The fishes were raised for five months, from September 2022 to January 2023. The average weight recorded at the end of the culture period was 283.13 ± 1.70 g, 186.26 ± 47.02 g, and 116.00 ± 0.87 g in *L. catla*, *L. rohita*, and *C. mrigala*, respectively. The survival rate of fish ranged from 80 to 88%. The specific growth rates (SGR) of *L. catla*, *L. rohita*, and *C. mrigala* were 1.82, 2.56, and 2.03, respectively. The species-specific net fish production per pen was recorded as 2601 kg, 898.8 kg, and 546 kg for catla, rohu, and mrigal, respectively. The fish from the pens were released into the reservoir for stock enhancement, resulting in livelihood support for the displaced tribal fishermen of the affected villages.



This technology was an eye-opener for the 370 fishers of the cooperative society, which yielded 8.1 metric tonnes of fish from two pens, which could ultimately produce 36 metric tonnes in a year from the reservoir with an additional average income of Rs. 24,000 per fisher (at Rs. 250 per kg). Society is highly motivated by this demonstration and will implement it for reservoir productivity enhancement in the coming years.



T. N. Chanu, B. K. Das and Aparna Roy

Women empowerment through cage culture in reservoirs: success stories of Chhattisgarh



Cage culture unit owned by female-led SHG in Kuwarpur reservoir

In the state of Chhattisgarh, cage culture has emerged as a promising practice for both economic development and food sustainability. Traditionally, fisheries and aquaculture have been perceived as male-dominated sectors, with women's roles often confined to post-harvest activities. Cage culture presents an opportunity for a more inclusive participation of women, as it involves a range of activities from cage installation to feeding, monitoring, and harvesting where women can be employed. In a recent study it was found that in the state, out of sampled cage culture sites, 20% are owned and cultured by women fish farmers. A self-help group in cage culture were also formed and run exclusively run by females. Such activities have allowed women to generate income and become economically independent. By earning their own income, women gain financial autonomy, enabling them to

support themselves and their families, make financial decisions, and improve their overall socio-economic status.

To ensure effective women empowerment through cage culture, it is crucial to address gender-specific barriers, provide equal access to resources and training, and promote gender equality in the fisheries sector. Encouraging supportive policies, fostering inclusive environments, and creating opportunities for women's capacity building and leadership development are essential for realizing the full potential of women empowerment in cage culture in reservoirs.

Anjana Ekka, Arun Pandit and B. K. Das



Cage culture unit owned by Gayatri Dhruw, in Ballar reservoir



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Awards & Recognition

- Dr. Dibakar Bhakta received the best 'Senior Scientist Award' at the National Seminar on "Ecology Vs. Economic Development with Special Reference to the Ganga Basin (NEED-2023), held at Nehru Gram Bharati and ICAR-CIFRI, Prayagraj, during 25-26 February 2023. He also received the best oral presentation award for paper on "Ichthyofaunal abundance, juvenile distribution with special reference to hilsa juvenile fishery at Hooghly-Matlah estuarine system along the Gangetic delta, India."
- Dr. A. K. Yadav received the 'Excellence in Research Award 2023' by the Kalash Research and Welfare Society for his contribution to science and research.
- Dr. S. C. S. Das received the 'Best Ph.D. thesis Award 2023' by Kalash Research and Welfare Society for his contribution to science and research. He also received the best oral presentation award for his paper on "Ecology and reproductive strategies of *Cyprinus carpio* L. in the River Ganga at Prayagraj, India" at the National Seminar on "Ecology vs. Economic Development with Special Reference to the Ganga Basin (NEED-2023), held at Nehru Gram Bharati and ICAR-CIFRI, Prayagraj, from February 25–26, 2023.
- Dr. S. Borah received the Young Scientist Award 2023 by Kalash Research and Welfare Society for his contribution to science and research.
- Dr. B. K. Bhattacharjya, Dr. Pronob Das, and Dr. B. K. Das were the recipients of the "Award of Appreciation" at the "Northeast Livestock-Aqua-Poultry Expo, 2023 & Conference" during April 18–20, 2023, at the Maniram Dewan Trade Centre, Guwahati, for their contribution to the development of fisheries and aquaculture in Northeast India.



Dr. Dibakar Bhakta receiving the best 'Senior Scientist Award'



Dr. Pronob Das receiving the "Award of Appreciation"

ICAR zonal sports tournament (Eastern Zone) 2022 at ICAR-IVRI, Izatnagar during 24-27 April 2023

The institute sports contingent won several medals in the tournament. Dr. Suman Kumari won a gold medal in discus throw (women) and a silver medal in javelin throw (women). Dr. Sajina A. M. won gold medals in badminton singles and doubles. Ms. Anjana Ekka won a gold medal in badminton doubles.



Dr. Sajina A. M. receiving medals



Dr. Suman Kumari, Ms. Anjana Ekka and Dr. Sajina A. M. with their medals (from R to L)

Human Resource Development

Trainings conducted for fishers/fish farmers

A total of 14 training programmes were conducted for the fishers/fish farmers during January- June 2023. The details are as under.

Sl. No.	Title of the training programme	Date	No. of participants	Venue
1.	DoF Bihar sponsored training on inland fisheries management	04-10 January	30 fishers/fish farmers from Sitamarhi district, Bihar	CIFRI HQ
2.	DoF Bihar sponsored training inland fisheries management	01-07 February	30 fishers/fish farmers from Sheohar district, Bihar	CIFRI HQ
3.	Hands-on training and field demonstrations on brood stock development and fish breeding of carps under the funding support of NTPC, Farakka conducted in association with the ICAR-CISH, KVK, Malda	08-10 February	Fishers of Farakka	ICAR-CISH-KVK, Malda
4.	Training on ornamental fish farming training	14-16 February	19 rural women of Kultali, Sundarbans	CIFRI HQ
5.	DoF Bihar sponsored training inland fisheries management	14-20 February	24 fishers/fish farmers from Saran district, Bihar	CIFRI HQ
6.	NABARD sponsored training on inland fisheries management	21-23 February	25 fishers/fish farmers of Haroa Block, North 24 PGS, WB	CIFRI HQ
7.	DoF Bihar sponsored training on inland fisheries management	21-27 March	30 fishers/fish farmers from Darbhanga district, Bihar	CIFRI HQ
8.	ATMA sponsored training on inland fisheries management with special emphasis on IFS	27-29 March	17 fishers/fish farmers from Berhampore Block, Murshidabad, WB	CIFRI HQ
9.	DoF Bihar sponsored training on inland fisheries management	04-10 April	30 fishers/fish farmers from Madhepura district, Bihar	CIFRI HQ
10.	DoF Bihar sponsored training on inland fisheries management	18-24 April	30 fishers/fish farmers from Katihar district, Bihar	CIFRI HQ
11.	DoF Bihar sponsored training on inland fisheries management	16-22 May	30 fishers/fish farmers from Munger district, Bihar	CIFRI HQ
12.	DoF Bihar sponsored training on inland fisheries management	24-30 May	30 fish farmers from Bhagalpur, district, Bihar	CIFRI HQ
13.	ATMA sponsored training on inland fisheries management	06-10 June	42 fishers/fish farmers farmers from Parjang block, Odisha	CIFRI HQ
14.	DoF Bihar sponsored training on inland fisheries management	22-28 June	30 fishers/fish farmers from Jamui district, Bihar	CIFRI HQ



Sitamarhi district fishers/fish farmers



Darbhanga district fishers/fish farmers



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Students training

Sl. No.	Title of the training programme	Date	No. of participants	Venue
1.	Fisheries work experience programme	21-23 February	32 nos. of 4 th year B.F.Sc students of the WBUAFS, WB	CIFRI HQ



B.F.Sc students of WBUAFS

Official Training

Sl. No.	Name of the training	Date	Participants	Venue
01.	NABL laboratory assessors' training course	17-21 January	22 Scientists from 12 ICAR Institutes	CIFRI HQ
02.	Demonstration of <i>eMatsya App</i> for collection of fish catch data from inland open waters	21 February	47 participants from Dept. staff and fish farmers	Directorate of Fisheries, Guwahati



NABL laboratory assessors' training



Demonstration of *eMatsya App*

Mass awareness campaign

Sl. No.	Title of the training programme	Date	Venue	No. of participants
1.	Mass awareness camps on pen culture at five reservoirs of Chhattisgarh	24 May to 4 June	Baherakhar, Sutiya path, Rabo, Paralkot and Ghunghutta reservoirs of Chhattisgarh	340
2.	Dolphin and hilsa conservation under the 'Namami Gange' programme	6 February 7 February 8 February 9 February	Budge Budge ferry ghat, Pujali fish landing sites, Birlapur, and Godakhali fish landing sites Burul, Raichak, and Falta fish landing sites Diamond Harbour fish landing sites Tyangra chaur fish landing sites	More than 250 active fishers, including social activists, and students
3.	Awareness on importance of fish and dolphins to riverine ecology as part of the "Namami Gange" programme	9 February	Lakshmipur Prabartak Junior High School, Fraserganj, Sundarbans	90 School students



