STI Hub in Fisheries: Pioneering Innovation for a Sustainable Future

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ICAR – CMFRI

The 'Science, Technology, and Innovation (STI) Hub in the Fisheries Sector' at Kochi Corporation, Ernakulam district, Kerala, is an externally funded project awarded to the ICAR-Central Marine Fisheries Research Institute (CMFRI) by the Department of Science & Technology (DST), New Delhi, for the period 2022–2025, with a budget of ₹3.18 crores. This initiative aims to enhance the institute's infrastructure while implementing fisheries-based interventions to benefit Scheduled Caste communities.

Strategic Goals:

The project aims to empower Scheduled Caste (SC) fisherfolk by mobilizing and strengthening Self-Help Groups (SHGs) and individual enterprises in the marine fisheries sector of central Kerala. A key focus of this initiative is to identify location-specific, fishery-based micro-enterprises that cater to the needs of SC stakeholders while promoting Entrepreneurial Capacity Building (ECB). This is achieved through targeted training programs and the adoption of economically viable and sustainable micro-enterprises. Additionally, the project seeks to elucidate and document successful ECB cases among SHGs and individual SC entrepreneurs,

leveraging **Information and Communication Technology (ICT) interventions** to contribute to the STI Hub. A crucial component of this initiative is facilitating linkages between SHGs/entrepreneurs and technical, institutional, and financial organizations**,** ensuring long-term empowerment and sustainability in the sector.

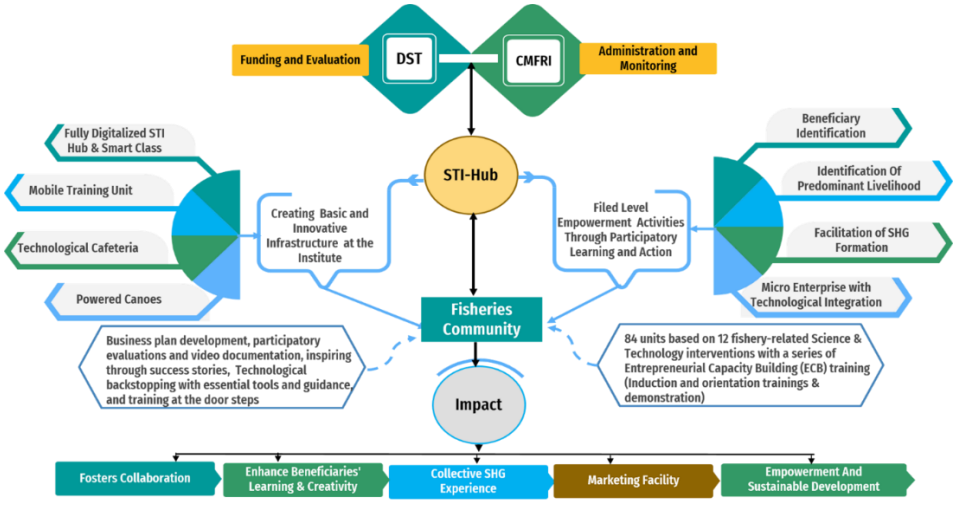
Execution Framework

The Science, Technology, and Innovation (STI) Hub in the Fisheries Sector aims to empower Scheduled Caste (SC) fisherfolk by mobilizing and strengthening Self-Help Groups (SHGs) and individual enterprises in the marine fisheries sector of central Kerala. A key focus of this initiative is to identify location-specific, fishery-based micro-enterprises that cater to the needs of SC stakeholders while promoting Entrepreneurial Capacity Building (ECB)**.** This is achieved through targeted training programs and the adoption of economically viable and sustainable micro-enterprises. Additionally, the project seeks to elucidate and document successful ECB cases among SHGs and individual SC entrepreneurs, leveraging Information and Communication Technology (ICT) interventions to contribute to the STI Hub. A crucial component of this initiative is facilitating linkages between SHGs/entrepreneurs and technical, institutional, and financial organizations, ensuring long-term empowerment and sustainability in the sector.

Conceptual Model of STI Hub

The Science, Technology, and Innovation (STI) Hub Project is designed to facilitate Self-Help Groups (SHGs) and individual entrepreneurs in establishing and strengthening linkages with

government and financial institutions. This will enable them to access financial credit and livelihood entitlements, ensuring effective resource mobilization through appropriate Human Resource Development (HRD) intervention programs. A key aspect of this initiative is fostering self-sustainability, where the experiential knowledge gained by SHGs will empower them to continue operating income-sustaining enterprises independently. The STI Hub at CMFRI operates under a unified collaboration with various institutional entities, including the Agricultural Technology Information Centre (ATIC), Fishery Resource Assessment, Economics and Extension Division, Programme Monitoring and Evaluation Cell, and Krishi Vigyan Kendra (KVK) of CMFRI. Additionally, the initiative ensures market sustainability by leveraging the ATIC sales counter as a practical sales outlet for SHG products, thereby providing a dedicated platform for marketing and long-term economic viability of the interventions.



