CIFT Perspective Plan

VISION-2025

ICAR

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

CIFT *Perspective Plan*

VISION-2025

Central Institute of Fisheries Technology

(Indian Council of Agricultural Research)

Matsyapuri P.O., Cochin - 682 029

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

Central Institute of Fisheries Technology
(Indian Council of Agricultural Research)
Matsyapuri P.O., Willingdon Island
Cochin - 682 029
Tel: 0484-2666845, 2666846, 2666847, 2666848
Fax: 0484-2668212
Email: enk_ciftaris@sancharnet.in, cift@ciftmail.org
Web: www.cift.res.in

Published by:

Dr. K. Devadasan
Director

Compilation and editing

Dr. G.R. Unnithan
Dr. Nikita Gopal
Dr. V. Geethalakshmi

Correct citation

CIFT- Perspective Plan Vision 2025
Central Institute of Fisheries Technology
Cochin, Kerala

July 2007

Printed at: Niseema Printers & Publishers
Kochi - 18.
Ph : 0484 2402948

CONTENTS

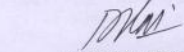
FOREWORD

Indian agriculture must continuously evolve to remain ever responsive to manage the change and to meet the growing and diversified needs of different stakeholders in the entire production to consumption chain. In order to capitalize on the opportunities and to convert weaknesses into opportunities, we at the ICAR attempted to visualize an alternate agricultural scenario from present to twenty years hence. In this endeavour, an in-depth analysis of the Strengths, Weaknesses, Opportunities and Threats (SWOT) was undertaken to place our research and technology development efforts in perspective so that we succeed in our pursuit of doing better than the best. Accordingly, the researchable issues are identified, strategies drawn and programmes indicated to have commensurate projects and relevant activities coinciding with the launch of the 11th Five Year Plan.

Capture fisheries harvest especially from the marine sector is nearly stabilized and reviving the growth of this sector aims at the oceanic and deep sea resources like tuna, squids, etc. It calls for better fishing vessels, improved handling practices, both onboard and at the landing centers and better packaging and transportation methods. Fishing is the largest diesel consuming industry and for the same reason designs of fuel efficient fishing vessels is a top priority. Adoption of high-tech processing techniques, value addition to wasted low value fishes, byproduct development, better technologies for the production of commercially viable fishery byproducts and fishery waste utilization to minimize environmental pollution are the priorities in the post-harvest sector. Food safety and quality are major concerns in perishable food like fish. All these changes necessitate development of appropriate technologies and management practices for which concerted research efforts along with effective transfer of technology and human resource development are other pressing needs.

The Central Institute of Fisheries Technology has been doing productive and useful work in all areas connected with fishing and fish processing, during the last 50 years. It has played a key role in bringing our fishing and fish processing industries to what they are today. The Institute has prepared a rational and practical perspective for the future growth of the sector and is devising programmes for achieving the goals.

It is expected that realizing the Vision embodied in the document would further ensure that the CIFT, Kochi continues to fulfill its mandate to make Indian agriculture locally, regionally and globally competitive. The efforts and valuable inputs provided by my colleagues at the ICAR Headquarters and by the Director and his team at the institute level for over an year to develop Vision 2025 deserve appreciation.



(MANGALA RAI)
Secretary, Department of Agricultural Research & Education and
Director General, Indian Council of Agricultural Research
Dr. Rajendra Prasad Road, Krishi Bhawan, New Delhi - 110001, India

February 2007

PREFACE

Fisheries is important to the national economy for several reasons. It provides direct and indirect employment to millions of rural poor especially the weaker sections and women. It is the largest single net foreign exchange earning export industry in the agriculture and related sectors. It also provides the only high quality nutritious food available at affordable prices for the common man. It has emerged as the fastest growing sector in agriculture. Capture fisheries developed fast in the last 50 years and in recent years organised aquaculture has given a sudden new fillip to its growth. State of the art harvest and post harvest processing technologies for the captured and cultured fishes from marine, brackish and fresh waters have therefore become a necessity.

Neighbouring countries like China and the countries in the far east are forging ahead fast in this field and unless we are vigilant and proactive we are likely to lose our pre-eminent position in the marine products processing and export industries. Harvesting, processing, packaging, product development, quality assurance, fishery by products, and fishery waste utilisation are areas where fast changes are happening. Food processing has turned into a high tech industry. Constant R&D in each of these areas mentioned and the effective transfer of the technologies developed have become essential. The Central Institute of Fisheries Technology (CIFT) under the Indian Council of Agricultural Research has been taking up this responsibility in the last 50 years of its useful existence and it has played a very vital role in bringing up the industry to what it is today. The scenario in fishing, fish farming, fish processing and marketing are all changing fast in the post globalisation set up. For the same reason it is only proper and essential that the R&D activities in this vital sector are planned and executed with vision, dedication and determination. This VISION 2025 document of the CIFT is an attempt to put these ideas and plans in proper perspective. It critically evaluates the Institute's achievements and summarises the present set up, future needs and plans for achieving those targets.

