



STRATEGIC PLAN (2011 - 2016)

Central Institute of Fisheries Technology
(Indian Council of Agricultural Research)
Willingdon Island, Matsyapuri, P.O. Cochin- 682 029 (Kerala)

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Preamble

The Central Institute of Fisheries Technology (CIFT) is the only national Institute working on all aspects related to harvest and post harvest technologies in fish. The CIFT was set up as Central Fisheries Technological Research Station on the recommendations of a high power committee constituted by the Ministry of Food and Agriculture, Government of India. It started functioning at Cochin on 29th April 1957, under the Department of Agriculture of the then Ministry of Food and Agriculture. The initial complement of craft and gear researchers was expanded to include the fish processing in 1958 and extension in 1961. The Institute was given its present name in 1962. The administrative control of the Institute was brought under the Indian Council of Agricultural Research from 1st October, 1967. The Headquarters of the Institute is at Cochin with Research Centres at Veraval (Gujarat), Visakhapatnam (Andhra Pradesh) and Mumbai (Maharashtra). Research work of the Institute is orchestrated through seven Divisions viz., (i) Fishing Technology Division, (ii) Fish Processing Division, (iii) Quality Assurance & Management Division, (iv) Biochemistry and Nutrition Division, (v) Microbiology, Fermentation and Biotechnology Division, (vi) Engineering Division and (vii) Extension, Information and Statistics Division.

The Institute has well equipped laboratories with modern, sophisticated, state-of-the-art equipment for both fundamental and applied research, an excellent library, a workshop and an animal house, an Agricultural Knowledge Management Centre (AKMC) and Agricultural Technology Information Centre (ATIC). The laboratories of the Institute also cater to the needs of the industry by testing processed fishery products, ice, water, and other materials like fishing gear and craft materials, packaging materials, marine paints, fishing craft and engines. A Business Planning & Development (BPD) Unit is also functional in the Institute to ensure commercialization of technologies on a public-private partnership mode. The Institute also facilitates IP management of ICAR Institutes in the Southern region through the Zonal Technology Management Centre (ZTMC).

The Central Institute of Fisheries Technology has played a vital role in the modernisation of Indian fisheries and in the development of both the fishing and fish processing industries to its present stature. The impact of CIFT on the development of fishing, seafood processing, seafood safety and quality control in India is well recognised. The Institute played an important role in facilitating mechanisation and modernisation of fishing fleet and introduction of durable synthetic fishing gear materials and improved gear designs and practices in Indian fisheries. The Institute's interventions have resulted in the adoption of improved methods of trawling, purse seining, gill netting, lining and trap operations and efficient vessel designs; improved methods of fish curing, fish processing, fish based value added products, fish waste utilisation and packaging; sanitary and hygienic standards based on microbiological and biochemical quality parameters and HACCP. CIFT has gained recognition for the production of bioactive and pharmaceutical compounds from aquatic resources.

The Institute has developed several instruments and machineries for meeting specific needs of fishing and fish processing sectors. Recent focus has been on development of conservation technologies such as energy efficient fishing vessels, bycatch reduction technologies, juvenile excluder devices, turtle excluder devices, energy efficient fishing gears, renewable energy based fish processing systems such as solar fish dryers and utilisation of fishery byproducts and fishery wastes, intelligent and active packaging systems and development of innovative quality systems.

Research Centres in different parts of the country caters to redressal of location specific technological problems faced by the industries. CIFT gained the status as referral laboratory in fishery technology. It is also accredited by National Accreditation Board for Laboratories (NABL). The Institute conducts regular need based training programs in responsible fishing techniques, fish processing, value added fish based products, quality assurance systems, fisheries microbiology and biochemistry and stakeholder empowerment programmes particularly targeting women and weaker sections with specific programmes for backward areas of Islands and North East region of the country. CIFT has been awarded as best Institute in the ICAR system twice, in the years of 2000 and 2006.

While the fisheries sector is facing challenges in terms of excess capacity, resource depletion and changes in the fisheries environment in the coastal waters, under-utilised and unutilised resources in the deeper waters hold potential along with rapid expansion envisaged in the aquaculture sector and culture based capture fisheries from reservoirs. This calls for dual strategies of application of resource conservation technologies in the shelf waters under an appropriate management plan and diversification of fishing to under-utilised resources such as mesopelagics, cephalopods and large pelagics in the deeper waters. Greater focus is required for development of appropriate post-harvest technologies for the new and under-utilised resources and for handling the probable production enhancements from aquaculture and culture based capture fisheries. Seafood safety systems and standards for the domestic market require focused attention, while continuous attention is required to deal with emerging challenges in terms of stricter quality standards, compliance requirements and policy changes by the importing nations. Expanding aquaculture and culture based capture fisheries would bring in its own challenges in terms of the need for development of region specific harvesting systems, market specific processing, value addition, product development, and quality assurance systems. Minimisation of harvest and post-harvest losses and conservation of energy in the harvest and post-harvest operations would be important policy objectives and technology challenges for the future.