At Lakshmipur Prabartak Junior High School



At Diamond Harbour fish landing site



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Exposure / Educational Visits

Sl. No.	Particulars of visitors	Date of visit	Venue
1.	42 students of TNJFAU, Tamil Nadu	21 February	ICAR-CIFRI, HQ
2.	32 students of Vidyasagar Women's College, Kolkata, WB	20 March	ICAR-CIFRI, HQ
3.	37 students of Santoshpur Rishi Aurobinda Balika Vidyapith, Kolkata, WB	29 March	ICAR-CIFRI, HQ
4.	42 B.Sc (Ag) students of CoA, Bhabanipatna, Odisha	04 April	ICAR-CIFRI, HQ
5.	36 students of St. Joseph College, Darjeeling, WB	27 April	ICAR-CIFRI, HQ
6.	42 students of CoF, Mangalore	01 May	ICAR-CIFRI, HQ
7.	23 students of Dept. of Zoology, Ramanuj Gupta Degree College, Silchar, Assam	08 May	ICAR-CIFRI, HQ
8.	8 school students of Army Public School, Barrackpore	16 May	ICAR-CIFRI, HQ
9.	16 students of 3 rd Year B.Sc students Bidhannagar College, Salt Lake, WB	17 May	ICAR-CIFRI, HQ
10.	43 4 th year B.F.Sc students of CoF, Lembuchera, Tripura	08 June	ICAR-CIFRI, HQ
11.	13 M.Sc. 4 th Semester Zoology Hons. students of Vidyasagar College, Kolkata, WB	08 June	ICAR-CIFRI, HQ
12.	36 students of Class IX of Udaypur Haradaya Nag Adarsha Vidyalaya for Girls, Kolkata, WB	13 June	ICAR-CIFRI, HQ
13.	30 B.F.Sc students of CoF, Gopal Narayan Singh University, Sasaram, Bihar	30 June	ICAR-CIFRI, HQ



Students of TNJFAU, Tamil Nadu

Students of Vidyasagar College, West Bengal



Exhibitions participated

Sl. No.	Particulars	Date	Place
1.	Krishi Samridhi Mela-cum-National seminar 2022-23	12-16 January	Sargachi, Murshidabad, WB
2.	Exhibition organized by Alumni Association, Govt. High School, Avana, Balasore, Odisha	14-16 January	Balasore, Odisha
3.	Bajarpore Gramin Pradarshini O Mela 2022	15-17 January	Purba Medinipur, WB
4.	International conference on agriculture & rural development 'AGRI VISION-2023' organized by SARM	27-29 January	Cuttack, Odisha
5.	National Seminar on 'Ecology Vs Economic Development with spl Reference to the Ganga Basin' (NEED - 2023) by NGB University, Prayagraj & ICAR-CIFRI Centre, Prayagraj	28-29 January	Prayagraj, UP
6.	Aqua Goa mega fish festival, Goa	10-12 February	Goa
7.	Krishi mela-cum-National Seminar at Sashyashyamala KVK	14-16 February	Sonarpur, South 24 PGS, WB
8.	<i>Pashu sanrakshan, udyan pradarshani evum atmanirbhar krishi mahotsav 2023</i> organized by KVK, Piprakothi	18-20 February	Piprakothi, Bihar
9.	"Acharya Prafulla Chandra Roy Smarak Vigyan Mela O Pradarshani" at the West Bengal University of Animal & Fishery Sciences	16-18 March	Belgachia, WB
10.	"Northeast Livestock -Aqua-Poultry Expo, 2023 & Conference" organized by P2C Communications, New Delhi along with Aqua Post and Smart Agri Post Magazines and ICAR-CIFRI, Barrackpore	18-20 April	Maniram Dewan Trade Centre, Guwahati
11.	34 th AICZ organized by ZSI & Dept. of Zoology, Kashmir University, Srinagar	05-07 June	Kashmir University, Srinagar





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Staff Corner

New Appointments

Name & Designation	Place of posting	With effect from
Shri Kumar Vivek, Chief Administrative Officer	ICAR-CIFRI Head Office, Barrackpore	30 January 2023



Shri Kumar Vivek

Superannuation

Name & Designation	Last place of posting	Date of superannuation
Shri Mohan Lal Sarkar, Skilled Support Staff	Barrackpore	31 January 2023
Dr. M. Karthikeyan, Scientist	Bangalore	31 March 2023



Dr. M. Karthikeyan

Promotions

Name & Designation	Promoted to	With effect from
Shri Sukhen Das	Lower Division Clerk	12 May 2023
Shri Jayanta Pramanik	Lower Division Clerk	12 May 2023



Shri Sukhen Das

Transfers

Name & Designation	From	To
<i>Intra institutional transfer</i>		
Shri Rajdip Dutta, Assistant	ICAR-CIFRI Regional Centre, Guwahati	ICAR-CIFRI Head Office, Barrackpore
Ms. Tanuja Abdulla	ICAR-CIFRI Head Office, Barrackpore	ICAR-CIFRI Research Station, Kochi
<i>Inter institutional transfer</i>		
Shri Biswajit Barua, Administrative Officer	ICAR-CIFRI Head Office, Barrackpore	ICAR-NBSSLUP Kolkata Centre
	ICAR-CIFRI Research Station, Vadodara	ICAR-CMFRI, RS, Kozhikode

River Ranching Programme

The institute is executing the National Ranching Program 2023 under the NMCG project. During the period of February 2023-June 2023, a total of 22.52 lakh of Indian Major Carps, Mahseer, and catfishes were ranched in 13 different events in West Bengal, Uttar Pradesh, Bihar, Jharkhand, and Uttarakhand. The ranching was graced by dignitaries including Shri G. Ashok Kumar, IAS, Director General, National Mission for Clean Ganga (NMCG) and Shri Shantanu Thakur (Hon'ble Union Minister of State for Ports, Shipping, and Waterways). Along with the ranching, 824 local fishermen were sensitised about the current river ranching, sustainable fishing, and clean Ganga initiatives undertaken by NMCG.

At Devprayag, 10,000 Mahseer advance fish fingerlings were released into the Ganga River on 16 June 2023 in the august presence of Shradhey Acharya Balakrishna ji, Vice Chancellor, Patanjali University, and Co-Founder Patanjali Yogpith, Haridwar. Dr. B. K. Das, Director, and Dr. Sandeep Behera, Senior Consultant, Biodiversity, NMCG, New Delhi were also present. The event was organised under the National Mission for Clean Ganga (NMCG) project in association with Pantajali Sevashram, Mulya Gaon, Devprayag, Uttarakhand.

The institute released 1,80,000 numbers of fertilised eggs and 3000 hilsa spawn in the river Ganga at Ojha Toli ghat, Sahibganj, Jharkhand on 17 February 2023. The major objective of the ranching of fertilised eggs and spawns is to provide the native habitat for better larval survival and growth towards adulthood in its natural ecosystem.



Ranching by DG, NMCG at Kanpur



Ranching at Varanasi



Awareness programme at Fatehpur



Mass awareness among the students



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Mahseer ranching at Devprayag



Releasing of hilsa spawn at Ojha Toli Ghat, Sahibganj, Jharkhand

Activities under Scheduled Tribe Component (STC)

Support to backyard ornamental fish farming

The institute organised stakeholder consultation, mass awareness, and ornamental fish farming live demonstration programme for the tribal beneficiaries in the Hilly region of Darjeeling district of West Bengal on 6 February 2023. A demonstration was organised for the tribal beneficiaries, comprising 20 males and 10 females from six villages in Shittong, Khasmahal in the presence Dr. B. K. Das, Director, ICAR-CIFRI.



Demonstration on ornamental fish farming at Darjeeling



Training on ornamental fish farming at Barrackpore

A training was organised on ornamental fish farming at ICAR-CIFRI, Barrackpore for 19 rural women from Kultali, Sundarbans, from 14 to 16 February 2023. Knowledge and skills on the fabrication of aquariums, natural and artificial feed preparation, feeding technique, breeding technique of livebearers and egg layers, maintenance and monitoring of aquariums, such as water quality management, use of aerators and thermostats, selection of compatible aquarium fish species, etc. were imparted through the training.

Distribution of fishing implements in Jharkhand

The Institute extended support to the fishermen's cooperative societies belonging to Scheduled Tribe (ST) communities in Jharkhand. Outboard engines were distributed at Kelaghag Reservoir and fitted to the already supplied FRP boats. Five nos. of outboard engines were distributed to the cooperative societies of ST fishers of five reservoirs situated in Ranchi and Simdega districts during 6-7 February. The demonstration of the motorised FRP boats was organised at Getalsud and Kelaghag reservoirs, respectively.



