Blue Revolution 2.0: Fisheries Entrepreneurship for Viksit Bharat @2047

The following article is a part of FIFP webinars conducted on 24th July, 2026 on the topic "Blue Revolution 2.0: Fisheries Entrepreneurship for Viksit Bharat@2047".

Note from the Chief Editor:

Blue Revolution 2.0: Fisheries Entrepreneurship for Viksit Bharat@2047 was the topic of FIFP webinar conducted on 24th July 2026. In contrast to Blue Revolution 1.0 that was primarily focused on production and expansion, Blue Revolution 2.0 shifts focus to value-driven innovation and technology-led fisheries. Pradhan Mantri Matsya Sampada Yojana (PMMSY) supports fisheries startups and technology upgrades. Government of India envisages adoption of a cluster approach under PMMSY to bridge gaps across the full value cycle. Dr George Ninan presented a very informative and enriching webinar on Blue Revolution 2.0 with special emphasis on fisheries entrepreneurship for Viksit Bharat. His presentation covered goals and targets of Blue revolution2.0 as envisioned by Government of India along with strategies to convert vision to reality. He explained in detail high-potential entrepreneurial avenues such as smart aquaculture, precision fisheries, post-harvest logistics, waste to wealth, and green enterprises. He highlighted the Core competencies of ICAR fisheries research institutions and how ICAR can handhold startups in fisheries & aquaculture. Presentation also covered how the dedicated platforms, the Zonal Technology Management Agribusiness Incubation Centre (ZTM–ABI) and the Fishery Incubation Centre (FIC) at ICAR-CIFT enable technology transfer, innovation, and business incubation activities. In addition, he threw light on new innovations from ICAR-CIFT. An overview of funding ecosystem and government schemes for startups was provided. Dr Ninan spelt out details of KSHITIJ 2.0, the Blue Horizon Cohort of ICAR that offers a unique platform for aqua-innovators, entrepreneurs, students, and young professionals to transform innovative ideas into viable fisheries and aquaculture ventures.

Introduction

Blue Revolution 2.0 envisions transforming fisheries into a powerful engine of growth for Viksit Bharat @2047, aligned with the economic goal of moving India toward a USD 30 trillion economy. Leveraging the Blue Economy for both food security and GDP expansion, the mission focuses on clear, measurable targets: raising fish production to 22 million tonnes under the proposed Second Blue Revolution, scaling seafood exports to ₹1 lakh crore (from the current peak of ~₹72,325 crore), and achieving 100% fish waste utilization through advanced value-addition and processing systems. Just as importantly, it aims to ensure livelihood security for over 30 million fishers and marginalized communities, enabling a paradigm shift from subsistence fishing to high-value entrepreneurship, where fishers evolve into FinTech & AgTech entrepreneurs rather than remaining dependent solely on catch-based income.

Strategies

To make this vision real, the strategy combines large-scale systems building with people-centered inclusion. It starts with infrastructure and value chains, including integrated cold chains, modern automated warehousing, and deep-sea fishing corridors supported through major harbor expansion under Sagarmala 2.0. It also adopts a cluster approach, implementing a Five-Year Cluster Development Program under PMMSY (Pradhan Mantri Matsya Sampada Yojana) to close gaps across the full value cycle, from pre-production and harvesting to post-harvest logistics. Alongside physical upgrades, technological modernization will be accelerated through AI-enabled ocean modeling, IoT-based monitoring, automated hatcheries, and advanced seaweed cultivation. The plan also expands inland fisheries by optimizing output across India's freshwater assets comprising 2.2 million hectares of ponds and tanks, and 29,000 km of rivers. Finally, the transition is made inclusive through women-led economic empowerment, strengthening Women FFPOs (Fish Farmer Producer Organizations), SHGs, and dedicated aquaculture startups ensuring that entrepreneurship grows with equity and opportunity.