Section 1: Vision, Mission, Objectives and Functions

Vision

To facilitate sustainable harvesting and total utilization of fishery resources through innovations in harvest and post harvest technologies.

Mission

Ensure responsible harvesting of fishery resources through eco-friendly, energy efficient and economical means; ensure total utilization of the harvested fish through appropriate processing, value addition, packaging and waste utilization; ensure food safety and nutritional security to the consumer and minimise carbon and water footprint per unit volume; and to ensure equitable benefits to the stakeholders, across the value chain.

Objectives

- To conduct basic, strategic and applied research in fishing and fish processing.
- To develop designs for fuel efficient fishing vessels and fishing gear for responsible fishing.
- To develop technologies for commercial isolation of bioactive compounds and industrially important products from fish and fishery wastes.
- To design innovative implements and machineries for fishing and fish processing and pilot plants for facilitating commercialization of technologies developed.
- To do advanced research in food safety in fish and fishery products.
- To provide training and consultancy services in fishing and fish processing.

Functions

- Develop technologies for responsible harvesting of fishery resources from marine, inland and aquaculture systems.
- Provide technologies for total utilization of harvested fishery resources.
- Facilitate introduction of green technologies in the fishing and fish processing sectors, to minimise carbon footprint of seafood.
- Prospect the aquatic resources for bioactive molecules and novel genes of pharmacological, nutraceutical or industrial value.
- Develop quality systems and standards appropriate for export and domestic markets.
- Facilitate technology commercialization through means such as consultancies, training, demonstration and extension education, semi-commercial production facilities for private incubatees, through proactive Public-Private partnership.
- Capacity building of the scientific manpower as well as the stakeholders.

Section2 : Assessment of the Situation in Fisheries Sector

Fisheries is a major source of food and provides employment and economic benefits to large sections of the society in India. Fish is also very significant nutritionally, being an important source of quality proteins and fats as well as vitamins and minerals, though consumption still tends to be low at the national level.

In the primary sector, the production has witnessed a plateauing of catches from the marine and inland capture fisheries while showing an increasing trend in aquaculture production. The scenario in the marine sector is that unbridled expansion of fishing effort is taking place leading to depletion of resources and inter-sectoral conflicts due to open access nature of the fisheries. About 2,44,000 fishing crafts of various sizes and classes are under operation. Problems of juvenile finfish mortality and bycatch and discards increased with the intensification of shrimp trawling. The need for sustainability and conservation of resources has taken centre stage in the shelf fisheries.

In the inland sector, the productivity of riverine systems remain low and there is general agreement among fishery experts that the overall production from Indian reservoirs could be substantially raised, with adequate management measures such as optimum fishing effort, responsible fishing, stocking support and mesh size regulation. Fishing implements employed for inland fisheries of India are traditional and are mostly of non-selective type, and also include prohibited practices like fishing with poison and explosives. Fishing crafts are largely traditional with fibreglass canoes catching up in certain areas.

Emerging trends and issues in aquaculture are organic aquaculture; integrated agriculture-aquaculture; open sea cage culture; live transportation of crabs, lobsters and finfishes; marine and freshwater ornamentals; impact of aquatic invasive alien species and associated trans-boundary pathogens.

India's exports of marine fish and fish products rose from ` 25 million in 1950-51 to Rs.129015 million during 2010-11. The export basket which was earlier dominated by shrimp, has diversified to frozen finfish, squid, cuttlefish, fillets and other products. However, shrimp continues to dominate the value realization from the export sector. Diversification into value added products has not really taken off in the country. Low capacity utilization of the industry as a result of non-availability of sufficient raw material continues to be an issue, even though imports have been liberalized. The industry has been facing imposition of newer standards by importing countries and the additional costs of compliance have affected profitability. Adopting food safety systems will become imperative in the coming years with the emergence of newer pathogens.

