



REVIEW ARTICLE

CONTRIBUTION OF ICAR-CIFRI IN STRENGTHENING FISHERIES, ENHANCING RURAL LIVELIHOOD & ACCELERATING INDIA'S BLUE ECONOMY

Hiralal Jana¹ and Debabrata Basu²

¹Department of Agricultural Extension, College of Agriculture, Burdwan: BCKV, Agricultural Farm-713101; Burdwan, West Bengal, India; ²Department of Agricultural Extension, Faculty of Agriculture, BCKV, Mohanpur, Krishniviswavidyalaya-741252; Nadia, West Bengal

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*Corresponding author: Hiralal Jana

ABSTRACT

Recognizing the role of inland fisheries, Government of India established a Central Inland Fisheries Research Station at Calcutta on 17 March 1947, under the then Ministry of Food and Agriculture. Later, in 1959, the Central Inland Fisheries Research Station was elevated to a full-fledged research institute, christened as "Central Inland Fisheries Research Institute". In 1967 it came under the administration of the Indian Council of Agricultural Research, Ministry of Agriculture (currently Ministry of Agriculture and Farmer's Welfare), New Delhi. India has vast and varied types of inland fisheries resources in the form of rivers, estuaries, reservoirs, floodplain wetlands, lakes, coastal lagoons and backwaters, which play important roles in fish production in the country, ensuring food and nutritional security, employment generation and livelihoods to millions of people. The Institute strives for knowledge-based management of inland open waters for sustainable fisheries, conservation of aquatic biodiversity, integrity of ecological services and to derive social benefits from these waters. Headquarters of the Institute is located at Barrackpore, West Bengal; the Regional Research Centres are located at Allahabad, Guwahati, Bangalore and Vadodara, with Research Centres at Kochi and Kolkata. The Institute is ISO 9001: 2008 certified and provide world-class service standards.

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INTRODUCTION

The government of India established a Central Inland Fisheries Research Station at Calcutta in 1947, under the then Ministry of Food and Agriculture. Later, in 1959, the Central Inland Fisheries Research Station was elevated to a full-fledged research institute, christened "Central Inland Fisheries Research Institute". In 1967 it came under the administration of the Indian Council of Agricultural Research, Ministry of Agriculture, New Delhi. ICAR-Central Inland Fisheries Research Institute strives for knowledge-based management of inland open waters for sustainable fisheries, conservation of aquatic biodiversity, the integrity of ecological services, and deriving social benefits from these waters. Central Inland Fisheries Research Institute (CIFRI) is an autonomous research institute dedicated to inland fisheries management and augmentation under the Indian Council of Agricultural Research of Government of India. Since, then the institute has been striving towards development of inland fisheries functioning from its HQ and four regional centres located at Prayagraj, Guwahati, Bengaluru, Vadodara and research stations at Kochi and Kolkata. Research activities are conducted through five divisions:

Riverine Ecology & fisheries (REF), Reservoir & Wetland Fisheries Management (RWF), Fisheries Resource Assessment & Informatics (FRAI), Open water Aquaculture & production Management (OWAPM) and Aquatic Environment Biotechnology & Nanotechnology (AEBN). The institute has been awarded with the Sardar Patel Outstanding Research Institute Award 2020 by the ICAR in the large institute category.

Aims: By fostering coordinated scientific efforts, inter-institutional partnerships, and outcome-oriented policy frameworks, ICAR-CIFRI aims to position India as a global leader in sustainable inland fisheries and Blue Economy development. Through science-led stewardship and inclusive growth, we remain committed to securing resilient aquatic ecosystems and prosperous fishing communities for generations to come. The Institute also aims at ecological conservation and mitigation plans through research on environmental flow requirements, habitat rehabilitation, bioremediation etc.

Vision: - Sustainable fisheries from inland open waters for environmental integrity, livelihood and nutritional security.

MISSION: -Knowledge based management for enhanced fishery, conservation of biodiversity, integrity of ecological services and to derive social benefits from inland open waters.

Mandate

- Basic, strategic and applied research for sustainable management of inland open water resources.
- Develop protocols for productivity enhancement in reservoirs and wetlands and aquatic ecosystems health management.
- Acts as repository of information on inland open water resources.
- Human resource development through training, education and extension.

Prospects: -India's fisheries sector is currently experiencing rapid growth, with a record production of 18.42 million tonnes in 2024–25—up from 0.7 million tonnes in 1950–51—positioning the country as the second-largest fish producer globally. The sector contributes about 1.09% to the national GDP and over 7% to agricultural GDP, moving confidently towards the goal of a Second Blue Revolution with a target of 22 million tonnes of production. India with its vast and diverse aquatic systems in the forms of rivers (29,000km), estuaries (2,00,000 ha), wetlands (3,50,000 ha) and ponds (22,00,000 ha), offers tremendous scope for increasing the production and productivity of fish from India.

Importance: India currently ranks as the world's second-largest fish-producing nation, contributing nearly 8% to global production, with inland fisheries accounting for over 75% of the total output. ICAR–CIFRI has been instrumental in driving this growth trajectory since its inception. The Institute's contributions in shaping India's fisheries sector, the importance of scientific progress in national development.