Blue Revolution 1.0 vs Blue Revolution 2.0

Blue Revolution 1.0 was primarily focused on production and expansion, emphasizing volume growth, higher yields, and catch expansion. This approach supported historic progress, taking fish production to around 19.5 million tonnes by 2025, through broad national schemes managed in a more decentralised manner. It relied heavily on infrastructure such as fish landing centres and local harbour facilities, while most production continued through traditional pond aquaculture and coastal netting. However, the ecosystem and market side often lagged behind, leading to fragmented supply chains, high post-harvest losses, and growing risks like coastal degradation and unmonitored overfishing.

In contrast, Blue Revolution 2.0 shifts from merely producing more to building value, resilience, and technology-led fisheries. Its core philosophy centers on holistic income, climate-smart resilience, and delivering better quality and value. The flagship ambition is to reach 22 million tonnes and beyond through precision aquaculture, driven primarily through the ₹20,050 crore PMMSY framework. It strengthens infrastructure through integrated tech hubs, automated cold chains, and Sagarmala-linked projects, while upgrading production methods using advanced systems such as RAS, biofloc, and IoT-enabled monitoring for better traceability and control. Market organization also becomes more structured through FPO-led models and localized cluster development, and ecologically, the approach introduces stronger safeguards such as biosecurity, mariculture zoning, and carbon-neutral targets.

High-potential entrepreneurial avenues

A strong interconnected opportunity ecosystem for technology-led and sustainable fisheries can be developed across the following five high-potential entrepreneurial avenues.

1. **Smart Aquaculture**: Intensive & Automated

Adoption of Biofloc systems, high-density Recirculating Aquaculture Systems (RAS), and automated sea cages to increase production per cubic metre, improve resource efficiency, and reduce land requirements.

2. **Precision Fisheries**: Data & AI driven

Application of Artificial Intelligence, remote sensing, water-quality monitoring drones, Potential Fishing Zone (PFZ) data, and disease-alert systems to enable faster decision-making and create new technology-based B2B fisheries services.

3. **Post-Harvest Logistics**: Cold Chain & Market Access

Development of solar-powered micro-cold storage facilities and digital marketplaces to reduce post-harvest losses, improve product quality, strengthen cold-chain connectivity, and provide direct access to markets.

4. **Waste to Wealth**: Circular & High-margin enterprises

Conversion of fisheries and seafood processing residues into high-value bioproducts such as collagen, chitin-based packaging materials, and premium fish oils, creating additional revenue streams while promoting circular economy principles.

5. **Green Enterprises**: Climate-smart & Investible businesses

Development of sustainable enterprises based on clean energy, water recycling, seaweed cultivation, alternative feeds, and eco-friendly packaging, supporting climate resilience, resource efficiency, environmental sustainability, and investment opportunities in the fisheries sector.

How ICAR can handhold startups in fisheries & aquaculture

ICAR can play a pivotal role in handholding and accelerating startups in fisheries and aquaculture by bridging the gap between scientific research and commercial enterprise. Through Technology Transfer and Licensing, ICAR can provide startups with access to patented technologies, research innovations, and ready-to-commercialise solutions. Incubation and Mentorship through Technology Management Units and Agribusiness Incubation Centres (ABIs) can offer technical guidance, workspace, business mentoring, and entrepreneurial support. Pilot-scale production and prototyping can enable startups to access pilot-scale processing facilities, R&D infrastructure, and technical expertise to develop, test, and refine innovative products. ICAR can also support Go-to-Market strategy and commercialisation through guidance on branding, market positioning, packaging innovation, and business-model development, helping startups successfully enter domestic and international markets. Through skill development and capacity building, ICAR institutes can conduct entrepreneurship development programmes, hands-on workshops, technical training, and specialised programmes tailored to fisheries and aquaculture entrepreneurs. Policy and regulatory guidance can help startups navigate licensing requirements, sustainability standards, food safety regulations, and international trade requirements. Market linkages and industry connect can facilitate collaborations with industry stakeholders, seafood processors,

exporters, retailers, investors, and other market players, creating opportunities for business growth and scale-up. Finally, through Testing, Validation and Certification, startups can access ICAR's specialised laboratories, research infrastructure, and field-trial facilities for product testing, performance validation, quality assurance, regulatory compliance, and certification, thereby strengthening the credibility and market readiness of their innovations.