The industry is also increasingly turning to the domestic sector. Marketing, especially in the domestic sector has been characterized by complex channels and multiple players. The standards of hygiene and sanitation leave a lot to be desired. The setting up of the National Fisheries Development Board gave an impetus to development of domestic markets and one of the critical areas in this

process is the development of standards which can be implemented and monitored, for building a network of high quality, world class markets.

International trade requirements like traceability are going to be essential for products to enter major importing markets and to ensure seafood safety. Certification and ecolabelling of fishery products will be directly related to better management practices. These, if implemented in a fair and practical way, sensitive to the needs of small producers, may provide opportunities to support responsible development of the sector, addressing negative environmental and social concerns. Principles, criteria and standards need to be developed and approaches to certification have to be harmonized, within the region.

The potential for isolation of bioactive substances from the vast and diverse aquatic resources is being discovered with scientific advancements in this area of research. Since India is blessed with a wide range of aquatic systems and resources this area holds great potential for research.

Likely scenario in the fisheries sector during the next few years may include the following:

- Further intensification of fishing pressure in the shelf and deep seas is possible in the next few years, due to addition of fishing units and enhancement of fishing efficiency in terms of vessel capacities, fishing power of gear systems and acoustic and satellite based fish detection systems and electronic navigation systems. This may raise issues of long term sustainability and impact on biodiversity and may result in diminishing returns in terms of landings and catch per unit effort.
- There will be increasing demand for development and implementation of conservation technologies for minimising negative impacts of fishing on resources, biodiversity and environment. These may include technologies for bycatch reduction, protection of vulnerable species, minimising energy use in harvest and post-harvest operations and minimising environmental impacts and materials protection technologies.
- Problems of scarcity and cost of timber resources for boat building, biodegradation and corrosion may further aggravate and may require intensive work on alternate boat building materials.
- Climate change is likely to show its impacts causing regime shifts of certain commercial species which may affect their regional availability and abundance, which in turn may impact on the fish harvesting and processing sectors, either negatively or positively.
- Requirement for the regionalisation and implementation of the FAO Code of Conduct for Responsible Fisheries, adoption and implementation of Ecosystem based Fisheries Management (EFM) and effective control of illegal, unreported and unregulated (IUU) fishing to management of fisheries may come to the forefront.
- Fishery certification, ecolabelling and traceability may become important issues influencing international seafood trade from India, in the next few years and expertise and infrastructure may have to be developed to address these issues on national and international level.

- Reservoir fisheries may get a boost, due to its high potential in enhancement of national fish production. Cluster based integration in harvest and post harvest operations, value addition and marketing, under value chain concept may have to be evolved. Factors affecting riverine fish production such as pollution, destructive fishing and overfishing may aggravate in the next few years and may need management redressal.
- Unconventional resources such as oceanic cephalopods and myctophids may become significant sources of seafood supply in the next few years, in the context of stagnation and shortfall in the availability of traditional fishery resources, and these developments may demand appropriate technology interventions for their sustainable harvesting, value addition and utilisation.
- Further enhancement in India-based tuna fishing effort may take place in Indian Ocean region and accompanying effort in improving harvesting and processing of high value tuna products may be required.
- Advanced techniques for seafood preservation such as non-thermal processing may become available and widely applied in seafood processing and preservation. Value addition will be the key principle in guiding product development. A zero-waste approach will be warranted with fishery waste also converted to economical products. Packaging will play an important role in determining consumer acceptability with respect to perceptions on safety as well as maintenance of quality.
- Newer products that have wide ranging applications may be available from the large aquatic resources, including microbes.
- There is need to mainstream fish in the food habits of the Indian population with better understanding of the role of fish in decreasing malnutrition and improving health and creation of awareness about its significance.
- Seafood safety issues may bring in newer challenges with the emergence of new forms and variants of pathogens. The issue will also come into focus with increasing stress on the domestic market for promotion of seafood products.
- Increased awareness of consumer regarding the usefulness of fish as a source of nutrition and the changing demands for newer and convenient products that are easy to cook or consume will call for intensified efforts in this area.
- The national and international policy regimes vis-à-vis trade, climate change, conservation and environment are changing rapidly and these will continue to have an impact on the fisheries sector of the country.
- The traditional systems of technology transfer will undergo changes and innovative models including public-private partnerships will evolve making the process of technology commercialization more dynamic and a truly two way process.
- Intellectual Property protection will see new challenges in the face of the need for judicious commercialization and responding to societal needs.

