



Restoring Indigenous Fish Stocks in River Ganga through Scientific River Ranching

A Decade of Evidence-Based Interventions under the Namami Gange Programme

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Key Takeaways

- 205.5 lakh indigenous fish seeds released through 169 river ranching programmes between 2017 and 2025
- In a landmark first, the ICAR–Central Inland Fisheries Research Institute (ICAR-CIFRI) estimated annual fish catches in major rivers, including 15,134 tonnes in the Mahanadi and 18,902 tonnes in the Krishna
- Ranching carried out across ecologically critical stretches of the Ganga and its tributaries
- Focus on native species conservation, genetic integrity, and sustainable riverine fisheries
- Scientific interventions implemented by ICAR–Central Inland Fisheries Research Institute under the Namami Gange Programme.

Background and Rationale

For much of the past century, the Ganga has carried more than water. It has sustained livelihoods, fed communities, and anchored a dense web of biodiversity along its course. In recent decades, however, the river's native fish have thinned - casualties of habitat degradation, altered flow regimes, pollution and relentless, often unregulated fishing pressure.

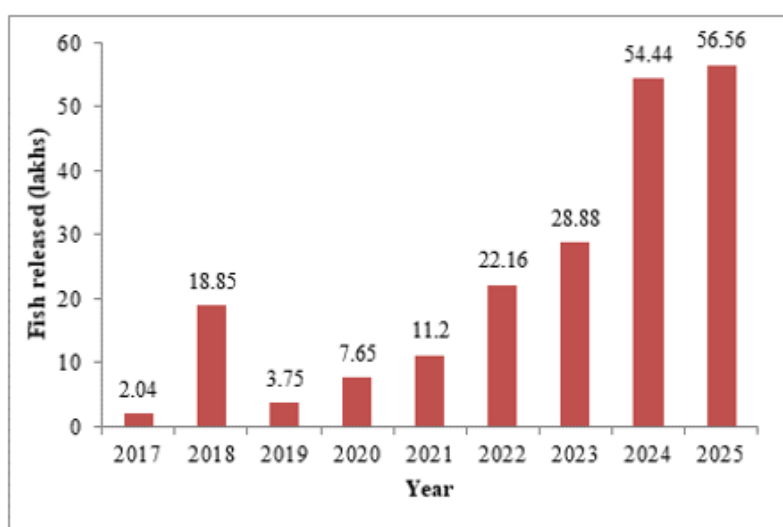
Over the last 10 years, a quieter effort has been underway to reverse that decline. Under the Government of India's **Namami Gange Programme**, the ICAR–Central Inland Fisheries Research Institute (ICAR-CIFRI) has carried out a large-scale programme of scientific river ranching - an intervention designed not merely to restock the river, but to restore its ecological balance.



Ranching by Former Union Minister for Water Resources, River Development and Ganga Rejuvenation, Sushri Uma Bharati at Barrackpore on 26th May 2017

The Scale of the Intervention

Between 2017 and 2025, ICAR-CIFRI organised 169 river ranching programmes across ecologically critical stretches of the Ganga and its tributaries. In that period, 205.5 lakh seeds of indigenous fish species were released into selected river segments. The emphasis has remained firmly on native species conservation, preservation of genetic integrity, and the long-term sustainability of riverine fisheries.



Impact of Ranching programmes

The programme has covered a wide range of indigenous species, including:

- Indian Major Carps (IMCs)
- Mahseer
- Native catfishes
- Chitala
- Freshwater scampi

To improve survival rates after release, the institute stocked the river with fingerlings and advanced fingerlings measuring 10–15 centimeters in length, with an average body weight of 100–120 grams. These were not generic hatchery fish. The seed were artificially bred from wild brooders collected directly from the Ganga, a step intended to safeguard native genetic lines. Before release, the fish were reared under controlled hatchery and nursery conditions to enhance their adaptability in natural waters.

A Targeted Geographic Strategy

The spatial distribution of these efforts reveals a deliberate strategy. Ranching was concentrated in stretches where ecological value and livelihood dependence intersect most sharply.

State-wise distribution of the 169 interventions during the reporting period shows:

- **West Bengal: 68%**
- **Bihar: 17%**
- **Uttar Pradesh: 9%**
- **Jharkhand: 5%**
- **Uttarakhand: 1%**

The concentration in West Bengal reflects both the ecological importance of its river stretches and the intensity of fishing activity in the lower reaches of the basin.

Measurable Gains

While ecological restoration is often measured over generations, early results suggest tangible gains. Fish landings of Indian Major Carps, a key indicator species group, have risen noticeably at major riverine centres.

- Prayagraj recorded a 24.7% increase
- Varanasi recorded a 41% increase



These improvements are largely attributed to sustained ranching interventions combined with associated conservation measures implemented under the **Namami Gange Programme**.

Beyond numerical increases, the initiative has helped rebuild native fish populations, strengthen the resilience of riverine ecosystems, and support the livelihoods of dependent fishing communities. It has also reinforced the role of science-based management in the stewardship of open-water fisheries.

- ICAR-CIFRI has developed the technique of artificial breeding of hilsa with cryopreserved milt and brood females collected from Hooghly estuary in 2025.
- A total of 3.82 lakhs of Hilsa adults were released in upstream of Farakka barrage in river Ganga. Of these, 6031 fishes were tagged.
- 54.91 lakhs of fertilized Hilsa eggs and 8.06 lakhs of hilsa spawn were released for improvement of natural Hilsa population.
- With the efforts of the institute yielding dividends, India has become the world's top producer of inland capture fishes with an annual production of 1.89 million tonnes, surpassing China.