Mahila Matasyajibi Sammelan and 'Mission 3000'

The institute organised *Mahila Matasyajibi Sammelan* at Kultali, Sundarban, West Bengal, in collaboration with Kultali Milantirtha Society on 19 May 2023. Dr. Himanshu Pathak, Secretary, DARE, Govt. of India, and DG, ICAR, inaugurated the meeting. Other distinguished guests were Dr. B. K. Das, Director, ICAR-CIFRI; Dr. Gouranga Kar, Director, ICAR-CRIJAF; and Dr. D. B. Shakyawar, Director, ICAR-NINFET.



Dr. Pathak distributed fisheries inputs like fish fingerlings, ICAR-CIFRI Cagegrow feed, lime etc. to 30 tribal women fish farmers and 470 SC women from 38 hamlets under 17 GPs of the Gosaba and Basanti blocks of the Sundarbans. More than five thousand fishers, including 3,000 women, participated in the meet. The institute took a target of adopting 3000 SC women for improving their livelihood.



Demostration of pen culture in Chhattisgarh

Pen culture demonstration programmes were held in Baherakhar, Sutiya path, Rabo, Paralkot, and Ghunghutta small reservoirs of Chhattisgarh during 24 May to 4 June 2023. The goal of the programme was to raise fingerlings in the pen so that the reservoir could produce more fish in a cost-effective way. After the demonstration, a sensitization programme was organised at the reservoir site to inform the beneficiaries about the importance of pen culture for fish production enhancement in the reservoirs. A total of 340 tribal beneficiaries attended the demonstration and awareness programme.

Activities under Scheduled Caste Sub-Plan (SCSP)

Training and demonstration of ornamental fish farming in Darjeeling district of West Bengal for livelihood enhancement

The institute organized a training programme "Inland ornamental fisheries management for income generation and livelihood enhancement in the hilly region" from 28 April to 1 May 2023 for 26 people, including 8 females, from Sittong, Manju Gaon, and Mongu of Darjeeling district, West Bengal. Apart from classroom teaching, hands-on training and an exposure visit to the ornamental fish market were included in the training programme.



Hands-on training on ornamental fish farming

In collaboration with Hemnagar Sundarban Dreams and Rotary Royal Bhubaneswar, the institute organised a live demonstration on ornamental fishery on 5 February at Sukhiya Block of Darjeeling district of West Bengal, where 50 beneficiaries belonging to the SC community, comprising 32 females and 18 males, from 4 villages participated under the SCSP and TSP programmes. The required inputs were distributed to the beneficiaries. During the mass awareness programme on 6 February, the director of ICAR-CIFRI, Dr. B. K. Das, emphasized the role of backyard ornamental fishery in empowering the rural community in making them *Atmanirvar*.



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Another demonstration on the ornamental fish farming was done on 1 June 2023, at Mirik, Darjeeling district, for 50 beneficiaries of the SC community of Kurseong and Mirik blocks, out of whom 15 were women. Each beneficiary was provided with a startup ornamental fish rearing kit consisting of a 500 lb FRP



Distribution of inputs in Darjeeling district

tank, an aerator, a thermostat, live bearer fish, fish feed medicine, etc. A demonstration was also organised on the spot for the beneficiaries about ornamental fish rearing and its maintenance.



Demonstration at Mirik, Darjeeling

Stakeholder consultation, mass awareness, and live demonstration programme were organized on 5 June 2023, at Sukhiya and Manju Tea Estates of Darjeeling district, West Bengal. 90 beneficiaries of the SC community, including 60 women, took part in the programme, and received input during live demonstrations.

Meetings and Events

World Hindi Day

World Hindi Day is celebrated all over the world on 10 January 2023. The institute also observed the day with great enthusiasm. Dr. B. K. Das, Director highlighted the work done by the institute in the promotion of Hindi. He said under the patronage of the present regime at the centre, the Hindi has got global dimension. Now a days, people have accepted the role of Hindi in our social, cultural, and economic development, and its scope has increased rapidly in all non-Hindi-speaking states.



First Technical Advisory Committee Meeting of NePPA Project



The institute organized the 1st Technical Advisory Committee (TAC) meeting of the ICAR-Network Program on Precision Agriculture (NePPA) on 10–11 January 2023 at the institute HQ, Barrackpore. Dr. S. K. Choudhry, DDG (NRM), ICAR chaired the steering committee of the ICAR-NePPA program. The program is monitored by a technical advisory committee, which is constituted involving twelve eminent experts from ICAR, IITs, and Universities. Dr. Amitabha Bandyopadhyay is the chairman of the Technical Advisory Committee. Sixteen ICAR institutes are working under this program.

Annual Sports for the Institute Staff

The institute organized the annual sports meet 2023 for the staff at the headquarters, Barrackpore on 12-13 January 2023. Dr. B. K. Das, Director inaugurated the meet and shared his thoughts about sports and their importance in leading a healthy life. He also highlighted the laureals brought by the staff in ICAR sports and encouraged all the members of the institute to



actively participate in the two days of events. On the occasion, the institute also paid homage to Swami Vivekananda whose birth anniversary falls on 12 January. The director highlighted the Swamiji's interest in sports and informed that this day is celebrated as the National Youth Day.

Workshop on IPR issues in Fisheries Science



The institute supported a workshop on "IPR issues in Fisheries Science" on 18 January 2023 with the goal of sensitising scientists to the need for intellectual property protection in the development and commercialization of inventions. The Director Dr. B.K. Das informed that ICAR-CIFRI has submitted seven patents, four industrial designs, and eight trademarks in the last five years. The Institute has commercialised and licenced seven technologies in the inland fisheries sector, with another six in the pipeline at Agrinnovate India Ltd., ICAR's commercial arm. The workshop was attended by 55 scientists from the ICAR-CIFRI headquarters in Barrackpore as well as regional centres in Guwahati, Bangalore, Prayagraj, Vadodara, Kochi, and Kolkata.

Republic Day

The institute celebrated the 74th Republic Day on 26 January 2023, at its headquarters in Barrackpore and in all the regional centres and stations. The Director greeted the gathering on the auspicious occasions of Republic Day and Basant Panchami. He remembered the great CIFRIans who made the country pride. Among them, Dr. M.V. Gupta, who has a long association with our Institute, has been awarded the Padma Shri this year. Dr. Gupta is also a World Food Prize Winner.





World Wetland Day

The Institute organised a brainstorming session on sustainable fisheries management of wetlands at the Guwahati Regional Centre on 2 February 2023, on World Wetlands Day (WWD) in hybrid mode. The theme for the WWD 2023 is 'It's time for wetlands restoration'. Representatives from Departments of Fisheries, Govt. of Assam, and WB; Assam Fisheries Development Corporation Ltd.; College of Fisheries (AAU), Raha; Assam State Wetland Authority; Gauhati University; National Fisheries Development Board, NERC, Guwahati; Dept. of Environment & Forest, Govt. of Assam; Assam Agribusiness and Rural Transformation Project (APART); WorldFish; Aaranyak (NGO); and progressive beel fishers attended the session. Dr. B. K. Das, Director, ICAR-CIFRI, briefly appraised the goods and services provided by wetlands, which are means of livelihood for local people. Scientists and staff of ICAR-CIFRI, RC Guwahati, interacted with the delegates and came up with a few recommendations from the session.



National Seminar by ICAR-CIFRI and NGB (DU) at Prayagraj

A National Seminar on "Ecology vs. Economic Development with Special Reference to the Ganga Basin (NEED-2023)" was jointly organised by ICAR-CIFRI and NGB (DU), Prayagraj, Uttar Pradesh, from 25-26 February 2023. The Seminar focused on raising awareness of the aquatic



biodiversity of the Ganga River, which is directly correlated to the economy of the fish farmers. The programme got



started with a welcome address by Dr. Dharm Nath Jha, Senior Scientist and HoC. Prof. R. S. Verma, Director, MNIT and IIIT, Prayagraj, was the Chief Guest on the occasion. He highlighted the importance of molecular biology and shared his experience in that field.

Institute Management Committee (IMC) Meeting

The 51st IMC meeting was held under the chairmanship of Dr. B. K. Das on 28 February. He welcomed all members and briefed them on the Institute's research and development activities since the last IMC meeting, overall Institute management, and links established with other stakeholders. The 51st IMC discussed 17 agenda points of various items and issues, followed by a scientific presentation on "Arsenic contaminations in the aquatic ecosystems: its mitigation for food safety and health," delivered by Dr. Srikanta Samanta, Principal Scientist and HoD (REF Division).



Research Advisory Committee (RAC) Meeting

The RAC Meeting of the Institute was held on 2-3 March 2023. Dr. B. Meenakumari, Chairperson of the RAC, presided over the meeting. The meeting was also attended by the members of the Committee, namely Dr. Madan Mohan, Dr. A. K. Singh, Dr. V. P. Saini, Prof. Subhashisa



Dutta, Dr. B. P. Mohanty, and all the scientists of the institute. Dr. B. K. Das, Director, briefed on the current and past activities of the institute, including river ranching, automation in cage culture, big data, and drone technology, climate resilient pen culture, outreach initiatives in the Sundarbans, and the introduction of artificial intelligence (AI) in inland open water research. All the HoDs presented the achievements of their projects. The Chairperson and all the members of RAC showed their satisfaction with the achievements and activities of the institute. A total of 14 recommendations were suggested in the meeting. Dr. A. K. Sahoo, member secretary, proposed a vote of thanks to the chair.