I take this opportunity to thank all my colleagues who have made significant contributions and have given valuable inputs in the preparation of this document. My special thanks are due to Dr. G. R. Unnithan, Dr. Nikita Gopal and Dr. V. Geethalakshmi of the Extension, Information & Statistics Division who summarised all the inputs and put it all into shape to give this document. The guidance and encouragement received from Dr. Mangala Rai, Secretary, DARE and DG, ICAR and Dr. S. Ayyappan, DDG (Fy) are also gratefully acknowledged. But for their critical comments, helpful suggestions and constant encouragement, this document would not have taken this shape. Suggestions given by Directors of sister Institutes, Assistant Director Generals, Dr. Chitranshi and Dr. A.D. Diwan and Principal Scientist Shri Anil Agarwal are also gratefully acknowledged.

(DR. K. DEVADASAN)
DIRECTOR

EXECUTIVE SUMMARY

While preparing this document vision 2025 of the Central Institute of Fisheries Technology (CIFT), care has been taken to include programmes in the light of the new WTO and IPR regimes and emerging frontier areas like biotechnology, bioinformatics, etc. The mandate of the institute has been revised, new priorities and strategic action plans have been identified and future programmes formulated accordingly. Fresh SWOT analysis has been made and areas of competence of the institute identified to ensure maximum scientific output. The available opportunities are to be exploited and the threats and weaknesses minimised. Due care has been taken to include the recommendations of various institutional committees for programme formulation.

Programmes for basic, adaptive and anticipatory research have been incorporated to ensure maximum sustainability of production, fuel saving and environmental protection. Commercially viable technologies and products for both domestic and international markets have been identified. Diversification and value addition have been given due importance. Bioactive compounds from aquactic sources is another major thrust area for research in view of the IPR regulations in pharmaceuticals. Programmes for effective extension, strengthening of internal markets, introduction of modern marketing and management strategies etc. have been incorporated. Internal resource generation continues to be a prime area of strength for the institute. For continuance and enhancement of this, suitable programmes have been drawn up to set up referral laboratories on both the East and West coasts. HRD and new thrust to technology dissemination programmes have also received due attention. Special care has been taken to give top priority to fuel efficiency, diversification of resources, responsible fishing, quality assurance, environmental protection, value addition and waste utilisation.

This document is prepared based on the revised mandate of the Institute. The thrust areas have been identified followed by a prioritisation exercise. Various programmes have been drawn, milestones indicated and critical inputs have been set. The document is spread over 40 pages in different chapters. The existing infrastructure regarding land and buildings (location, area etc.), details of research centres and laboratories, information on the fishing vessels, budget (both Plan and Non-Plan), approved cadre strength, present staff position, man power over different Plan periods, etc. have been presented in Chapter 3. The salient research achievements of the Institute over the years have been provided in the next Chapter. Impact assessment of programmes initiated under the Institute's leadership contributing to the growth of the fisheries sector has been provided under the Chapter 'Impact Assessment'. Details of the assessment separately on harvest and post-harvest sector have been indicated and short comings, options for the future etc. have been spelt out in Chapter 5. Under the Chapter 'Scenario', SWOT analysis has been performed which will indicate corrective measures to be initiated for enhancement of the R & D system at the Institute level. Under the 'Perspective' Chapter, the status of technologies to be evolved by the year 2025 has been indicated giving detailed scientific programmes. Basic, adaptive and anticipatory research have been identified and programmes under anticipatory research have been clearly spelt out in Chapter 7. Major issues and strategies have been included in the next Chapter while different programmes and topics on time scale have been detailed in Chapter 9. Linkages, coordination and executive arrangements, critical inputs, risk analysis, project review and monetary parameters, output and outcome of the anticipated projects etc. have been included in the subsequent chapters.