Its sustained efforts in enhancing farmers' and fishers' incomes. The Institute's revolutionary technologies that have driven the Blue Revolution in the country. The Institute's legacy and its continued contributions to inland open water fisheries, biodiversity conservation, and stakeholder empowerment. Emphasizing the integration of climate-resilient and advanced technologies such as drones and sensor-based systems. The Institute's alignment with the principles of the Blue Economy and the One Health approach. ICAR–CIFRI's role in achieving the Sustainable Development Goals (SDGs), particularly in the areas of zero hunger, nutrition security, and gender equality. The importance of skill development and knowledge exchange for the sector's growth, the remarkable increase in India's fish production over the past decade, from 95.79 lakh tons to 175.45 lakh tons, about the government's initiatives like PMMSY to further boost the sector.

HISTORY: India has vast and varied inland fisheries resources in the form of rivers, estuaries, reservoirs, floodplain wetlands, lakes, ponds, etc. These resources play an important role in fish production of the country, ensuring food and nutritional security as well as employment generation especially in rural areas. Besides, this sector is an important source of livelihood to a sizable section of the country's rural populace. Recognizing the role of inland fisheries, Government of India established a Central Inland Fisheries Research Station on 17 March 1947 at Kolkata under the

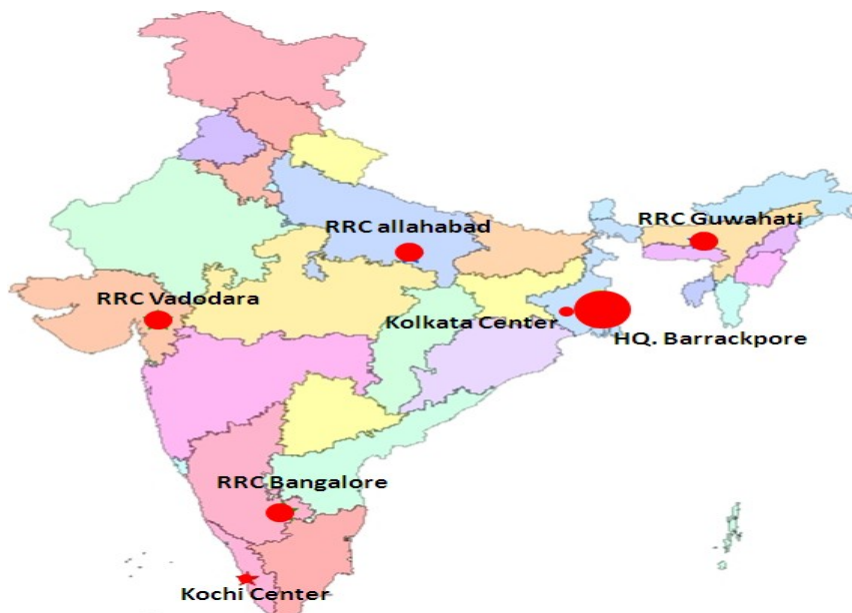
Ministry of Food and Agriculture. Later this research station was elevated to a full-fledged "Central Inland Fisheries Research Institute" in 1959 and it moved to its own building at Barrackpore, West Bengal. In 1967 the institute came under the administrative control of the Indian Council of Agricultural Research (ICAR), New Delhi. In 1971 four All India Coordinated Research Projects, viz., "Composite Fish Culture", "Riverine Fish Seed Prospecting", "Air-breathing Fish Culture" and "Ecology and Fisheries Management of Reservoirs" were started by the institute. Another AICRP on "Brackishwater Fish Farming" was initiated in 1973. The first two projects were combined together as Composite Fish Culture and Fish Seed Production" in 1974. These AICRPs were turning points in the history of inland fisheries and aquaculture in India. The resounding success of these projects has given a firm support for the development of freshwater aquaculture in the country.

During the seventies, the institute focused its attention on aquaculture research in consonance with the plan priorities of Government of India and established the Freshwater Aquaculture Research and Training Centre (FARTC) at Dhauli, Orissa in 1977, which eventually became the Central Institute of Freshwater Aquaculture (CIFA) in 1987. Simultaneously, the Central Institute of Brackish-water Aquaculture (CIBA) and National Research Centre on Cold Water Fisheries (NRCCWF) were carved out from this Institute to provide added research thrust on brackish-water aquaculture and cold-water fisheries, respectively. The name of the Institute was changed to Central Inland Capture Fisheries Research Institute (CICFRI) in 1987, West Bengal and its mandate reoriented. The ICAR, however, restored its original name "Central Inland Fisheries Research Institute" (CIFRI) in 2002. Over the years the institute has grown to a premier research organization in inland fisheries in the country. It carried out benchmark studies on the fish and fisheries of major rivers, estuaries, lakes and wetlands spread along the length and breadth of the country. During the pre-seventh plan period, the Institute identified the potential zones in major rivers where riverine major carp seed can be collected and supplied to aquaculture farms. It also developed and standardized spawn collection nets for the purpose. Oxygen packing for long distance transportation of fish seeds was developed by the institute resulting in lower mortality of fish seeds, while transportation. The development of induced breeding technology for Indian and Chinese major carps, during the seventies coupled with the bundh breeding of Chinese carps, nursery management techniques and composite fish culture technology gave a fillip to freshwater aquaculture development in India. Development of seed production and culture technologies for air-breathing fishes, methods of aquatic weed control and integrated fish farming systems gave additional support to the growth of freshwater aquaculture. The Institute also developed eco-system-oriented management guidelines for increasing fish production from large reservoirs (> 5000 ha area).