Geographical Scope and Beneficiary Outreach of the STI Hub Project

The STI Hub Project is strategically implemented in the central zone of Kerala, with a primary focus on Ernakulam district, aiming to establish a robust Science, Technology, and Innovation (STI) ecosystem in the fisheries sector. The project specifically targets coastal areas with a high concentration of Scheduled Caste (SC) households, including Vypin, Narakkal, Elamkunnappuzha, Cherai, Vallarpadam, Chellanam, and Paravoor. Additionally, the initiative may extend its impact to selected border regions of Thrissur, Alappuzha, and Kottayam districts to ensure broader outreach and inclusivity. A total of 500 SC fisherfolk, comprising men, women, and transgender individuals, will be engaged as direct beneficiaries, representing 500 households. Through this structured intervention, the project is expected to generate a cascading effect, benefiting an estimated 2,500 indirect beneficiaries, significantly enhancing livelihood opportunities, economic stability, and social empowerment within the SC fisherfolk communities.

Practical Implementations of the STI Hub: Empowering SC Fisherfolk through Entrepreneurial Capacity Building

The STI Hub is dedicated to fostering Entrepreneurial Capacity Building (ECB) among Self-Help Groups (SHGs) of Scheduled Caste (SC) beneficiaries and individual entrepreneurs by imparting hands-on training in cutting-edge fisheries-based technologies. Key focus areas include cage culture, pearl spot seed production, fish vending,

fish fertilizer production, value addition, integrated fish farming, fish culture, mussel culture, oyster culture, clam collection, fish drying, and advanced fish value addition techniques.

Training will be systematically conducted in three phases: awareness programs, orientation training, and practical demonstration sessions. To ensure long-term impact, all data, success stories, and scientific advancements in fisheries technology will be meticulously digitized and documented in the state-of-the-art Data Documentation Centre at the STI Hub of CMFRI. This centre will be equipped with an Entrepreneur Consultancy Cell, an Entrepreneur Technology Park, and a Digital Training Hall, serving as a knowledge repository and practical reference for sustaining and scaling fisheries-based entrepreneurial ventures.

To extend its reach across potential locations, the STI Hub's field initiatives will be executed through a Mobile Training Unit equipped with essential laboratory instruments, canoes with safety gear, and cutting-edge digital tools such as high-resolution cameras and drones for real-time documentation and impact assessment of interventions. This dynamic approach ensures effective dissemination of technology-driven fisheries innovations, fostering self-reliance and economic empowerment among SC fisherfolk communities.

Progress and Impact: Advancing Fisheries-Based Microenterprises under the STI Hub

The STI Hub Project has made significant strides in promoting fisheries-based microenterprises across eight districts of Kerala,

including Ernakulam, Thrissur, Kottayam, Alappuzha, Kozhikode, Kannur, Pathanamthitta, and Kollam. A total of 71 microenterprises have been successfully initiated, building on the 57 enterprises established during the first and second years of the project. Additionally, 13 new interventions have been implemented in various parts of the state, further expanding the project's reach and impact.

These microenterprises cover a diverse range of fisheries-related activities, including cage culture, pearl spot seed production, fish vending, fish culture, ornamental fish culture, integrated fish farming, fish fertilizer production, value-added fish products, mussel culture, oyster culture, clam processing, and dry fish production units.

To date, the initiative has directly benefited 400 individuals, comprising 197 men, 197 women, and 6 transgender beneficiaries, empowering them with sustainable livelihood opportunities and enhancing their economic resilience through technology-driven fisheries entrepreneurship.

Transforming Livelihoods: The Impact of the STI Hub on SC Fisherfolk Communities

The Science, Technology, and Innovation (STI) Hub Project is a groundbreaking initiative aimed at enhancing the livelihoods of Scheduled Caste (SC) fisherfolk through the implementation of 12 distinct fisheries-based microenterprises, replicated across 84 targeted interventions.

Among these interventions, cage culture has emerged as a promising livelihood and nutritional security solution, with significant potential to expand employment opportunities, improve the socioeconomic status of fisherfolk, and boost aquaculture production at a global scale. The pearl spot seed production venture addresses the persistent challenges of seed scarcity, poor survival rates, and inferior quality stock, ensuring a consistent supply of superior fish seed for sustainable fish farming.

The establishment of value-added fish product units has facilitated year-round production and supply of processed fish products, enhancing economic viability. Fish vending units, equipped with transparent display cases, allow consumers to select fresh fish while extending shelf life by 4 to 5 days, increasing profitability for vendors. Fish drying, predominantly carried out by fisherwomen in coastal regions, has been revolutionized through the adoption of modern drying technologies, improving hygiene standards, ensuring food safety, preserving fishery resources, and boosting income generation.