ABBREVIATIONS USED

ARIS	-	Agricultural Research Information System
ATIC	-	Agricultural Technology Information Centre
EU	-	European Union
FAO	-	Food and Agriculture Organisation
FRP	-	Fibreglass Reinforced Plastic
GLP	-	Good Laboratory Practices
GMP	-	Good Manufacturing Practice
HACCP	-	Hazard Analysis Critical Control Point
HRD	-	Human Resources Development
IDP	-	Inter Departmental Panel
IPR	-	Intellectual Property Rights
LOA	-	Length Over All
NACA	-	Network of Aquaculture Centres in Asia-Pacific
NATP	-	National Agricultural Technology Project
NCAFB	-	National Collection of Aquatic Fish Bacteria
NEH	-	North Eastern Hilly
NGO	-	Non-Governmental Organisation
NORAD	-	Norwegian Agency for International Development
NRSA	-	National Remote Sensing Agency
ODA	-	Overseas Development Administration
PFZ	-	Potential Fishing Zone
R & D	-	Research and Development
SAARC	-	South Asian Association for Regional Cooperation
SAT	-	Supervisory Audit Team
SIFFS	-	South Indian Federation of Fishermen Societies
SSOP	-	Standard Sanitary Operating Procedures
WFC	-	World Fish Centre
WTO	-	World Trade Organisation

1. PREAMBLE

The Central Institute of Fisheries Technology (CIFT), named at the time of its inception as Central Fisheries Technological Research Station, was set up following 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 with a small nucleus of staff for research work in fishing craft and gear. The Processing Division of the Institute was started in 1958 and the Extension, Information and Statistics Division 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 Institute is the only National Centre in the country where research in all disciplines relating to fishing and fish processing is undertaken. The Headquarters of the Institute is at Cochin with Research Centres at Veraval (Gujarat), Visakhapatnam (Andhra Pradesh), Burla (Orissa) and Mumbai (Maharashtra).

The Institute is headed by a Director, with whom all administrative and financial powers regarding research and management are vested. He is assisted by a Senior Administrative Officer for dealing with matters relating to general administration and an Assistant Finance & Accounts Officer for looking after financial accounting aspects as also internal audit of the Institute. A Technical Officer attends to the technical matters including those connected with research projects handled by the Institute at its Headquarters at Cochin and Research Centres. An Official Language Section monitors the official language policy and caters to the requirements of the Institute for bringing out its reports, publications etc. in Hindi.

The Institute has well equipped laboratories with modern, sophisticated, state-of-the-art equipment for both fundamental and applied research. These laboratories also cater to the needs of the industry by testing processed fishery products, ice, water, and other materials like marine paints, engines etc.

The library of the Institute subscribes to all scientific journals relevant to the field. It has access to ASFA and FSTA CD ROMs which has considerably improved its capacity to provide information on fisheries research and development.

There is also a well equipped workshop which looks after routine repairs of boats, equipments etc. and renders assistance in other project works also. An animal house meets the Institute's research needs in the field of nutrition. Pilot plants function for chitin, chitosan, battered and breaded products, extruded products etc. An ARIS cell serves as a central facility for EDP and information retrieval. An ATIC functions as a single window information and services provider of the Institute. The Institute in collaboration with CIFE, also conducts post graduate courses (M.F.Sc. & Ph.D.) in post harvest technology of fish.

Research work of the Institute is carried out in the following Research Divisions:

1. Fishing Technology Division
2. Fish Processing Division
3. Quality Assurance & Management Division
4. Biochemistry & Nutrition Division
5. Microbiology, Fermentation & Biotechnology Division
6. Engineering Division
7. Extension, Information & Statistics Division

1.1 MISSION

1. To develop designs for fuel efficient fishing crafts and conservational fishing gear for eco-friendly and responsible fishing.
2. To develop technologies for :
   a. Value addition in processed fishery products
   b. Ensuring food safety in processed fishery products
   c. Isolation of bioactive and industrially important compounds from fish and fishery wastes
   d. Minimising post harvest losses and ensuring economic utilization of by catches and fishery wastes.

1.2 VISION

To develop into an internationally recognised centre of excellence in fishing and fish processing technologies

2. MANDATE

2.1 PRESENT MANDATE

1. To evolve innovative, cost-effective technologies for fish harvest.
2. To develop and standardize various aspects of post-harvest technologies.
3. To develop technologies for extraction of biomedical, pharmaceutical and industrial products from aquatic organisms.
4. To act as a repository of information on harvest and post-harvest technologies with a systematic data base.
5. To conduct transfer of technology through training, education and extension education programmes.
6. To provide consultancy services and to popularize the innovations for the overall development of fishery industry.