INFRASTRUCTURE: Based on the facilities available, ICAR-CIFRI has been identified as the Eastern Zonal Centre for Agricultural Research Information System of ICAR. The library at HQ. Barrackpore subscribes more than 20 international and 60 national Journals, 106 e-journals related to the fisheries and allied sciences. Presently, the library has a holding of 9849 books, 4278 reprints, 1252 maps, and 4222 miscellaneous publications.



CIFRI, Barrackpore



Fisheries Research Institutes and Regional Research Centres'

Sl.	Fisheries Research Institutes	Place	Regional/Research Centres
1	Central Institute of Fisheries Education (CIFE)	Mumbai, Maharashtra	- Madhya Pradesh (Powarkheda) - Andhra Pradesh (Kakinada) - Haryana (Rohtak) - West Bengal (Kolkata) - Bihar (Motipur)
2	Central Marine Fisheries Research Institute (CMFRI)	Kochi, Kerala	- Tamil Nadu (Mandapam, Chennai & Tuticorin) - Andhra Pradesh (Visakhapatnam) - Gujarat (Veraval) - Maharashtra (Mumbai) - Karnataka (Karwar and Mangalore) - Kerala (Calicut and Vizhinjam) - West Bengal (Digha)
3	Central Inland Fisheries Research Institute (CIFRI),	Kolkata, West Bengal	- Karnataka (Bangalore) - Uttar Pradesh (Allahabad) - Assam (Guwahati)
4	Central Institute of Fisheries Technology (CIFT)	Kochi, Kerala	- Maharashtra (Mumbai) - Andhra Pradesh (Visakhapatnam) - Gujarat (Veraval)
5	Central Institute of Freshwater Aquaculture (CIFA)	Bhubaneswar, Odisha	- Karnataka (Bangalore) - West Bengal (Rahara) - Andhra Pradesh (Vijayawada) - Punjab (Bathinda)
6	Central Institute of Brackishwater Aquaculture (CIBA),	Chennai, Tamil Nadu	- West Bengal (Kakdwip) - Gujarat (Navsari)
7	Central Institute of Coldwater Fisheries Research (CICFR)	Bhimtal, Uttarakhand	Experimental station at Champawat, Uttarakhand
8	National Bureau of Fish Genetic Resources (NBFGFR)	Lucknow, Uttar Pradesh	Kerala (Kochi)



SHG members are pulling net in a pond for catching fish

All the publications are digitized and most of these are available on-line. The Institute has state of the art infrastructure and facilities at HQ. Barrackpore; Regional Centres, Allahabad, Guwahati, Bangalore and adequate facilities at its other centres and stations to carry out advanced research in various aspects of inland open waters under the given mandate. The Institute has well equipped conference room for 30 persons, state of the art meeting room for 60 persons and state of the art auditorium seating 120 persons. The Institute has state of the art laboratories for water and soil chemistry, fisheries/ fish biology, limnology, microbiology/ Pathology, biochemistry/ nutrition, genetics/ biotechnology, biodiversity, aquarium and hatchery, GIS and computer application and a fish feed mill. The laboratories hold modern equipment like Particle Analyzer, HPLC, GLC, GCMS, Real Time PCR, Spectrophotometer, AAS, Biolog Systems, Microwave Digester, Portable water quality probes, GIS facilities, etc. are some of these. The Institute maintains a trainee's hostel that can accommodate 35 persons; the Teestha hostel can accommodate 22 persons and has dining room, kitchen, gym, visiting doctor; the Bhagirathi guest house has a VVIP suit, VIP rooms and Standard rooms in all for 10 persons, with kitchen and dining hall.

THE INSTITUTE'S RESEARCH AND POLICY THRUST AREAS:

The Institute's research and policy thrust areas include fisheries enhancement and scientific stock management in reservoirs and wetlands; riverine and estuarine ecosystem conservation; environmental flow assessment; habitat fingerprinting; GIS- and remote sensing-based resource mapping; ecosystem health benchmarking; pollution abatement; fish disease surveillance; biodiversity conservation; and climate-resilient fisheries modelling. Equal emphasis is placed on developing decision-support systems, resource assessment and forecasting models, valuation of ecosystem services, and participatory governance frameworks to inform evidence-based policymaking. ICAR-CIFRI is also advancing frontier research in genomics, metagenomics, proteomics, and nanotechnology to provide next-generation solutions for sustainable aquatic ecosystem management. As a scientific partner in the National Mission for Clean Ganga (Namami Gange), the Institute contributes to assessment, conservation planning, and restoration strategies for the Ganga river system, reinforcing the integration of fisheries science within river basin management policies. Through ICAR's Farmers FIRST and Mera Gaon Mera Gaurav initiatives, along with targeted interventions under the Tribal Sub Plan in ecologically sensitive regions such as the Sundarbans, the Institute ensures that research outcomes are translated into field-level impact, capacity building, and livelihood enhancement. Collaborative engagements with national institutions, state fisheries departments, and international organizations further strengthen policy coherence and

technology dissemination. As we advance toward Viksit Bharat @2047, our mandate extends beyond research excellence to strategic leadership in inland fisheries governance.

TECHNOLOGIES

Environmental monitoring and management protocols: The Institute has developed environmental impact assessment protocols using physio-chemical, microbiological, molecular, physiological, and community level indicators for rapid assessment of environmental perturbations caused by pollution, barrage and dam construction, river linking etc. for inland open water fisheries and ecology.

Fisheries Management/ Enhancement Protocol for Reservoirs: The Institute has developed protocols for scientific fisheries management in small, medium and large reservoirs in the country.