Stakeholder profile

Stakeholders in fishing sector

Stakeholders in aquaculture sector

Stakeholders in fish pre-processing sector

Stakeholders in fish processing sector

Stakeholders in fish transportation sector

Stakeholders in fish marketing sector

Fish exporters

Fish consumers

Fisheries Departments of State and Union Governments

Fisheries related research organizations

Fisheries related environmental groups

Fisheries related NGOs

Fisheries related drug, nutraceutical and industrial groups

Fisheries related conservation groups

Section 3: Outline of the Strategy

Immediate and projected requirements of fisheries sector during 2011-16 include the following:

- Sustainability of the fishery resources – marine and inland,
- Continued optimization of fishing gear for marine, inland and the aquaculture sector, in terms of selectivity and environmental footprint,
- Conservation of biodiversity through optimization of fishing effort, prevention of capture of juveniles and non-targeted catches by suitable technical measures,
- Development of harvest and post-harvest technologies for the non-conventional deep sea resources,
- Enhancement of shelf fishery resources,
- Value addition along the value chain,
- Utilization of fishery wastes
- Ensuring environmental safety in harvest and post-harvest operations,
- Energy conservation in fish production and post-harvest sectors,
- Ensuring aquatic food safety and traceability,
- Responsible utilization of landed fish,
- Minimizing harvest and post-harvest losses,
- Suitable inputs for policy formulation and
- Effective transfer of technology.

Section 4: Implementation Plan

- Conducting focused, need based and demand driven research programmes in developing harvest and post-harvest technologies for marine, inland and aquaculture resources and in the area of food safety.
 - Research programme formulation with stakeholder participation and prioritization of research programmes to be undertaken at Institute level
 - Continued development of responsible fishing systems for inland and marine capture fisheries incorporating principles of bycatch reduction, protection of biodiversity, minimisation of environmental impacts and energy conservation.
 - Development of appropriate harvesting systems and strategies for aquaculture.
 - Standardisation of craft-gear combinations in terms of fishing power and capacities.
 - Development and standardisation of processing technologies for emerging species from aquaculture and less utilized species from inland and marine capture fisheries.
 - Continued development of processes for utilization of processing waste and low value bycatch for isolation of novel potentially commercial products.
 - Continued development of appropriate packaging technologies for improvement of consumer appeal and better storage.
 - Developing food safety standards for the domestic market along the value chain and standards for processes and products.
 - Rapid techniques for identification of hazards and surveillance of aquatic systems.
- Carry out basic research for isolation of useful bioactive substances and novel genes
 - Extraction and characterization of bio-molecules and genes for therapeutically and industrially significant biological activities, including anti-inflammatory, antiviral, anti-bacterial, anti-oxidant and anticoagulant activities.
- Focused research on green technologies
 - Development of fuel saving technologies and practices for existing fleet and onboard fish processing.
 - Development of green technologies and practices for the fish processing sector, including fuel saving, recycling and reuse of process water.
- Efficient technology transfer and policy analysis
 - Developing innovative models for technology transfer based on need evaluation and impact assessment.
 - Technology incubation
 - IP management
 - Sectoral level analysis of impacts of policies

- Capacity building for stakeholders
 - Responsible fishing
 - Fish processing, packaging and value addition
 - Fishery waste utilisation
 - Energy conservation in fishing and fish processing
 - Food safety and quality

Strategic initiatives for the period 2011-16

Strategic initiatives	Weightage
Strategic initiative 1. Development of improved craft and gear materials and Responsible fish harvesting systems	: 15
Strategic initiative 2. Development of technologies for processing, value addition and packaging of fish and fishery products and for utilization of fishery wastes.	: 15
Strategic initiative 3. Development of technologies for isolation of bioactive compounds and Industrially important products from Aquatic sources.	: 14
Strategic initiative 4. Development and management of quality and safety system for fish and Fishery products.	: 14
Strategic initiative 5. Assessment of microbial seafood safety hazards and bioprospecting of aquatic microbial resources.	: 14
Strategic initiative 6. Energy conservation in fish processing, through use of renewable energy sources.	: 14
Strategic initiative 7 Studies on transfer of technology (ToT) and socioeconomics in Fisheries sector	: 14

Section 5: Linkages between Strategic Plan and RFD

- Objectives in the annual RFDs during 2011-16 will be aligned with the implementation plan in the Strategic Plan for the period 2011-16. The priorities of the programmes may change depending on the various externalities detailed in Section 2 and may need review and corrections in terms of activities. *Inter se* priorities of RFD 2011-12 are given below:

Inter se Priorities among Key Objectives, Success Indicators and Targets (RFD 2011-12)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6					
Objectives	Weight	Action	Success Indicators	Unit	Weight	Target / Criteria Values				
						Excellent	Very Good	Good	Fair	Poor
						100%	90%	80%	70%	60%
1. Development of improved and responsible fish harvesting systems	14	Development of responsible fishing gear and accessories.	Responsible fishing gear/accessories designed and developed.	No.	7	2	1	-	-	-
		Identification/development of Improved craft and gear materials	Alternate material for fishing craft and gear identified/ evaluated.	No.	6	2	1	-	-	-
		Development/popularization of bycatch reduction technologies	Bycatch reduction technologies developed / popularized.	No.	1	2	1			
2. Development of post-harvest technologies.	40	Development of technologies for fish processing and value addition.	Fish based products and processes developed.	No.	7	5	4	3	2	1
		Development of technologies for fish waste utilisation	Products from fish wastes/ processes for fish waste utilisation developed.	No.	6	2	1	-	-	-
		Identification and development of improved packaging systems and materials.	Improved packaging materials and systems identified / developed	No.	6	2	1	-	-	-
		Energy conservation in fish processing	Design and development of solar dryers/ instrumentation for solar dryers	No.	6	1	-	-	-	-
		Development of technologies for isolation of bioactive compounds and industrially important products from aquatic sources and nutrient profiling of fishes.	Bioactive compounds/ industrially important products identified/nutrient profiling/chemical contaminants done.	No.	5	2	1	-	-	-
		Development / implementation of quality and safety system for fish and fishery products.	Quality and safety system for fish and fishery products, developed / implemented.	No.	5	2	1	-	-	-
		Assessment of microbial seafood safety hazards and bio-prospecting of aquatic microbial resources.	Seafood borne pathogens characterized / Biomolecules prospected from microbial sources.	No.	5	2	1	-	-	-
3. Extension , training and consultancy.	35	Extension and HRD programmes for stakeholders in fisheries sector	Skill upgradation programmes conducted.	No. of programmes conducted.	5	4	3	2	1	0
			Exhibitions participated.	No.	3	10	8	6	4	2
		Advanced training in harvest and post-harvest technologies.	Training in responsible fishing gear	No. of trainees	2	10	8	6	4	2
			Training in post-harvest technology	No. of trainees	3	20	15	10	5	0
			Training in HACCP / Seafood Quality Assurance	No. of trainees	4	60	40	20	10	0
			Training in Modern Analytical Techniques in Biochemistry	No. of trainees	3	20	15	10	5	0
			Training in Laboratory Techniques in Microbiological Examination of Seafood	No. of trainees	3	10	8	6	4	0

		Commercialization of products and processes	Products and processes commercialized.	No.	3	2	1	-	-	-
		Consultancy services	Analytical and advisory support to the industry.	No.	6	50	40	30	20	10
			Consultancy services undertaken	No.	3	2	1	-	-	-
4. Mandatory Indicators	11	Timely submission of RFD and Results for 2011-12	On time submission of RFD for 2011-12	Date	2	10.6.11	13.6.11	14.6.11	15.6.11	16.6.11
			On time submission of Results for 2011-12	Date	1	1.5.12	2.5.12	3.5.12	4.5.2012	5.5.12
		Development of Strategic Plan (2011-16)	Strategic Plan for 2011-16) developed.	Date	2	10.12.11	12.12.11	14.12.11	16.12.11	18.12.11
		Identify potential areas of corruption related to organization activity and develop an action plan to mitigate them.	Potential areas of corruption related to organization activity identified and mitigation plan developed.	Date	2	10.12.11	12.12.11	14.12.11	16.12.11	18.12.11
		Implementation of Sevottam	Sevottam compliant system to implement, monitor and review Citizen's Charter created	Date	2	10.12.11	12.12.11	14.12.11	16.12.11	18.12.11
			Sevottam compliant system to redress and monitor public grievances created.	Date	2	10.12.11	12.12.11	14.12.11	16.12.11	18.12.11

Section 6: Cross departmental and cross functional issues

- Initiatives under strategic plan will maintain clear and consistent alignment with 12th Plan and budget and other related documents.

Section 7: Monitoring and reviewing arrangements

- Performance Monitoring and Evaluation System (PMES)
- The PME Cell.
- Results Framework Document (RFD) review process.
- The Research Advisory Committee (RAC) constituted of Chairman and five external members and an in house Member Secretary, which meets annually.
- The Institute Research Council (IRC), which meets annually.
- Quinquennial Review Team (QRT) constituted by ICAR every five years