- In a landmark first, the institute estimated annual fish catches in major rivers, including 15,134 tonnes in the Mahanadi and 18,902 tonnes in the Krishna.
- Sustainable management protocols were developed for four major estuaries - Hooghly-Matlah, Rushikulya, Mandovi-Zuari and Netravathi-Gurupur and three brackishwater lakes, strengthening science-based governance of these ecosystems.

Did You Know?

Reservoir fisheries management guidelines helped raise average productivity from 20 to 150 kg/ha/year, while wetland productivity increased from 600 to 1,600 kg/ha/year. These efforts culminated in the formulation of national reservoir fisheries management policy guidelines in 2025.

Leadership, Visibility and Public Engagement

Several of the ranching events were conducted in the presence of senior public representatives and policymakers, a signal of the national importance attached to restoring riverine biodiversity. These occasions doubled as platforms for:

- Public awareness
- Stakeholder engagement
- Promotion of sustainable fisheries practices across the Ganga basin



Ranching by Shri Nitin Gadkari, Minister for Road Transport & Highways, at Praygraj on 8th November, 2019



Ranching by Shri Shantanu Thakur, Union Minister of State for Ports, Shipping & Waterways, at Sahibganj, Jharkhand on 24th April 2023

An Institution with Deep Roots

Established in March 1947 at Barrackpore, West Bengal, ICAR-CIFRI has long been central to the evolution of inland fisheries research in India. What began as production-oriented research has matured into a broader ecosystem-based approach that integrates sustainability, conservation, livelihoods and nutritional security.

Did You Know?

The institute produced many stalwarts in the field of fisheries. ICAR-CIFRI's alumni Dr. V.G. Jhingran and Dr. S. Ayyappan are the only recipients of the Padamshri award in the country's fisheries fraternity.

River ranching sits within a larger scientific mandate that includes river and estuarine fisheries restoration, habitat characterisation, catch estimation, ecosystem services valuation, climate resilience research and policy support for inland open waters.

A Legacy of Scientific Stewardship

ICAR-CIFRI has developed enclosure culture technologies with diversified high value fish species like *Ompok bimaculatus*, *Labeo bata*, *Systomus sarana*, *Labeo rohita*, *Labeo rohita (Jayanti)*, *Labeo gonius*, *Osteobrama belengari*, *Cyprinus carpio haematopterus* and *Etroplus suratensis*, etc. at different geographical locations for increasing profitability and adoptability of cage farming.

- Three technologies ICAR-CIFRI-GI model cage, ICAR-CIFRI HDPE circular cage (16 m diameter, 5 m depth, 1005 m³ volume), and CIFRI-CAGEGROW feed have been developed and commercialised for promotion of cage culture.
- Cage culture produces an average of 3-4 MT of fishes per cage (96 m³) dimension with fast growing fish species like *Pangasianodon hypophthalmus* and *Oreochromis niloticus*.
- CIFRI CAGEGROW, BSF Floating Fish Feed, RESHMEEN are three fish feeds developed by the institute in last couple of years which are nutritionally balanced with better digestibility.
- CIFRI Fish Tanavhari and CIFRI ARGURE are the two health care products released by the institute with the objectives of reducing disease loss and harnessing higher returns.
- CIFRI GI cage, CIFRI Circular Cage, CIFRI FRP Coracle, CIFRI FRP Ornamental tank were the other technologies recently commercialised by the institute.
- Two patents namely 'Vertical gel electrophoresis' and 'Portable Split Beam Transducer Assembly on Water Craft for Measuring Exact Transducer Position Below the Water' were obtained.
- The institute is doing research on developing IoT (Internet of Things)-based technologies for:
 - Real-time monitoring and management of water quality parameters like DO, ammonia and turbidity
 - Drone-based technology for water sampling, floating macrophyte coverage area estimation, underwater fish behaviour studies using ROV (remotely operated vehicle), waterbody mapping using space technology etc.

Indian Inland Fisheries Informatics (INNF)

ICAR-CIFRI's Indian Inland Fisheries Informatics (INNF) revolutionises India's inland fisheries management through an integrated cloud platform combining machine learning, geospatial analytics, and data science.

Core Capabilities:

- **Unified Web-GIS portal:** Consolidates national inland fisheries related data, spatiotemporal visualization tracking environmental changes, intuitive dashboards converting complex data into actionable policy insights, secure, scalable architecture with continuous data enrichment.
- **RiverAquaMap:** Integrates CPCB (Central Pollution Control Board) water quality data with CIFRI-generated data to map aquatic life suitability nationwide and identify hypoxic risk zones and national trend.

The Road Ahead

The experience of the past decade suggests that river restoration is neither rhetorical nor symbolic. When evidence-based interventions are aligned with ecological principles and supported by long-term monitoring, they can produce measurable outcomes.

Scientific river ranching under the **Namami Gange Programme** demonstrates that depleted native fish stocks can be replenished without compromising genetic integrity or ecological balance. The task now is continuity - scaling such initiatives, sustaining research, deepening stakeholder participation and refining adaptive management. The future of river Ganga's biodiversity and fisheries potential will depend not on one season of stocking, but on persistent stewardship grounded in science.



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