Fisheries Development in Wetlands: The CIFRI's intervention has led to sustainable enhancement of fish yield in wetlands in the Eastern and North Eastern States of India through scientific stocking, conservation of fish habitat, as well as, the indigenous fish species.

Designing of Fish Pass: The Institute has designed fish passes for dams and barrages leading to maintenance and conservation of fish species diversity upstream and downstream of the impoundment.

GIS Map of Inland water Resources: The Institute has prepared GIS map of water bodies having more than 0.5 ha in area throughout the country.

National Repository of Fish and Fisheries Data: Through decades of meticulous research, the Institute has generated and continues to generate time-series data on physical, chemical, biological and fish species diversity and fisheries in major rivers, reservoirs, estuaries, lakes and wetlands in the country for long-term scientific management of the resources and towards sustainable fisheries.

Hilsa Migration Biology: The Institute conducted detailed research on Hilsa biology, breeding and migration through experimental tagging that led to development of regulatory regimes on fishing for sustainable Hilsa fishery.

Cage and Pen Culture: The Institute has developed the cage and pen culture technologies for large water bodies through meticulous research on pen/cage construction, size and shape of pen/cage, selection of fish species for the enclosure culture and economic evaluation of the technologies. This has led to

successful raising of carp fingerlings as stocking material in reservoirs and wetlands, as well as, table size production of carp and prawn through these enclosure techniques.

Package of practices for increasing production of Air-breathing fishes: The air-breathing fishes are distinguished by the possession of an accessory respiratory (air-breathing) organ, which enables them to exist for hours at times out of water, or indefinitely in oxygen poor waters and even in moist mud. Not only they are able to thrive in water containing low oxygen but they are also extremely hardy with respect to all other environmental parameters and are suited to shallow and derelict waters.

Package of practices for increasing production in Brackish water fish and shrimp culture: Along the 5,600 km coastline of India, about 1.42 ill ha of saline tract is available for development of brackish water aquaculture. Apart from the utilisation of this vast unproductive fallow swampy land for increasing fish production, the brackish water aquaculture entails the culture and production of prawn, a high-priced commodity having universal demand for earning foreign exchange.

Carp production using domestic sewage: Waste water produced in a community is looked upon today as the residue of resources that the community has metabolised. The approach towards waste water disposal should be utilization of this residue with the concept of their reuse or recycle through an ecologically balanced system involving mainly aquaculture and agriculture.

Carp Culture: The country had a traditional system of carp culture which depended on naturally occurring fish spawn/early fry of major carps mixed with undesirable species and was largely practiced in Bengal and, to some extent, in adjoining states. Without any basis of scientific management in the traditional system of culture, the yield varied in the range 60-600 kg/ha/yr.

Carp seed raising: The Indian and Chinese major carps, viz. catla (Catlacatla), rohu (Labeorohita), mrigal (Cirrhinus mrigala), silver carp (Hypophthalmichthys molitrix) and grass carp (Ctenopharyngodon idella) generally breed in riverine conditions. Though they show gonadal maturation upto a point in captivity in ponds, yet the final phase of maturation and ovulation/spermiation do not normally take place in pond ecosystem.

Brackish water fish and prawn farming: Large quantities of marketable sized brackish water fish and prawn can be harvested per unit water area by stocking with the quick growing compatible species of fish and prawn in appropriate combination and applying. Suitable kinds of fertilizers in desired quantities for the production of natural fish food organisms along with artificial feeding of fish.

Fish-cum-Duck culture & Fish-cum-Pig culture: A multi-commodity farming system is more advantageous to the farmer than the monocropping system. However, commodity mix must fit into the available resources and needs as well as the economic and environmental forces around the farmer. Based on the above principles, a system of integrated fish-cum-duck farming has been developed through a number of production trials. The system not only results in more economic benefit to the farmer but also both the commodities mixed i.e., the fish and ducks are benefitted by their co-existence.

NATIONAL FISH FARMERS DAY

The ICAR-Central Inland Fisheries Research Institute (CIFRI), Barrackpore, celebrated National Fish Farmers Day 2025 with great enthusiasm at its headquarters on July 10. The day commemorates the historic success of the induced breeding technique pioneered by Prof. Hiralal Chaudhury and his team at Angul Fish Farm, Cuttack on July 10, 1957 by the then Central Inland Fisheries Research Station, which is now the ICAR-Central Inland Fisheries Research Institute (ICAR-CIFRI), Barrackpore. —an innovation that ignited India's first Blue Revolution. The gathering included 120 fishers and farmers, including 27 women, along with entrepreneurs, researchers, and NGO representatives. Seventeen progressive fish farmers including four women fishers from eight states—West Bengal, Bihar, Jharkhand, Chhattisgarh, Assam, Kerala, Karnataka, Gujarat, and Uttar Pradesh—were felicitated for their exemplary contribution to the inland fisheries sector. Dignitaries urged fish farmers to adopt modern technologies developed by CIFRI and utilize schemes like PMMSY (Pradhan Mantri Matsya Sampada Yojana) to enhance fish production. Emphasized on the importance of science-backed practices in making the fisheries sector a cornerstone of India's economic and nutritional security, highlighted the institute's ongoing research in improving productivity in reservoirs and wetlands, river restoration, sustainable development goals (SDGs), and environmental flow requirements, called upon award-winning farmers to share their experiences with fellow stakeholders to help uplift rural livelihoods, mentioned that at present the thrust of the institute is to increase the production and productivity of medium and large reservoirs and wetlands as well as river restoration protocols, including the environmental flow requirement for open water fisheries under natural resource management mode. The programme began with a floral tribute to Prof. Hiralal Chaudhury and served as a platform for dialogue between fishers, scientists, entrepreneurs, and policymakers. The celebration reinforced the collective vision of a prosperous inland fisheries sector aligned with the national goal of Viksit Bharat—a developed India.