International Women's Day

The institute celebrated International Women's Day on 8 March 2023, on the theme 'Embrace Equity'. On this occasion, Dr. B. Meenakumari, Former Deputy Director General (Fishery Science), ICAR and RAC Chairperson, encouraged women staff members of the institute and told them that gender equity needs to be part of every society's DNA. Equality is the goal, and equity is the means to get there.

Institute-Industry Interface Meeting on Waste-to-Wealth Products

The institute organised an Institute-Industry Interface meeting on waste-to-wealth products on 15 March 2023. The meeting was centred around the technology of silkworm pupae-based fish feed, which was developed recently. The meeting was attended by Dr. B. K. Das, Director, and all staff of the ICAR-CIFRI; Dr. K. Satyanarayana, Director, CSB-Central Tasar Silk Research and Training Institute, Ranchi and industry representatives.





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77th Foundation Day

The 77th Foundation Day of the Institute was celebrated on 17 March 2023, at the headquarters of the institute. Since 1947, ICAR-CIFRI has been conducting research, training, and extension programs in inland open



waters to promote the holistic development of fisheries. Shri Avanindra Singh, IAS, Secretary to West Bengal Department of Fisheries, was present as the Chief Guest; Dr. Dhriti Banerjee, Director, Zoological Survey of India; Dr. D. B. Shakyawar, Director, ICAR-NINFET; and Dr. Gouranga Kar, Director, ICAR-CRIJAF, were the Guests of Honour. 150 farmers and entrepreneurs and 150 students of local schools were also present on this occasion.



3rd Advisory Committee Meeting of Hilsa Project

The Advisory Committee Meeting of the NASF project on Captive breeding of hilsa, *Tenualosa ilisha*, Phase II, was held on 28-29 March 2023, under the Chairmanship of Dr. K. K. Vass. Dr. J. K. Jena, DDG (Fishery Sciences), and Dr. Ashok Kumar, Principal Scientist, NASF, joined the meeting online. Dr. S. Raizada and all the CCPIs, including Dr. Debasis De, Dr. S. Adhikary, and Dr. G. Biswas, attended the meeting physically. The Chairman and members expressed their satisfaction with the progress of the project with respect to the gonadal maturity of the captive stock. The first day of the meeting was held at ICAR-CIFRI, Barrackpore. A visit to captive stock farm facilities maintained at ICAR-CIBA, Kakdwip was made on the second day.

Northeast Livestock-Aqua-Poultry Expo, 2023 & Conference

P2C Communications, New Delhi, along with Aqua Post and Smart Agri Post Magazines as media partners and ICAR-Central Inland Fisheries Research Institute (ICAR-CIFRI), Barrackpore, as a knowledge partner, organised "Northeast Livestock-Aqua-Poultry Expo, 2023 & Conference" during April 18-20, 2023, at Maniram Dewan Trade Centre, Guwahati, for the benefit of the region. In the programme, concerned research institutes, private companies, government agencies, line departments, entrepreneurs, and others put up exhibition stalls to display their products and technologies. More than 5000 people (including women and professional students) from the entire Northeastern region visited the exhibition stalls and interacted with the exhibitors.



World Intellectual Property Day

On 'World Intellectual Property Day 2023' the institute highlighted the "can-do" spirit and ground breaking work of women innovators, creators, and entrepreneurs around the world. Celebrating the innovative and creative scientific activities of all ICAR-CIFRI women researchers, a hybrid workshop on the theme "Women in IP: Accelerating Innovation and Creativity" was held on 26 April 2023. The programme drew 150 scientists, technical personnel, and research scholars from the institute's headquarters in Barrackpore and regional centres in Guwahati, Prayagraj, Bengaluru, Vadodara, Kolkata, and Kochi.



IRC Meeting

The Institute Research Committee Meeting for the year 2022-23 was held on 2-4 May 2023, at the Institute headquarters in off-line mode. The achievements of 18 institutional as well as network projects were discussed, and recommendations were made by the house under the chairmanship of Dr. B.K. Das, Director. In addition to these, the RAC recommendations, ICAR regional committee reporting, reporting done by the PME Cell, KRISHI, animal ethics for experiments, and administrative and financial issues of project management were also discussed by the house. Three new projects were also presented at this IRC meeting.

Mahila Matsyajibi Sammelan

The institute organized *Mahila Matsyajibi Sammelan* (Women Fishers Meet) at Kultali, Sundarbans, West Bengal, in collaboration with the Kultali Milantirtha Society on 19 May 2023. Dr. Himanshu Pathak, Secretary, DARE, Govt. of India, and DG, ICAR, inaugurated the event as the Chief Guest. Other distinguished guests were Dr. B. K. Das, Director, ICAR-CIFRI; Dr. Gouranga Kar, Director, ICAR-CRIJAF; and Dr. D. B. Shakyawar, Director, ICAR-NINFET. Dr. Pathak, in his address, said that the rural population of Sundarban is suffering due to continuous natural disasters like cyclones. He acknowledged the excellent and exceptional work carried out by ICAR-CIFRI for the livelihood enhancement of women fishers in the Sundarban. More than five thousand fishers, including 3,000 women, participated in the meet.





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Interactive workshop on 'Management of Openwater Fisheries of Sikkim'



The Institute organised an interactive workshop on 'Management of Open Water Fisheries of Sikkim' at Gangtok in collaboration with the Directorate of Fisheries (DoF), Govt. of Sikkim, on 29 May 2023. In addition to Dr. B. K. Das, Shri N. Jaswant, and Dr. B. K. Bhattacharjya, the programme was attended by Dr. Thangapandiyan, Head, Zoology Department, SRM University, Sikkim; Ms. Niti Sharma, Scientist, ICAR-CIFRI Regional Centre, Guwahati; officers from DoF, Sikkim; M.Sc. students of SRM University; fishers, fish farmers, and members of the Sikkim Anglers' Association. Representatives from local print and media were also present.

International Yoga Day

Yoga is an ancient physical, mental, and spiritual practise that originated in India. International Yoga Day has been celebrated across the world annually on June 21st since 2015, following its inception in the United Nations General Assembly in 2014. Now a days, it is practised in various forms around the world and continues to grow in popularity. The institute celebrated this day on 21 June at its headquarters as well as in all its centres and stations. The event centred around the theme '*Vasudhaiva Kutumbakam*,' meaning The World is One Family and *Har Aangan Yog*. Shri Sujit Ghorui, a yoga instructor, delivered a lecture on "The Role of Yoga in Health and Wellbeing" to raise the awareness of the staff regarding the benefits of yoga. In the morning, the staff did a practical yoga session under the guidance of the instructor.



Other Major Events



New year celebration on 1 January 2023



Saraswati Puja on 26 January 2023



Institute staff attended the post budget discussion on 24 February 2023



Workshop on stress management by Bramha Kumaris on 31 March 2023



FPC Meet on "Capacity building for livelihood enhancement & Sundarban Dream Krishak Samman" on 29 April 2023



CIFRI Cage Grow feed technology license transfer on 27 April 2023



World Environment Day on 5 June 2023



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Eminent Visitors



Dr. Pravin Kumar, Director, ICAR-CCARI, Goa visited CIFRI Vadodara centre

Dr. Sailesh Kulkarni, Base Hospital, Barrackpore and team visited the Institute headquarters on 05 January 2023



Prof. R. S. Verma, Director, MNIT & IIIT, Prayagraj visited the ICAR-CIFRI, Prayagraj centre on 26 February 2023

Dr Dilip Kumar, Ex-Director/ VC ICAR-CIFE Mumbai and Former UN (FAO) advisor visited the ICAR-CIFRI, Prayagraj centre on 25 February 2023



Swachha Bharat Activities



Swachhata activities at Guwahati Centre



Swachhata activities at Vadodara Centre



Regular campus cleaning activities at Barrackpore



Fumigation for mosquito control at Barrackpore



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अनुसंधान उपलब्धियां

गंगा नदी के ऊपरी और मध्य भाग में सूक्ष्म बैथिक प्रजातियों का वितरण रिकॉर्ड

वर्ष 2022-23 के सर्दियों में नमूना संग्रहण के दौरान, हर्षिल से बलिया तक गंगा नदी से 12 ऑर्डर और 22 फैमिली के कुल 31 सूक्ष्म बैथिक प्रजातियों को दर्ज किया गया जिनमें 13 गैस्ट्रोपॉड, 6 बाइवाल्व, 8 कीट, 2 पॉलीकीट और 2 किलटेलटा शामिल थे। इन 31 प्रजातियों में से आठ (08) सूक्ष्म बैथिक प्रजातियों को पहली बार विभिन्न नमूना केंद्रों पर दर्ज किया गया था। नरोरा के मध्य खंड से साइबिस्टर प्रजातियों और नरोरा तथा हरिद्वार के ऊपरी भाग से सिगारा प्रजातियों और एंटोचा प्रजातियों को दर्ज किया गया। बिजनोर के ऊपरी खंड में *सेगमेंटिनाकलाथा* प्रजाति तथा गाजीपुर में *डिप्लोनीचस इक्स* को देखा गया है। *जाइरोसिग्मा एकुमिनेटम* को बिजनोर के ऊपरी खंड तथा और कैपिटैला प्रजाति को नरोरा के ऊपरी भाग में दर्ज किया गया था। कैनिस प्रजाति को गंगा के ऊपरी भाग, हरिद्वार में दर्ज किया गया था।