Core competencies of ICAR fisheries research institutions

Fisheries research institutions serve as the institutional backbone of the fisheries sector, providing the scientific foundation required to translate research and laboratory innovations into market-ready technologies, protocols, and commercial applications. The ICAR fisheries research institutions collectively provide specialised expertise covering the entire fisheries and aquaculture value chain, from resource assessment and sustainable production to post-harvest processing, education, conservation, and genetic resource management. ICAR-CIFT specialises in advanced harvest and post-harvest fish processing technologies, value addition, product development, and related fisheries engineering solutions. ICAR-CMFRI focuses on marine fishery resource assessment, sustainability monitoring, and the development of commercial open-sea cage mariculture technologies. ICAR-CIFE provides world-class higher education, institutional training, and human resource development in fisheries science and allied disciplines. ICAR-CIBA develops technological systems for brackish-water aquaculture, including shrimp, mud crab, and coastal finfish farming. ICAR-CIFRI focuses on sustainable ecosystem management and productivity enhancement of rivers, reservoirs, estuaries, and other open inland waters. ICAR-CIFA specialises in scientific freshwater aquaculture, genetic improvement, breeding technologies, and sustainable farming practices for freshwater fish species. ICAR-CICFR contributes technologies for aquaculture development, resource management, and conservation of cold water and hill-region aquatic species. ICAR-NBFGR focuses on the collection, cataloguing, conservation, characterisation, and DNA barcoding of India's diverse aquatic genetic resources, supporting their sustainable utilisation and long-term conservation.

Deep dive – ICAR-CIFT's dual engines for startups

ICAR-CIFT manages technology transfer, innovation, and business incubation activities through two dedicated platforms: the Zonal Technology Management – Agribusiness Incubation Centre (ZTM–ABI) and the Fishery Incubation Centre (FIC). The ZTM–ABI Centre, established in 2009, operates under the Ministry of Agriculture, Government of India, and functions as an ICAR-supported incubation platform under the National Agricultural Innovation Fund (NAIF) Plan Scheme, providing a structured ecosystem for technology management, entrepreneurship, and agribusiness development. The Fishery Incubation Centre (FIC), established in 2025, is supported by the Ministry of Fisheries, Department of Fisheries, under the Pradhan Mantri Matsya Sampada Yojana (PMMSY), with specific focus on fostering innovation, entrepreneurship, technology adoption, and business development in the fisheries and aquaculture sector. Together, these two centres provide complementary pathways for technology commercialisation, startup incubation, technical mentoring,

prototyping, capacity building, and market-oriented innovation, strengthening the bridge between fisheries research and entrepreneurship.

Support through ICAR-CIFT Business Incubation Centre

The ICAR-CIFT Business Incubation Centre provides comprehensive incubation facilities under one roof, including office space, pilot plants, laboratories, and a library, enabling startups and entrepreneurs to develop, test, refine, and commercialise fisheries-based innovations. The pilot plant facilities include process lines for chilled and frozen fish, coated fish products, ready-to-eat (RTE) fish products, extruded fish products, fish sausages, smoked fish products, fish-based cookies, fish pickles, fish wafers, chitin and chitosan, protein hydrolysates, collagen peptides, and advanced packaging solutions. The Centre also houses a National Reference and Referral Laboratory, recognised by the Food Safety and Standards Authority of India (FSSAI), Ministry of Health and Family Welfare, Government of India, providing specialised testing and analytical support. Facilities available to incubatees include a Pilot Plant Facility, Product Development Centre, Engineering Workshop, Net Fabrication Unit, Fishing Float Testing Unit, Pilot-Level Wood Preservation Facility, and Animal House. In addition, ICAR-CIFT offers specialised training programmes covering Quality Assurance, Fishing Technology, Fish Processing Technology, HACCP concepts and certification, production of value-added fish products, operation and maintenance of cold-storage plants, laboratory techniques for microbiological examination of seafood, and modern analytical techniques in biochemistry and microbiology, thereby providing startups with the technical infrastructure, knowledge, skills, and support required for successful product development and commercialisation.