Fish culture, a critical sector for income generation and job creation, particularly for local youth, offers an accessible and low-risk aquaculture model that strengthens food security and protein availability for marginalized communities. The cultivation of mussels and oysters, which require minimal investment and no supplementary feed, provides a highly nutritious and sustainable source of protein, fat, and carbohydrates for indigenous communities while generating steady income within just six months.

Clam collection and processing not only create employment opportunities but also contribute to nutritional well-being, as clams are rich in vitamins, proteins, iron, and essential nutrients that support heart and thyroid health.

The implementation of integrated fish farming technology has transformed waste management practices by repurposing by-products from different subsystems to enhance productivity and reduce production costs. This model promotes economic efficiency, diversification of aquaculture activities, and the integration of allied enterprises, ensuring higher profitability. Similarly, fish fertilizer production effectively addresses waste disposal challenges by converting fish market and processing industry waste into biofertilizers, serving as a sustainable plant growth promoter. Given its low capital requirement, this sector is highly accessible to marginalized communities, promoting income generation and environmental responsibility.

The ornamental fish culture industry, another key intervention, leverages the growing domestic market for marine and freshwater aquaria, stimulating the expansion of subsidiary industries and providing a stable livelihood for economically disadvantaged populations.

Unlike conventional fisheries projects, the STI Hub is unique in its practical implementation of diverse, location-specific, technologically feasible, economically viable, and environmentally sustainable interventions. It is specifically designed to uplift SC fisherfolk, who face numerous socio-economic challenges, including

marginalization due to mechanization, unemployment, financial distress, high investment demands from motorization, inter-sectoral conflicts, shifting job opportunities, out-migration, and the erosion of traditional skills.

The STI Hub facilitates the development of linkages between SHGs, individual entrepreneurs, government agencies, and financial institutions, ensuring access to credit, livelihood entitlements, and resource mobilization through targeted Human Resource Development (HRD) programs. Sustainability is further reinforced through strategic collaborations with the Agricultural Technology Information Centre (ATIC) of CMFRI and Krishi Vigyan Kendra (KVK), with the ATIC sales outlet serving as a dedicated platform for marketing SHG-produced goods, ensuring long-term viability even beyond the project's funding period.

Additionally, the fully digitized STI Hub at CMFRI operates within an extensive network of institutional and community partnerships, including Knowledge Institutions (KIs), local NGOs, voluntary organizations (VOs), and last-mile delivery systems. The project integrates backward linkages with scientific organizations and agricultural/fisheries universities for technology transfer and innovation, while also establishing forward linkages with SHGs, Farmer Producer Organizations (FPOs), and Farmer Producer Companies (FPCs) to ensure the sustainability and scalability of fisheries-based entrepreneurial ventures.

Integrated farming at Thengathara

Mussel farming unit at Kottappuram

Ornamental fish culture unit under construction at Pulprapadi

Training programme for Clam processing unit at Panambukadu, Vaikom

Bund preparation for fish culture at Tharavattom

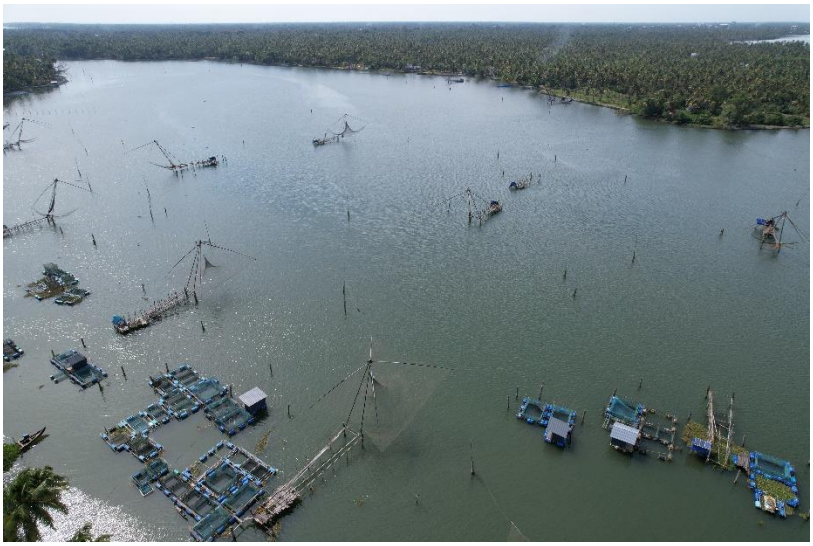
Fertilizer unit at Puthanchira

Fish culture at Ezhikkara

Sample collection of Cage culture unit in Thuruthipuram

Bund Preparation for fish culture

Fish culture seed stocking at Thravattom



Cage culture site of STI Hub in Thuruthipuram

Mussel & Oyster Culture site at Kottappuram, Kodungallur