वी. आर. ठाकुर, एस. के. वर्मा, डी. एन. झा, ए. आलम, जे. कुमार, एस. के. मिश्रा, डी. वर्मा, आर. जयसवाल और बि. के. दास

ब्रह्मपुत्र नदी घाटी से मिस्टस टेंगरा की प्रजनन विशेषताएं

मिस्टस टेंगरा, जिसे स्थानीय रूप से टेंगरा के नाम से जाना जाता है, एक छोटी कैटफिश है जो बैग्रिडे परिवार से संबंधित है। ब्रह्मपुत्र नदी प्रणाली के अंतर्गत नदियों और आर्द्रभूमियों से *एम. टेंगरा* (50 मछलियों) को जुलाई 2022 से जून 2023 तक हर महीने एकत्र किया गया था। नर मछली की कुल लंबाई और वजन 6.8-9.5 सेमी और 3.6-8.6 ग्राम के बीच और मादा मछली में क्रमशः 6.8-10.15 सेमी और 3.5-11.21 ग्राम के बीच पाए गए। एकत्रित मछलियों में नर और मादा मछली का अनुपात 1.18:1 पाया गया। अध्ययन में यह पाया गया कि मछलियों के जननांग का विकास जनवरी में शुरू होता है और जून और जुलाई महीनों में 80-100 प्रतिशत परिपक्वता देखी गई। परिपक्व नर मछली की पहचान उनके गुदा पंख के सामने एक लम्बी जननांग पैपिला द्वारा की जाती है, जबकि मादा मछली का शरीर भरा-पूरा होता है। गोनोडो-सोमैटिक इंडेक्स (जीएसआई) नर मछली में 0.54-1.07 और मादा मछली में 0.45-17.84 के बीच पाया गया। पूर्ण प्रजनन क्षमता 10160 से 16131 अंडाणु/मछली और सापेक्ष उर्वरता 1231.1 से 1455.5 अंडाणु/ग्राम शरीर के वजन के बीच पाई गई।

सोना येंगकोकपम, एन. शर्मा, बी. सी. रे, डी. बोरदोलोई और बि. के. दास

महानदी में अवैध मछली पकड़ने से जलीय वन्यजीव पारिस्थितिकी तंत्र को खतरा

ओडिशा में हाल ही में एक सर्वेक्षण के दौरान यह देखा गया है कि महानदी के मध्य और निचले हिस्से में मछुआरे अवैध तौर पर मछली पकड़ने में कई विनाशक और प्राणघाती तरीके अपनाते हैं जैसे विस्फोटक डायनामाइट का उपयोग, जल निकायों के पानी को विषाक्त करना तथा बिजली का प्रयोग आदि। विस्फोटक के उपयोग से न केवल कुछ दुर्लभ प्रजातियों का अस्तित्व खतरे में पड़ गया है बल्कि पानी भी प्रदूषित हो गया है। नदी में इस तरह की अवैध गतिविधियों ने मछली उत्पादन को भी प्रभावित किया है, विशेषकर निचले हिस्से में मछली उत्पादन में की कमी आई है। स्थानीय मछुआरों का मानना है कि पारंपरिक जाल तकनीक से अधिक मछली पकड़ना एक चुनौतीपूर्ण कार्य है। हालांकि, वे मछली पकड़ने के लिए विस्फोटकों के उपयोग के दुष्प्रभावों से अवगत थे। मत्स्य पालन में गिरावट का कारण मछलियों का अंधाधुंध दोहन, छोटे छिद्र वाले जाल से मछली पकड़ना, प्रजनन की कमी, मानसून के दौरान मछली पकड़ निषेध अवधि का पालन आदि है। मछली पकड़ने के ऐसे तरीकों से जलीय जीवों के आवास को नष्ट हो जाते हैं, जीवों की अंधाधुंध मृत्यु होती है और अंततः मछली पकड़ में कमी आती है।

कैसियाल जॉनसन, मितेश रामटेके और बि. के. दास

हुगली-मातलाह मुहाना के ऊपरी भाग में वर्मीक्युलेटेड सेलफिन कैटफिश की उपस्थिति

हुगली-मातलाह मुहाना (मुहाना के ऊपरी हिस्से में) के मानसून सर्वेक्षण के दौरान वर्मीक्युलेटेड सेलफिन कैटफिश, *टेरीगोप्लिचथिस डिसजंक्टिवस* (वेबर, 1991) की किशोर मछली नवद्वीप से बालागढ़ तक अच्छी संख्या में पाए गए। यह एक परभक्षी कैटफिश है जिसके कारण स्वदेशी अकशेरुकी और कशेरुकी प्रजातियों की अतिजीविता गंभीर रूप से प्रभावित हो रही है। यह प्रजाति अलगीभक्षी प्रकृति की है जो नितल भाग में रहने वाली स्वदेशी

मछलियों के लिए खतरनाक है। सितंबर (प्रजनन मौसम) में, नबद्वीप और बालागढ़ के समुद्री तट से सेट-बैरियर नेट से पी. डिस्जंक्टिवस (लंबाई – 51–65 मिमी, वजन 4.21–8.12 ग्राम) के 5 किशोर मछली एकत्र किए गए। नर स्पॉन आमतौर पर नदी के किनारों में बिल बनाते हैं जहाँ मादा अपने अंडे देती है और उनकी रक्षा करती है। पर बड़े पैमाने पर बिल खोदने से गाद की समस्या बढ़ती है। नबद्वीप और बालागढ़ में लवणता मान क्रमशः 0.01 और 0.29 पीपीटी पाई गई। रिपोर्ट के अनुसार, कई स्पॉन के लिए अपनी लचीलापन और प्रवृत्ति के कारण, यह प्रजाति अन्य जलीय पारिस्थितिक तंत्रों में स्थानीय मछली जर्मप्लाज्म को तेजी से विस्थापित कर रही है। ऐसी विदेशी आक्रामक प्रजातियों के प्रवेश को रोकने के लिए पर्याप्त वैधानिक नियम, सामुदायिक भागीदारी और मजबूत प्रबंधन उपाय किया जाना चाहिए।

मितेश रामटेके, कैसियाल जॉनसन और बि. के. दास

मछली आधारित जैविक अखंडता सूचकांक (आईबीआई) के आधार पर ताप्ती नदी की पारिस्थितिकी

मछली संयोजन डेटा के आधार पर, नदी के पारिस्थितिकी स्थिति की जांच मात्स्यिकी आधारित जैविक अखंडता सूचकांक (index of biotic integrity) द्वारा किया गया था। यह जांच पांच श्रेणियों के तहत किया गया – जैसे वर्गीकरण समृद्धि, मत्स्य वास स्थल संरचना, सहनशीलता संकेतक, प्रजातियों का लचीलापन और ट्रॉफिक संरचना। ताप्ती नदी में मछली बहुतायत डेटा के आधार पर आईबीआई स्कोर 33 से 60 के बीच था। अध्ययन से पता चला कि नदी का तीन-चौथाई हिस्सा आंशिक तौर पर क्षतिग्रस्त पाया गया था (25–50%)। सबसे अधिक क्षति (45%) कामरेज में देखी गई।

संगीता एम. नायर, सजीना ए. एम., दिबाकर भक्त, प्रणब गोगोई, एस. सामंता और बि. के. दास

पन्ना राष्ट्रीय उद्यान परिसर के केन नदी में लुप्तप्राय कछुओं का दुर्घटनावश पकड़ा जाना