ICAR-CIFT IPR portfolio

The Intellectual Property Rights (IPR) portfolio of ICAR-CIFT is managed and protected through the Zonal Technology Management Centre (ZTMC). The Centre is responsible for the protection, management, and commercialisation of ICAR-CIFT's intellectual assets through various forms of intellectual property, including patents, industrial designs, copyrights, and trademarks. This structured IPR management framework helps safeguard innovative technologies and research outcomes while facilitating their technology transfer, licensing, commercialisation, and adoption by industry and startups.

Spotlight on new innovations from ICAR-CIFT

ICAR-CIFT continues to strengthen innovation and technology development in fisheries and aquaculture, with several promising technologies and innovations receiving patent protection in 2026. Recently granted patents include an apparatus for hypothermic anaesthetisation of aquatic animals prior to live transport; antioxidative bio-composite films; a solar-powered feed distributor system for aquaculture; an apparatus for rearing aquatic species; an IoT-based system for antibacterial photodynamic inactivation; nanofibers and a process for their preparation; and a green process for the extraction of bioactive compounds from brown seaweeds. In addition to patent-protected innovations, ICAR-CIFT has

developed an Empanelled Manufacturing Model to facilitate the fabrication and adoption of selected fisheries technologies through empanelled manufacturers. These technologies include hybrid solar dryers, solar tunnel dryers, hot-air-assisted continuous infrared dryers, refrigerated fish vending kiosks, fish-smoking kilns, and fish descaling machines in both hand-operated and motorised versions, providing practical solutions for processing, preservation, value addition, and improved post-harvest management.

CIFT–TED manufacturing network

The ICAR-CIFT TED Manufacturing Network comprises 14 empanelled manufacturers across 9 states in India, supporting wider access to TED technology and promoting sustainable fishing practices.

Products launched by ICAR-CIFT clients

Products launched by ICAR-CIFT clients include a diverse range of fisheries and seafood-based innovations, such as TEDs, fresh fish stores for chilled fish, dry seafood, seafood pickles, fish cutlets, fish fingers, fish burger patties, fish samosas, fish wafers, fish cookies, fish mixtures, prawn chutney powder, prawn biryani, fish biryani, instant fish soup, chitin, chitosan, and natural pure-phase hydroxyapatite, among other value-added seafood and fisheries products.

Funding ecosystem and government schemes for startups

India offers a diverse funding ecosystem to support startups in fisheries, aquaculture, and allied sectors. PMMSY supports fisheries startups and technology upgrades, while the FIDF provides infrastructure financing for large-scale fisheries and aquaculture projects. For incubation and grants, NAARM–a-IDEA provides incubation, mentoring, networking, and investment support for agri-food startups; RKVY–RAFTAAR offers incubation and grant support of up to ₹5 lakh at the idea/pre-seed stage, while BIRAC BIG provides funding of up to ₹50 lakh from ideation to proof of concept. For startup enablement, MUDRA and Startup India provide access to business finance and eligible startup benefits, while KIED supports reimbursement of technology-transfer costs up to ₹1.5 lakh. In addition, NABARD's AgriSURE, a ₹750 crore fund, supports innovative agriculture and rural startups, including enterprises in the fisheries sector.