Research and development activities of CIFRI: Resource and yield estimation of inland fisheries. Assessment of protocols for inland aquatic ecosystem and fish health System specific fish stock management practices for wetland and reservoirs. Protocols for spawn prospecting in rivers and estuaries Mapping of water bodies using remote sensing and GIS Carp seed raising in pens and cages in wetlands and reservoirs Community based fisheries management in seasonally flooded areas/floodplain wetlands. Fishery resource assessment and environmental management. Models for predicting fishery potential of large inland water bodies.

ADMISSION: CIFRI offers various graduate courses as well as Post Graduate courses. Central Inland Capture Fisheries Research Institute (CIFRI) offers 4 Years Full Time Bachelor's Degree in B.E Agricultural and Irrigation Engineering; Duration: 4 Years Learning Mode: Full Time Course Level: Bachelor's Degree

Available College Facilities & Amenities for students of CIFRI

- wifi
- Library

- Sports
- Transportation
- Hostels
- Healthcare
- Internet
- Cafeteria
- Computer Labs

MAJOR BREAKTHROUGH: Scientists of ICAR–Central Inland Fisheries Research Institute, Barrackpore have achieved a major breakthrough in the production and ecological restoration of two high-value indigenous catfishes — *Mystustengara* and *Mystuscavasius* — in Chamtabeel, North 24 Parganas, West Bengal, under the collaborative CIFRI–WorldFish project. The initiative pioneered an innovative restoration strategy wherein seeds of these indigenous catfishes were first nurtured under protected captive conditions within specially designed pen enclosures before their phased release into the open wetland ecosystem. This scientific approach substantially enhanced fish survival, growth, and establishment in the natural habitat. Throughout the culture period, ICAR-CIFRI scientists implemented rigorous wetland management protocols, including optimized stocking density, continuous water quality monitoring, predator management, and nutritionally balanced feed administration. Adaptive scientific interventions ensured favourable environmental conditions within the culture system, leading to improved production performance and reduced losses. The results have been striking. Within just 4–5 months, both species reached marketable size, opening new economic opportunities for wetland-dependent fishing communities. *Mystustengara*, a premium indigenous delicacy, commands nearly five times the market value of Indian Major Carps (IMCs), while *Mystuscavasius* fetches almost double the price, substantially enhancing income potential for local fishers. The project also delivered encouraging biological outcomes. Despite winter conditions, *Mystuscavasius* achieved an impressive average body weight of 19.2 g within five months, underscoring its strong culture potential in wetland ecosystems. The successful restoration and production of indigenous catfishes in wetland ecosystems highlights the critical role of science-led fisheries management in advancing the twin national priorities of livelihood security and biodiversity conservation.

Hilsa In Upper Ganga After Decades: A Hopeful Sign for River Ecosystem: Hilsa lovers rejoice, for the OG fish is finally back in the upper and middle stretches of the Ganga after decades of effort and scientific intervention. For anyone who grew up around or close to the Ganga, Hilsa is more than just a fish. In Bengal, the arrival of Hilsa, or Ilish, is practically a seasonal announcement that monsoon has arrived. The markets start filling up with fresh arrivals, and somewhere, a plate of steaming rice is waiting for a slice of the iconic fish dressed in mouth watering mustard. But beyond its culinary reputation, Hilsa also possesses another identity that matters just as much: it is a migratory fish whose movements can tell us something about the ecosystem and connectivity of a river. However, after remaining virtually absent for years from the middle and upper stretches of the Ganga river, two Hilsa weighing 740 grams altogether were found near the Markandey Mahadev Temple in Chandauli district of Uttar Pradesh. According to the Central Inland Fisheries Research Institute (ICAR-CIFRI), this sighting has taken place nearly three decades after the species disappeared

from the upstream reaches. The officials have described it as a significant milestone in river restoration and aquatic biodiversity conservation. Historically, Hilsa had always migrated from the Bay of Bengal through the Ganga river and its tributaries up to Varanasi, Prayagraj and farther places. But the development of a man-made structure for human life improvement changed its course. In 1975, the commissioning of the Farakka Barrage and its subsequent functioning severely disrupted Hilsa's migratory pathway, causing a drastic decline in its population and presence in the middle and upper Ganga. This, in turn, also affected the riverine fishing communities, who were dependent on the species. Since the decline of the Ilish population in those stretches meant significant ecological, cultural, nutritional, and economic distress, the ICAR-CIFRI (Barrackpore) and the National Mission for Clean Ganga (NMCG) launched a long-term scientific programme to restore ecological peace as well as Hilsa. These were not the only organisations; the Central Water Commission and the Farakka Barrage Authority also joined forces in 2016 to re-establish Hilsa fisheries in the middle Ganga at locations including Prayagraj, Varanasi, Patna, Bhagalpur, and Farakka. As Ilish is a sensitive migratory species, its presence is an important ecological indicator of both river connectivity and habitat suitability. Its return could be the sign everyone was waiting for of the Ganga's improving ecological conditions and functionality.