IUCN रेड लिस्ट में रेतीली और गहरी नदियों, झीलों और तालाबों में पाये जाने वाले गंगा सॉफ्टशेल कछुआ, *निल्सोनिया गैंगेटिका* (कुवियर, 1825) और क्राउन नदी कछुआ, *हरदेलाथुरजी* (ग्रे, 1831) को लुप्तप्राय के रूप में वर्गीकृत किया गया है। मध्य प्रदेश में पन्ना राष्ट्रीय उद्यान परिसर में केन नदी के किनारे मानसून सैपलिंग के दौरान दो एन. गैंगेटिका और एक एच. थुरजी के नमूनों को पाया गया। इन जीवों को स्थानीय मछुआरों ने गलती से गिल नेट ऑपरेशन के दौरान पकड़ लिया था और सजावट के लिए एक मछली व्यापारी के घर के टैंकों में रखा गया था। एन. गैंगेटिका के नमूने की पहचान कैरपेस और प्लास्ट्रॉन की संरचना के आधार पर की जा सकती है। कैरपेस पर विशिष्ट काले रेटिक्यूलेशन मौजूद होते हैं। किशोर केकड़ों के कवच पर 3–6 गहरे गोलाकार धब्बे पाए गए। एन गैंगेटिका उन प्रजातियों में से एक है जिसका सबसे अधिक उपयोग इनके तेल और मांस के लिए किया जाता है। इसकी अधिकतम लंबाई 940 मिमी तक और एच. थुरजी की 650 मिमी तक हो सकता है। नमूना स्थलों में, मीठे पानी के कछुए का संरक्षण ठीक से नहीं किया जाता है क्योंकि आकस्मिक रूप से पकड़े गए कछुओं को तुरंत नदी में वापस नहीं छोड़ कर उनका उपयोग घरों में सजावट के लिए किया जाता है। वन्यजीव (संरक्षण) अधिनियम, 1972 की अनुसूची I के भाग II के अनुसार इन कछुओं को रखना अवैध है इसलिए हितधारकों सहित स्थानीय मत्स्यपालकों को इस तथ्य से अवगत कराया जाना चाहिए।

दिबाकर भक्त, आर. के. मन्ना, राबन सी. मांडी और बि. के. दास

गोमती नदी में कीटनाशक संदूषण का मानदंड तय करना और इससे स्वास्थ्य हानि का अनुमान

कीटनाशक एक प्रकार के जहरीले पदार्थ होते हैं जो मछली के साथ जलीय प्रणाली में खाद्य श्रृंखला में जैव-संचयित हो जाते हैं और इससे जलीय जीवों और मानव स्वास्थ्य को गंभीर खतरा हो सकता है। कीटनाशक के अवशेष मुख्यतः मानवजनित गतिविधियों से उत्पन्न होते हैं, और वे अक्सर नदियों सहित जलीय वातावरण में पाए जाते हैं। गंगा नदी की सहायक नदी, गोमती नदी के अध्ययन में ऑर्गेनोक्लोरीन संदूषण पानी (52%), तलछट (30%) और मछली (43%) के नमूनों में और ऑर्गेनोफॉस्फेट संदूषण क्रमशः 33%, 25% और 39% पाए गए। पर किसी भी नमूने में सिंथेटिक पाइरेथ्रोइड्स नहीं पाया गया। पानी में कीटनाशकों की सांद्रता जलीय जीवन के लिए तनाव की स्थिति का संकेत देती है। कीटनाशकों का प्रतिशत अनुमानित और स्वीकार्य दैनिक सेवन के अनुसार 0.1 से कम था, जो वयस्कों और बच्चों पर किसी खतरे की कम संभावना को दर्शाता है।

एस. के. नाग, सोमा दास सरकार, एस. के. साहू, सजीना ए. एम., केया साहा और एस. बंधोपाध्याय



Vol.27 No.2
ISSN : 0972-0774

सिफरी समाचार

(January - June 2023)

पूर्वी-कोलकाता वेटलैन्ड से तलछट माइक्रोबायोम का मेटाजिनोमिक लक्षण

पूर्वी कोलकाता वेटलैन्ड (सीवेज साइट, इनलेट साइट, मध्य क्षेत्र और आउटलेट साइट) में स्थित सरदार भेरी में एक मेटागेनोमिक अध्ययन किया गया जिससे इस आर्द्रभूमि में शहरी अपशिष्ट जल प्रवाह का पता लगाया जा सके। जैव सूचना विज्ञान विश्लेषण से पूर्वी-कोलकाता वेटलैन्ड में कुल 57 फाइला और 117 विभिन्न वर्गों के सूक्ष्मजीवों का पता चला। तलछट माइक्रोबायोम की टैक्सोनॉमिकल प्रोफाइलिंग से पता चला कि सूक्ष्मजीव सबसे अधिक तलछट में पाए गए, उसके बाद क्रमशः इनलेट साइट, मध्य क्षेत्र और आउटलेट साइट पर देखे गये। इस वर्गीकरण ने पुष्टि की है कि डोमेन बैक्टीरिया की प्रधानता 86.05 से 89.15% तक है, इसके बाद यूकेरियोटा और आर्किया पाए गए; हालाँकि, इस वायरस की उपस्थिति केवल सीवेज स्थलों में ही पाई गई। सरदार भेरी, पूर्वी-कोलकाता आर्द्रभूमि में जीवाणु समुदाय का सबसे प्रचुर समूह प्रोटीओबैक्टीरिया का था, जो सीवेज साइट (63.12%), इनलेट साइट (44.03%), मध्य क्षेत्र (45.28%) और आउटलेट साइट (44.66%) में पाए गए। सीओजी (ऑर्थोर्लॉगस जीन क्लस्टर) के वर्गीकरण से पता चला कि अधिकांश जीन लगभग 50% चयापचय में तथा इसके बाद सेलुलर प्रक्रियाओं और सिग्नलिंग, और सूचना भंडारण और प्रसंस्करण में शामिल थे। निर्मित प्राकृतिक अपशिष्ट जल उपचार आर्द्रभूमि प्रणाली में माइक्रोबियल समुदाय संरचना और कार्यक्षमता की जांच करने वाला यह पहला अध्ययन है।

सुव्रा रॉय, विकास कुमार, तनुश्री बनर्जी, बी. के. बेहरा और बि. के. दास

माइक्रोएल्गे बायोडीजल उत्पादन के पूरक के रूप में केले के स्यूडोस्टेम के अपशिष्ट-आधारित हाइड्रोचार

जलवायु परिवर्तन और गैर-नवीकरणीय ऊर्जा की कमी हमें स्वच्छ और हरित संसाधनों से वैकल्पिक ईंधन के बारे में सोचने के लिए प्रेरित करती है। माइक्रोएल्गे-आधारित बायोडीजल एक ऐसा विकल्प है जिसने ईंधन के रूप में अपने कई लाभों के कारण हाल के वर्षों में बहुत प्रचलित हुआ है। हालाँकि, सूक्ष्म शैवाल की व्यावसायिक पैमाने पर खेती के लिए कम लागत पर बायोडीजल के अधिक उत्पादन करने के लिए अधिक शोध प्रयासों की आवश्यकता है। हाल ही में, शैवाल की खेती के लिए अपशिष्ट-आधारित पालन का तेजी से उपयोग किया जा रहा है, लेकिन अपशिष्ट का प्रत्यक्ष उपयोग सूक्ष्म शैवाल के लिए उपयुक्त नहीं पाया गया है। दूसरी ओर, भारत में लगभग 80 मिलियन मीट्रिक टन केले के तने का कचरा उत्पन्न हो रहा है, जो अप्रयुक्त रह जाता है। वर्तमान अध्ययन में, पूरक के रूप में केले के स्यूडोस्टेम के हाइड्रोथर्मल कार्बोनाइजेशन (एचटीसी) से प्राप्त हाइड्रोचार के प्रभाव की जांच बायोडीजल उत्पादन के लिए माइक्रोएल्गे, ग्रेसीलेमरसोनी एमएन877773 के विकास के प्रदर्शन के लिए की गई थी। परिणाम यह बताते हैं कि माइक्रोएल्गे में हाइड्रोचार के अतिरिक्त उपयोग से पीएच का स्तर बहुत कम हो गया पर बायोमास उत्पादकता, लिपिड संचय और सूक्ष्म शैवाल में डॉ गुना वृद्धि देखी गई। मिथाइल पामिटेट जैसे बायोडीजल के लिए वांछनीय फैटी एसिड 56% से अधिक पाया गया। उत्पादित बायोडीजल राष्ट्रीय और अंतर्राष्ट्रीय मानकों के अनुसार पाया गया है।

संथाना कुमार वी., डी. जे. सरकार, तनुश्री बेरा और बि. के. दास

संवर्धित पैसिफिक व्हाइट झींगा (पश्चिम बंगाल, भारत) के सफेद मल सिंड्रोम से जुड़े माइक्रोस्पोरिडियन परजीवी, एंटरोसाइटोजून हेपेटोपेनेई (ईएचपी) की पहचान