KSHITIJ 2.0 – the Blue Horizon Cohort by ICAR

KSHITIJ 2.0 – The Blue Horizon Cohort offers a unique platform for aqua-innovators, entrepreneurs, students, and young professionals to transform innovative ideas into viable fisheries and aquaculture ventures. Participants gain knowledge of innovations developed by ICAR fisheries research institutes across India, along with expert mentoring from scientists, innovators, and industry professionals. The programme provides access to technical guidance, business support, incubation inputs, and exposure to business opportunities and innovation ecosystems, enabling participants to refine ideas, develop business ventures, and expand professional networks. The programme follows a Hub-and-Spoke Model, with ICAR-CIFT as the

Hub Institute and CIBA, CIFA, CIFE, CICFR, CMFRI, CIFRI, and NBFGR as participating Spoke Institutes.

The KSHITIJ 2.0 programme is scheduled from July 2026 to March 2027. Applications can be submitted through the ICAR-CIFT website (www.cift.res.in) following the call for applications, with submissions made through the Accubate Portal. Selected participants are expected to receive confirmation by the last week of August 2026. In addition, seed funding is available through the Fisheries Incubation Centre (PMMSY) under the CIFTEQ IDEATHON, offering seed capital of ₹50,000 and an accelerated fund of up to ₹4 lakh, providing early-stage financial support to promising fisheries and aquaculture innovations.

Conclusion

Blue Revolution 2.0 of Government of India focuses on value-driven innovation and technology-led fisheries along with ensuring livelihood security for over 30 million fishers. There is a paradigm shift from subsistence fishing to high-value entrepreneurship. KSHITIJ 2.0, the Blue Horizon Cohort by ICAR is designed for students, research scholars, young innovators, startups, aspiring entrepreneurs, early-stage venture teams, and professionals working in fisheries, aquaculture, seafood processing, and allied sectors, as well as applicants with innovative ideas, technologies, products, or service concepts. By connecting research institutions, startups, government schemes, finance, industry, infrastructure, and markets, India can build a resilient and sustainable fisheries ecosystem capable of generating employment, enhancing fisher incomes, promoting innovation, and making a significant contribution to the vision of Viksit Bharat @2047.

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Dr. George Ninan is Director, Central Institute of Fisheries Technology, Kochi under the Indian Council of Agricultural Research. Dr. George Ninan is a distinguished alumnus of the School of Industrial Fisheries at Cochin University of Science and Technology (CUSAT), where he graduated at the top of his class with an M.Sc. in 1990. He later completed his Ph.D. in Marine Sciences from CUSAT in 2009. His doctoral research earned him the prestigious Jawaharlal Nehru Award in 2010, alongside the 2011 A.V. Jones Young Scientist Award. Dr. Ninan officially began his research career in 1997 by joining the Agricultural Research Service (ARS) as a scientist at the ICAR Central Institute of Fisheries Technology (CIFT).

As a leading expert in post-harvest fish technology, Dr. Ninan specializes in fish shelf-life assessment, value-added by-products, and fishery waste management. He has served as the Principal Investigator for 20 major research programs and authored over 250 peer-reviewed articles. Before becoming Director, he led ICAR's Agri-Business Incubation Unit and the Zonal Technology Management Centre. In these roles, he mentored more than 200

business incubatees and helped build a unique Fishery Incubation Centre funded by the Ministry of Fisheries.

Under Dr. Ninan’s leadership, ICAR-CIFT has been designated as the Apex National Reference Laboratory by the Food Safety and Standards Authority of India (FSSAI). The institute's facilities hold NABL accreditation dating back to 2006, covering more than 4,713 parameters across chemical, biological, and mechanical testing. Beyond the institute, Dr. Ninan influences national policy by serving on the FSSAI Scientific Panel for Fish and Fishery Products and chairing the Food Hygiene and Safety Management Sectional Committee (FAD 15) at the Bureau of Indian Standards (BIS) and various other committees of the Dept of Fisheries, Govt of India