ICAR-CIFRI, Barrackpore Strengthens Women-Led Blue Economy: Reaffirming its commitment to promoting women-led fisheries and sustainable livelihood development, ICAR–Central Inland Fisheries Research Institute, Barrackpore, distributed cage nets and coracles to 25 tribal women fisher families at Umiyam Reservoir, Meghalaya, under its North Eastern Hills and Tribal Sub-Plan (TSP) programmes. Umiyam Reservoir, one of Northeast India's most important inland fishery resources, supports the livelihoods of numerous tribal fishing communities. Through science-driven interventions, ICAR-CIFRI has been transforming fisheries in the reservoir by promoting cage aquaculture, culture-based fisheries, fish stock enhancement, capacity building and scientific resource management. These initiatives have contributed to enhanced fish production, improved livelihood security and increased participation of women in fisheries-based enterprises. The distribution programmes, organised on 28 and 31 July 2026, were conducted by the ICAR-CIFRI Regional Centre, Guwahati, in collaboration with the Ri-Bhoi Farmers' Union (RFU), Meghalaya, and the Department of Fisheries, Government of Meghalaya. As part of the initiative, six scientifically designed cage nets were distributed to support cage aquaculture, while coracles were provided to improve mobility, operational efficiency and safety for women engaged in cage culture and reservoir fishing. It shows ICAR-CIFRI's commitment to empowering tribal and riparian communities through science-based fisheries interventions. The distribution of cage nets and coracles would strengthen women-led fisheries, promote sustainable livelihoods and enhance the resilience of inland fisheries in the Northeast. The long-standing partnership between ICAR-CIFRI and the Union in improving the socio-economic conditions of tribal fishing communities. The institute's sustained scientific support, which has significantly enhanced fish production while creating sustainable livelihood opportunities for reservoir-dependent families. Participants were also demonstrated the standard operating procedures for scientific cage culture and the safe operation of coracles, with emphasis on best

management practices and safety measures for reservoir fishing activities. The beneficiaries noted that the assistance would significantly strengthen the livelihoods of tribal women fishers and encourage greater participation of women in fisheries-based enterprises.

FISHERIES RESEARCH INSTITUTES AND REGIONAL RESEARCH CENTRES

India has several key premier fisheries research institutes under the Indian Council of Agricultural Research (ICAR) focused on marine, inland, freshwater, and technological advancements.

Major ICAR Fisheries Institutes

Central Marine Fisheries Research Institute (CMFRI): Located in Kochi, Kerala (established 1947); focuses on marine fisheries resource assessment and coastal-pelagic research.

Central Inland Fisheries Research Institute (CIFRI): Located in Barrackpore, West Bengal (established 1947); works on inland open-water fisheries, rivers, and reservoirs. Central Institute of Fisheries Technology (CIFT): Located in Kochi, Kerala (established 1957); specializes in fishing and fish processing technology. Central Institute of Fisheries Education (CIFE): Located in Mumbai, Maharashtra (established 1961); serves as a deemed university for higher fisheries education. Central Institute of Freshwater Aquaculture (CIFA): Located in Bhubaneswar, Odisha (established 1987); focuses on freshwater species breeding and culture. Central Institute of Brackish water Aquaculture (CIBA): Located in Chennai, Tamil Nadu (established 1987); researches brackish water fish and shrimp farming.

As reported by the Indian Council of Agricultural Research (ICAR), eight resource specific Fisheries Research Institutes operate across the country, supported by their research stations and centres (thirty research stations/Centres), located in diverse ecological zones. The ICAR has reported that four regional fisheries research centres are currently operating in Andhra Pradesh. These include the Kakinada Regional Centre of the ICAR–Central Institute of Fisheries Education (CIFE), which also maintains a field centre at Balabhadrapuram; the Regional Research Centre of the ICAR–Central Institute of Freshwater Aquaculture (CIFA) at Vijayawada; the Regional Research Centre of the ICAR–Central Marine Fisheries Research Institute (CMFRI) at Visakhapatnam; and the Regional Research Centre of the ICAR–Central Institute of Fisheries Technology (CIFT), also located in Visakhapatnam. ICAR has further indicated that there is no current proposal for establishing additional centres under ICAR in the State of Andhra Pradesh. A major initiative on Super-Intensive Precision Shrimp Farming has been launched by ICAR-CIBA and NFDB at Moolapolam, Srikakulam, to support commercial-scale adoption. Pangasius breeding and seed production technologies have been demonstrated to farmers and entrepreneurs, while indigenous ornamental fish breeding has been showcased in East Godavari. The state has also advanced integrated seaweed–shrimp winter cropping, particularly the co-culture of *Gracilaria salicornia* with *P. vannamei* in Srikakulam, promoting diversification and strengthening coastal livelihoods.

Considerations

Nutritional security: Fish is a nutritionally rich food product. Consumption of fish in a regular basis enrich nutritional level of human body. As an aquatic food, fish consumption has a good impact on human health. It is told & believed that aquatic protein & fat are comparatively more digestible than terrestrial protein & fat. India is a country where world's largest population is residing –there to maintain nutritional level of each human body, fish foods have a significant role. Fish is a low-fat, highly digestible food packed with high-quality protein, omega-3 fatty acids and essential vitamins like D and B12 that support heart & brain health.

Fish as a balanced food: Fish food is nutritionally rich, we know it. But many of people day by day considering fish food as a balanced food like milk, egg etc. It is seen that fishermen who are going to catch fish in deep sea, or the people living in coastal areas, they mostly consume fish as curry cause easily available of fish & not easily available of fresh vegetables, though their health is good. So, people are considering fish as a balanced food.