एंटरोसाइटोजून हेपेटोपेनेई (ईएचपी) एक माइक्रोस्पोरिडियन परजीवी है जिसे पहली बार 2004 में थाईलैंड के ब्लैक टाइगर झींगा पीनीअस मोनोडोन के नाम पर रखा गया था। प्रधानमंत्री मत्स्य संपदा योजना (पीएमएमएसवाई) द्वारा वित्त पोषित एनएसपीएडी चरण II परियोजना के तहत मछली रोग निगरानी और स्वास्थ्य प्रबंधन कार्यक्रम के दौरान पश्चिम बंगाल के पूर्वी मिदनापुर जिले के कोंटाई, चांदीपुर और मोरघाट के झींगा फार्मों में इस परजीवी संक्रमण देखा गया। इसमें झींगा की वृद्धि मंद थी, इनके आकार में परिवर्तनशीलता बढ़ गई थी और वे अधिक उन्नत अवस्था में थे। संक्रमित झींगा के खोल मुलायम होते हैं और उनमें सुस्ती, भूख कम लगना और मध्य आंत खाली होना देखा गया। अतः संक्रमित झींगा के नमूने एकत्र किए गए और आणविक पुष्टि के लिए संस्थान के प्रयोगशाला में लाए गए। नेस्टेड पीसीआर परख का उपयोग एंटरोसाइटोजून हेपेटोपेनेई परजीवी की संभावित उपस्थिति के लिए झींगा के ऊतक, मल, फीड और पर्यावरण के नमूनों की जांच करने के लिए किया गया है। परिणाम यह बताते हैं कि अधिकांश झींगा के नमूने संक्रमित पाए गए। वर्तमान में, ईएचपी के इलाज के लिए कोई प्रभावी तरीका नहीं है। इससे निपटने का एकमात्र तरीका महामारी नियंत्रण और प्रजनन से लेकर खेती तक जैविक निवारक उपायों का कार्यान्वयन है।

विकास कुमार और बि. के. दास

जलवायु परिवर्तन के प्रभाव के परिपेक्ष्य में भारत के सुंदरबन मैंग्रोव तलछट में संग्रहित कार्बन की परिवर्तनशीलता का अध्ययन

भारतीय सुंदरबन के झारखाली, धमाखली और पाथरप्रतिमा स्थलों से तलछट गहराई प्रोफाइल (0–10 सेमी, 10–20 सेमी, 20–30 सेमी, और 30–45 सेमी) का नमूना लिया गया था। परिणामों से पता चला कि सभी स्थलों और मौसमों में तलछट कार्बन का औसत मान गहराई के साथ घटता जाता है। कार्बन स्टॉक के स्थानिक पैटर्न से पता चला है कि मॉनसून पूर्व और मॉनसून पश्चात में मॉनसून की तुलना में कार्बन का स्तर अधिक होता है। कुल तलछट कार्बन का स्तर सबसे अधिक धामखाली में पाया गया। कार्बन की एक बड़ी मात्रा मुख्य रूप से गैर-लेबिल कार्बन से जुड़ी होती है क्योंकि अधिकांश कार्बन मैंग्रोव तलछट में प्रतिरोधी पूल के रूप में संग्रहीत होता है। इस प्रकार, यह कार्बन अंश भारतीय सुंदरबन की तलछट में जमा हो जाता है। कुल मिलाकर, भारतीय सुंदरबन मैंग्रोव एक प्राकृतिक कार्बन सिंक के रूप में कार्य करते हैं। लेकिन अगर मैंग्रोव वनस्पति की रक्षा नहीं की गई तो यह ग्रीनहाउस गैसों का एक महत्वपूर्ण स्रोत हो सकता है।

अजय साहा, प्रणव गोगोई, बि. के. दास और प्रीतिज्योति माझी

कॉमन कार्प, साइप्रिनस कार्पियो, सिल्वर बार्ब, बार्बोनिमस गोनियोनोटस और रोहू, लेबियो रोहिता का मध्य-ऊंचाई वाले पिंजरों में पालन का मूल्यांकन

जलाशय में 100 घन मी. प्रति पिंजरा (5 × 5 × 4 घन मीटर प्रति पिंजरा) क्षेत्र में छह सिफरी-जीआई पिंजरों की एक बैटरी स्थापित की गई थी (कुल पानी की मात्रा 540 घन मी., प्रति पिंजरा 90 घन मी.)। इनमें लेबियो रोहिता (20%), साइप्रिनस कार्पियो (60%) और बार्बो निमसगोनियोनोटस (20%) की अंगुलिकाओं को 3 स्टॉकिंग घनत्व, अर्थात् 10 मछली प्रति पिंजरा, 15 मछली प्रति पिंजरा और 20 मछली प्रति पिंजरा की दर से प्रति घनत्व 2 पिंजरों में रखा गया था। मछलियों को उनके शरीर के वजन के 2–5% पर CIFRI-CAGEGROW (क्रूड प्रोटीन, 28%) फ्लोटिंग फीड दिन में दो बार खिलाया गया। छह महीने के पालन के बाद, कुल 500 कि.ग्रा. प्रति पिंजरा (औसतन) मछली का उत्पादन प्राप्त हुआ। मध्य ऊंचाई वाले क्षेत्र में पिंजरों में कॉमन कार्प का उत्पादन सबसे अच्छा हुआ। सिल्वर बार्ब का विकास भी अच्छा था और यह प्रजाति पिंजरों में अवांछित जमाव को कम करती है जिससे पिंजरा साफ रहता है। ग्रीष्मकाल में सिल्वर बार्ब का पालन किया जा सकता है। कॉमन कार्प और सिल्वर बार्ब की तुलना में रोहू का विकास प्रदर्शन कम देखा गया है। पूर्वोत्तर भारत में मध्य-ऊंचाई वाले पिंजरों के लिए ग्रीष्मकाल में सिल्वर कार्प के साथ कॉमन कार्प का पालन एक मॉडल हो सकता है। सामुदायिक भागीदारी के माध्यम से पिंजरों का प्रबंधन अच्छा से हो सकता है। री-भोई किसान संघ के 25 मछुआरा महिलाओं के परिवारों को पिंजरा पालन से प्रत्यक्ष लाभ हुआ है। मछली स्टॉक बढ़ाने के लिए पिंजरे में संग्रहीत मछली (मुख्य रूप से रोहू) जलाशय में छोड़ दिया गया था।

प्रोनोब दास, बी. के. भट्टाचार्य, एस. बोरा, एस. येंगकोकपम, डी. के. मीना और बि. के. दास

मेघालय के उमियाम जलाशय की मत्स्य विविधता

मेघालय के री-भोई जिले में स्थित उमियाम जलाशय में समुद्र तल से 900 मीटर की ऊंचाई पर स्थित है। इस छोटे जलाशय का विस्तार क्षेत्र 500 हेक्टेयर है। अध्ययन से पता चला है कि कॉमन कार्प (साइप्रिनस कार्पियो) की संख्या जलाशय में अधिक स्वदेशी प्रजाति चॉकलेट महाशीर (नियोलिसोचिलुशेक्सा गोनोलेपिस) की कम है। अध्ययन के दौरान, साइप्रिनस कार्पियो की पांच किस्मों को दर्ज किया है: साइप्रिनस कार्पियो कम्युनिस (स्केल कार्प), साइप्रिनस कार्पियो स्पेक्युलैरिस (मिरर कार्प), साइप्रिनस कार्पियो नुडस (लेदर कार्प), साइप्रिनस कार्पियो कोई (कोई कार्प), और साइप्रिनस कार्पियो हेमटोप्टेरस (अमूर कार्प)। सभी प्रजातियों में, स्केल कार्प को सबसे अधिक बार दर्ज किया गया है जो उमियाम जलाशय में तटवर्ती आबादी की आजीविका में महत्वपूर्ण योगदान देता है क्योंकि जलाशय में नियोलिसोचिलुशेक्सा गोनोलेपिस सहित स्वदेशी मछलियों की पकड़ में कमी आ रही है। पहली बार जलाशय में लेदर कार्प और अमूर कार्प को देखा गया है। विभिन्न स्रोतों से कुल 38 मछली प्रजातियों का दस्तावेजीकरण किया गया है। अत्यधिक मांसाहारी, क्लारियास गैरीपिनस को भी जलाशय से दर्ज किया गया है, जो जलाशय की मत्स्य विविधता के लिए एक बड़ा खतरा है।

प्रोनोब दास, बी. के. भट्टाचार्य, एस. बोरा, एस. येंगकोकपम, डी. के. मीना और बि. के. दास



Vol.27 No.2
ISSN : 0972-0774

सिफरी समाचार

(January - June 2023)

उत्तर प्रदेश के रामगढ़ ताल (गोरखपुर) में उच्च जैविक प्रदूषण के कारण यूट्रोफिकेशन

वर्ष 2023 की सर्दियों में रामगढ़ ताल (आर्द्रभूमि) में कुल 22 पादपप्लवक प्रजातियाँ दर्ज की गईं, जिनमें बेसिलरियोफाइटा (8 प्रजाति), क्लोरोफाइटा (8 प्रजाति) और साइनोबैक्टीरिया (6 प्रजाति) थीं। सबसे अधिक दस प्रजातियों का लगभग 85% प्रचुरता देखी गई, जिनमें से चार फिलामेंटस साइनोबैक्टीरिया (क्रोकोकस एसपी., फोर्मिडियम एसपी., गीतलेरिनेमा एसपी., और एफ़ानोकैप्सा एसपी.) 61% पाए गए। पादपप्लवक का घनत्व पचास लाख प्रति लीटर से अधिक दर्ज किया गया, जो रामगढ़ ताल में यूट्रोफिकेशन और उच्च जैविक प्रदूषण की पुष्टि करता है। इसलिए, उपयुक्त मछली प्रजातियों का संचयन और करके उन्हें फिलामेंटस साइनोबैक्टीरिया खिलाने से इनके घनत्व को कम किया जा सकता है।

जीतेंद्र कुमार, ए. आलम, वी. आर. ठाकुर, एस. के. श्रीवास्तव, विजय कुमार, ए. के. दास और बि. के. दास

उत्तर प्रदेश के अरगा पार्वती पक्षी अभयारण्य, गोंडा के पार्वती आर्द्रभूमि में जूनोटिक ट्रेमेटोड का आकस्मिक रिकॉर्ड

फरवरी 2023 के दौरान उत्तर प्रदेश के गोंडा जिले के पार्वती अर्गा पक्षी अभयारण्य में पार्वती आर्द्रभूमि की पारिस्थितिक स्थिति के एक सर्वेक्षण में कॉमन लीवर फ्लूक, फासिओलास्प को आकस्मिक तौर पर देखा गया। यह एक चपटे आकार का कृमि होता है जिसे विश्व स्तर पर अंटार्कटिका को छोड़कर सभी महाद्वीपों में जुगाली करने वाले पशुओं के परजीवी के रूप में दर्ज किया गया है। इस परजीवी के कारण इन मवेशी के लीवर में फ़ैसीओलियासिस नामक संक्रमण होता है। फासिओलाइन का जीवन चक्र जुगाली करने वाले मवेशी के मल में रहता है जो घोंघा, विशेष रूप से लिम्नेया, गल्बा, फोसारिया और स्पूडोसुकिनिया जेनेरा की प्रजातियों को संक्रमित करता है। इस आर्द्रभूमि के जल गुणवत्ता मापदंडों निम्नलिखित पाए गए जैसे, जल का तापमान – 28.5 डिग्री सेल्सियस; पारदर्शिता 130 सेमी; पीएच 8.4; कुल क्षारीयता – 208 मि.ग्रा. प्रति ली.; कुल कठोरता 168 मि.ग्रा. प्रति ली.; चालकता 259 μ बैर-1; कुल घुलित ठोस – 121 मि.ग्रा. प्रति ली.; घुलित कार्बनिक पदार्थ 3.835 मि.ग्रा. प्रति ली.; नाइट्रेट 3.5 मि.ग्रा. प्रति ली.; और सिलिकेट 3.935 मि.ग्रा. प्रति ली.।

अबसार आलम, जीतेंद्र कुमार, धर्म नाथ झा, राजू बैठा, सुशील कुमार वर्मा, सुमन कुमारी, आर. के. मन्ना, और बि. के. दास

मैथन जलाशय, झारखंड में पिंजरे में संवर्धित ओमपोक बिमाकुलैटस को आइसोपारोरकिस हाईसेलोबैग्री का गंभीर संक्रमण

वर्ष 2022 में ओमपोक बिमाकुलैटस में आइसोपारोरकिस हाईसेलोबैग्री का गंभीर संक्रमण देखा गया जैसे 42.2% (जुलाई), 42.2% (अगस्त), 51.11% (सितंबर), 60% (अक्टूबर), 68.89% (नवंबर) और 88.89% (दिसंबर) होने का अनुमान लगाया गया था। संक्रमण की तीव्रता 1 से 10 के बीच थी और औसत तीव्रता 1.68 (जुलाई), 2.26 (अगस्त), 2.73 (सितंबर), 2.93 (अक्टूबर), 3.10 (नवंबर) और 3.175 (दिसंबर) दर्ज की गई थी। आई. हाइसेलोबैग्री का संक्रमण मछली के पूरे शरीर में फैल गया था और गुर्दे तथा इसके आसपास में अधिक केंद्रित था। इसके अलावा, पिंजरे के साथ लगे हुए घोंघों में सेरकेरिया संक्रमण का भी पता चला है। इससे ओ. बिमाकुलैटस के उपभोग में कमी आ सकती है और यह उपभोक्ता की पसंद को प्रभावित कर सकता है। अतः इस संक्रमण से बचने के लिए ऐसे घोंघा रोगवाहकों का नियंत्रण आवश्यक है। इसके अलावा पिंजरा पालन में स्थल चयन और प्रजातियों के चयन में परजीवी संक्रमण की संभावना पर भी विचार करना चाहिए। इससे बीमारी के कारण होने वाले आर्थिक नुकसान को कम किया जा सकता है और उपभोक्ता सुरक्षा सुनिश्चित की जा सकती है।

मनोहरमयुम शाय्या देवी, गुंजन कर्नाटक, असित कुमार बेरा और बसंत कुमार दास

पश्चिम बंगाल के उत्तर दिनाजपुर के कुलिक नदी में स्वदेशी मछली जाल 'ढोल' का प्रयोग : स्थायी मत्स्य पालन के लिए अनुपयुक्त

'ढोल' एक स्वदेशी मछली जाल है, जिसका उपयोग पश्चिम बंगाल के उत्तर दिनाजपुर जिले के कुलिक नदी में मछुआरों द्वारा किया जाता है। यह एक बेलनाकार मछली पकड़ने का गियर है, जो धातु, बांस के फ्रेम और नायलॉन जाल से बना है। वर्तमान में ढोल जाल के दोनों सिरों में गोलाकार लोहे के फ्रेम का उपयोग किया जाता है जिसमें क्षैतिज रूप से लगभग 10 बांस की खपच्चियों से जुड़े होते हैं। धातु के फ्रेम और बांस की खपच्चियां जाल का मुख्य ढांचा हैं जो मछली पकड़ने के दौरान अपना स्थिर रहती हैं। जाल का बाहरी आवरण नायलॉन से बना महीन जाल होता है। ढोल एक एकल फनल जाल है, जहाँ एक आंतरिक फनल या प्रवेश द्वार होता है जिनसे मछलियाँ जाल के अंदर आती हैं। इसमें 3.5- 4 मीटर लंबी शून्य-मेष जाल की एक लंबी दीवार है, जो जाल के खुले हिस्से में लंबवत तौर पर बंधी होती है और मछलियों को जाल की ओर ले जाने और पकड़ने में मदद करती है। ढोल

को चारे के साथ और उसके बिना दोनों तरह से संचालित किया जाता है। गेहूँ के आटे को आमतौर पर चारे के रूप में उपयोग किया जाता है। स्थानीय मछुआरे ज्यादातर झींगा, स्पाइनी ईल और अन्य देशी मछलियों को पकड़ने के लिए इस पारंपरिक मछली पकड़ने के गियर का उपयोग करते हैं। यदि पोना मछली के लिए जाल का आकार उपयुक्त रूप से बढ़ाया जा सके तो इन जालों का उपयोग टिकाऊ मत्स्य पालन के लिए किया जा सकता है।

सजीना ए. एम., सुमन कुमारी, अली वाई. और आर. के. मन्ना

भारत के उष्णकटिबंधीय छोटे जलाशय के जन्तुप्लवक समुदाय

जलीय खाद्य जाल में जन्तुप्लवक की एक महत्वपूर्ण भूमिका है। इसके स्थानिक पैटर्न और उतार-चढ़ाव को समझने के लिए एक उष्णकटिबंधीय जलाशय, डेरजांग में अध्ययन किया गया था। लोटिक ज़ोन में रोटिफ़ेरा (*केराटेलाट्रोपिका* और *ब्रैचियोनसफाल्कैटस*) और क्लैडोसेरा (डायफ़ानोसोमा एसपी) का घनत्व प्रमुख था। हालाँकि, जलाशय के मध्यवर्ती क्षेत्र में कोपेपोडा और क्रस्टेशियन नुप्ली प्रचुर मात्रा में देखे गए। कुल मिलाकर, बांध क्षेत्र और लोटिक क्षेत्र के बीच कुल जन्तुप्लवक बहुतायत स्थानिक रूप से काफी भिन्न थी (पी 0.05)। बांध से नियमित जल निर्वहन के कारण बांध क्षेत्र/जलाशय के बहाव क्षेत्र में न्यूनतम जन्तुप्लवक घनत्व दर्ज किया गया था। जंतुप्लवक के इस स्थानिक फैलाव की जानकारी जलाशय के स्वास्थ्य और टिकाऊ प्रबंधन के लिए उपयोगी सिद्ध हो सकती है।

पी. माझी, पी. गोगोई, लियानथुआमलुआया, सी. जाना, बि. के. दास और आर. के. मन्ना

Manipur's Loktak Development Authority is going to develop Champu Khangpok as an iconic heritage village. This is the only natural floating village in India made up of floating huts called Khangpok, built on what is locally known as Phumdis. It has around 330 hut dwellers, whose main occupation is fishing.

source: <https://www.hindustantimes.com>

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