Make fish cultivation as a cottage industry: Fish is used as food, provides nutrition to body, selling fish there is opportunity to earn. In fish eating areas of country, fish cultivation as a technology is very useful. Every family having no pond to cultivate fish. But, now –a-days new technology to be used to provide everyone who wants to cultivate fish in small scale. Bio-floc technique, water tank fish farming, drum water fish cultivation technique etc. By that the fishermen can provide fish for his family, earn money by selling excess fish, above all whole round the year purchasing fish from market & spend lot of money is to be stopped. Fish cultivation in a small scale is showing the ray of hope to be a future cottage industry in rural areas mainly.

Use larger water bodies: Our country having over 173000 sq. km of rivers and canals, ponds & tanks spanning over 2 million hectares, covering more than 3 million hectares (over 1% of the country's land) man-made reservoirs offer major potential for open water and co-operative –managed fisheries. Beyond it, cold, oxygen-rich high-altitude waters in Himalayan regions support specialized cold-water fisheries like trout. Inland water bodies in India constitute nearly 4% of the country's total geographical area. If this huge area is used heavily for fisheries & other aquatic crops cultivation, obviously it will support country's economy in a better way.

Promote fish eating: Around 20 to 39% of the population in India identifies as vegetarian depending on the survey data and definition used. Convincing vegetarians to be non-vegetarians by consuming fish is need of the hour. Fish is a good, healthy food & fish protein is good for human heart and brain. If fish consumption enhances, it will enhance inland fish production as well as sea fish harvesting. Well organized fish markets will be developed due to high demand of fish which has a great impact on country's economy. Some people consider fish eating is a sin, but it is not true, it is food chain. If eating fish, animal is sin, then tiger is the most sinner. Sin is that when without any cause anybody killing any animal even an ant. Otherwise, poultry, fishery, goatary etc. where these animals are reared for eating, not harming natural animals or ecological balance. Beyond this logic if anybody consider animal eating is sin, when you consume curd, lakhs of bacteria you are consuming, bacteria come under animal kingdom, then what to do by you? Leave eating or leave life. Even in our

breathing, many bacteria enter in our body and our body's immune system kill them automatically. Is it killing, is it a sin? When body is affected by any disease may be bacteria, virus or protozoa-we consume medicine as tablet. By our own hand we are killing those animals, is it sin?

Value addition: Various value-added products to be developed from fish. Generally we consume/purchase raw fish from market, about value-added fish product, we have listened less. Hence, more innovation and invention both are needed to develop value-added fish product. Dry fish is a value-added product. A curry is cooked but taste is not so good, if fish is added, taste of curry will enhance. Instead of fish, if fish powder is added, taste of curry will also enhance. So fish powder is a value-added product. Similarly, if super fine fish powder is added in spices, spice quality will enhance, or to develop simply fish spice, will have better demand in future. By the value addition, excess raw fish can be processed & preserved as well as an earning opportunity for round the year.

Bio-diversity conservation: Package of practice of each fish is to be developed & circulated among fishermen. As a result, various fishermen will cultivate various types of fish according to their situation & ultimately fish biodiversity will be maintained. In time respect, many inland fish species are day by day extincting. Hence, bio-diversity conservation is necessity of the hour.

Empowerment of people: By fish cultivation, economic empowerment of people is possible. Fish having a demand in market & fish price is more compare to grains, vegetables, fruits. Hence, farmers along with their crop enterprise, if take interest on fish enterprise, obviously they will have comparatively better economic taste. Poor people can make their economic condition better by cultivation of fish. Fish cultivation upto a great extent natural calamity resistant. Hence, give home economy a stability.

One of strong pillar of vikshit Bharat-2047: Base of Indian economy is agriculture. Agriculture has three main economic pillars i.e. crop cultivation (Green revolution), milk production (white revolution) and fish production/harvest (blue revolution). In the year 2047, 100 years of Independence Day India is going to be vikashit Bharat or Developed nation. In this target, fishery plays an important role.

Cage culture/ Cage fish farming: Cage fish farming is a very good technology for fish cultivation. Another most important advantage of this technology is proper utilization of water body. Large water bodies-sea, river, canal, reservoir, quarry etc are properly used by this technology. A cage is placed in water body; fingerlings are released inside the cage & fish feed is provided regularly. For promotion of this up-to-date technology, extension agencies who are working at base level, must be more careful.

Food security: To provide food security to every Indian, we are cultivating crops in crop field. Whatever the production is coming nearly sufficient to provide food to countrymen. There are lots of water bodies in our country, if these water bodies are used to cultivate fish, rearing duck, cultivating water crops i.e. lotus, water lily, water chestnut, mukhna etc. obviously, this water production will give a strong support to total food production in our country as well as provides food security.

Maintaining ecological balance: By fish cultivation, proper utilization of water bodies is possible as well as food chain is maintained in nature which is ultimately conducive to maintain ecological balance.

Fishery: proper utilization of resource: Land is a resource, air is a resource, forest is a resource, in this line water or water body is also a resource. Due to pressure of population, land resource is overused, along with other resources use. But water resource is not properly utilized till today. Now-a-days more emphasis will be given on fishery along with aquatic crops cultivation means proper utilization of water resource. Food coming from land & food coming from water bodies both jointly are playing a great role in bringing food security for countrymen.

Fishery: natural calamity resistant up to a certain extent: Cultivated crops sometimes is destroyed by natural calamities like storm, cyclone, flood, drought, insect-pests, diseases invasion etc. But these things having less impact on fish cultivation. Hence, fish cultivation has better security of earning compare to crop cultivation.

Intensive resource utilization: In crop field, whatever way the intensive crop cultivation is possible, like intensive fish cultivation in water bodies is also possible. Few fish varieties get selling weight in three months, few in 4 months, few in 6 months. Considering it in a year, 4 or 3- or 2-times fish cultivation is possible which enhances economic returns & uplift the socio-economic condition of fishermen.

Livelihood security: In fish enterprise, it is possible to make livelihood secure. Fish provides more profit compare to crops.

Recognised fish selling national market development: To develop a recognised fish selling national market (s) in each state is need of the hour. Where a common fish farmer can get guarantee to sell his fish in reasonable price. This market will have fish processing facilities, preservation facilities, facility to sell fish in other state market as well as export facility to other countries. This effort obviously gives fish enterprise a jerk to progress further.

Fish based enterprise: To develop villages economically sound along with all other enterprises, emphasis will be given more on fish-based enterprises.

SHGs: Self-Help Groups are mainly formed by women. Now-a-days SHGs are the main pillar of economic development of women or base of women empowerment. If these groups along with all its activities include fishery as one of activities their financial condition will be comparatively better. It is seen that few of SHGs adopting fishery, developing themselves better way. Hence, SHGs members would be encouraged to adopt fishery in their activities (where it is possible).

CONCLUSION

In conclusion, the activities of the ICAR-Central Inland Fisheries Research Institute (ICAR-CIFRI) have been instrumental in transforming India's inland open-water fisheries into a sustainable, highly productive, and scientifically managed sector. Over its eight decades of operation, CIFRI's multi-dimensional approach has bridged

the gap between cutting-edge laboratory research and grassroots field applications. The overall impact of CIFRI's institutional activities can be concluded across five key pillars:

Technological Innovation and Production Enhancement:

(a) Yield Multiplication: CIFRI's scientific stocking and management guidelines have dramatically boosted fish production levels in reservoirs and wetlands (e.g., historical wetland yields of 150–250 kg/ha/year can scale up to 1,500–2,500 kg/ha/year under their protocols):- (b) Indigenous Milestones: From introducing landmark induced breeding and composite fish culture techniques to the commercialization of specialized floating fish feeds (*CIFRI Cagegrow*), the institute has consistently driven self-reliance in aquaculture.(c) Patented Breakthroughs: Recent advancements like securing patents for therapeutic technologies (*CIFRI ARGCURE*) and water treatments (*CIFRI-CleanMeen*) highlight its growing research-to-market strength. (c)

Ecosystem Restoration and Bio-Conservation: (a) Riverine Revitalization: CIFRI has played a central role in mega river ranching initiatives, particularly under the National Mission for Clean Ganga (NMCG), releasing millions of fingerlings to revive declining local species like Hilsa and indigenous catfishes. (b) Eco-Friendly Initiatives: Campaigns like *Khet Bachao Abhiyan* address environmental runoff and check nutrient eutrophication in wetlands by training adjacent agricultural communities on balanced fertilizer usage.

Precision Fisheries and Modernization: (a) **Next-Gen Monitoring:** The institute has actively adopted digital-age tools, deploying IoT-enabled sensors, AI, and drone technology for aerial mapping, water quality surveillance, and precision aquatic habitat assessments. (b) **Advanced Diagnostics:** Research is backed by intensive training in molecular tools (qPCR, PCR) to combat emerging fish pathogens and maintain biosecurity.

Livelihood Security and Socio-Economic Upliftment:-

(a) Community Empowerment: A core conclusion of CIFRI's extension work is its focus on marginalized groups, creating resilient livelihoods for thousands of tribal women, Scheduled Caste (SC) fishers, and rural small-scale fisheries.(b) Income Multiplication: By teaching local fishers to utilize pen/cage enclosures for premium species (which fetch 3 to 4 times the price of Indian Major Carps), CIFRI has effectively elevated rural income metrics. Ultimately, ICAR-CIFRI acts as the scientific backbone of India's Blue Economy. Its current trajectory aligns directly with national goals like *Viksit Bharat @2047*, moving from merely optimizing fish yields to pioneering climate-resilient, ecologically stable, and socially equitable open-water resource management. ICAR-CIFRI is committed to ensure better earth for the future generations.

Quotation

“No Fishermen, no fish.” — Lailah Gifty Akita
Without sound conservation and management measures, fisheries will quickly become depleted and a basic component of global food security will be lost.-Sigmar Gabriel

We heard of White & Green Revolution but now we need a Blue Revolution & harness the potential in fisheries sector.-- Narendra Modi

There is no sustainable future for fisheries as long as human populations continue to increase.--Paul Watson

To the naked eye, our oceans are beautiful. But scientists tell us that all of the world's fisheries will collapse by 2048, unless we change how we manage them. Help protect our oceans so the next generation can also enjoy their bounty.--Ted Danson
“The water is a dark flower and a fisherman is a bee in the heart of her.”

— Annie Proulx, *The Shipping News*

“A poor fisherman who knows the beauties of the misty mornings is much richer than a wealthy man who sleeps till noon in his palace!”

— Mehmet Murat ildan

Be patient and calm-for no one can catch fish in anger. -- HERBERT HOOVER

“There are only two occasions when Americans respect privacy. Those are prayer and fishing.” —Herbert Hoover
"Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime." —Maimonides

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