2.2 REVISED MANDATE

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

3. GROWTH

3.1 INFRASTRUCTURE

3.1.1 Land and Buildings

Land

1	Residential quarters for the staff at Cochin	:	6.25 acres
2	Leased land housing the office-cum-lab building for the headquarters of the Institute at Willingdon Island, Cochin	:	3.93 acres
3	Leased land housing the office-cum-lab building at Veraval Research Centre of CIFT (sharing the building with CMFRI)	:	0.63 acres
4	Residential quarters at Visakhapatnam	:	0.40 acres
5	Burla (on lease from Govt. of Orissa)	:	3.2 acres

Buildings

- CIFT, Cochin : 5784.20 m^2
- CIFT, Veraval : 2482.20m^2 (CIFT & CMFRI housed in the same building)
- CIFT, Visakhapatnam : 2016.75 m^2 (CIFT & CMFRI housed in the same building)
- CIFT, New Bombay : 275.39 m^2
- CIFT, Burla : Functioning from rented building but land has been acquired
- Wet fish processing halls
- Agricultural Technology Information Centre (ATIC)
- Animal House
- Pilot plants
- Engineering Workshop
- Cold Storage Plant
- Chill Room Plant

Laboratories

Headquarters, Cochin

- Craft Laboratory
- Gear Laboratory
- Biochemistry Laboratory
- Processing Laboratory
- By-products Laboratory
- Modern well equipped state-of-the-art Microbiology Laboratory (designed to meet ISO 9003 standards)
- Modern well equipped state-of-the-art biotechnology (molecular biology) laboratory

- Quality Assurance Laboratory
- Instrumentation Laboratory
- A good laboratory for research in all aspects of packaging of food products

Research Centres

- Veraval Research Centre - Processing Laboratory
- Visakhapatnam Research Centre - Processing Laboratory
- Bombay Research Centre - Processing Laboratory
- Burla Research Centre - Processing Laboratory

3.1.2 Major Equipment

- LCMS-MS
- Accelerated freeze dryer
- Pearl nucleus production machines
- Testing and precision measuring instruments
- *In-situ* measurement facility for water salinity and water temperature
- Signal generators
- Constant temperature bath
- Computer aided design facility for fishing vessels and small crafts
- Large format printing and scanning
- Lathe
- Radial drilling machine
- Hydraulic press
- Gas Chromatograph
- Gas Chromatograph with Mass Spectrograph
- High Performance Liquid Chromatograph
- Atomic Absorption Spectrophotometer
- Amino Acid Analyzer
- Spectrophotometer
- Spectrofluorometer
- Electrophoresis Unit
- Ultra filtration Unit
- Lyophiliser
- Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES)
- Fourier Transform Infrared Spectroscopy (FTIR)
- Universal Testing Machine (UTM)

- Bioassay for testing of the biotoxins of PSP & DSP
- HPLC
- Ion chromatograph
- Pastel UV monitor
- Spectroquant
- Water activity meter
- Blast freezer
- Deep freezers
- Battering and breading machine
- Ice making machine
- Refrigerated centrifuge
- Over pressure autoclave
- Vacuum oven
- Rotary viscometer
- Auto analyzer
- Meat bone separator
- Smoke kiln
- DNA Sequencing System
- ELISA Equipment
- GEL Documentation System
- Fluorescent Microscopes with projection and photographic system
- Radiation Counting System
- Varian UV-Vis double beam Spectrophotometer
- Speed Vacuum Concentrator
- PCR System
- Vacuum Blotting Unit

3.1.3 Referral lab – services to industries

1. The referral lab facility is intended to provide technical support for maintaining the quality of fish and fishery products as per international standards. The laboratory has already started providing assistance to the industry in the following areas :

   a) Determination of all important metal residues in food, water and other food additives at ppb level.

   b) Determination of PAH (Poly Aromatic Hydrocarbons) in fish and fishery products especially smoked products using solid phase extraction unit and HPLC at 0.1 ppb

level.

c) With the help of Charm II system the referral lab is giving analytical assistance to a variety of industries for estimation of certain antibiotic residues in products, fish, packaged drinking water, spices, milk, cakes etc.

d) Using LC MSMS CIFT is giving assistance in detecting 0.1 ppb level of chloramphenicol and nitrofurans in food items as per the requirement of EU countries.

e) The referral lab is also providing thermal process validation data to industries engaged in production of ready to eat cooked products, which no other agency in India is able to give.

f) The facilities are also being standardised for estimation of certain other safety hazards relevant in HACCP certification.

2. Using the Referral lab facilities a short course on Food Safety Residue Monitoring was organised from 1-11-2004 to 11-11-2004 in which 16 participants from Universities and research institutes participated. Similar training programmes will be organised in the coming years also for generating skilled manpower.

3.1.4 Fishing vessels

- *MFV Matsyakumari*: 17.5 m LOA, 278 hp steel vessel equipped for stern trawling; with Echosounder and GPS
- *MFV Sagar Shakthi*: 15.2 m LOA, 222 hp wooden combination vessel equipped for stern trawling; with Echosounder and GPS
- *MFV Sagar Kripa*: 15.5 m LOA, 120 hp fuel-efficient steel vessel equipped for stern trawling; with Echosounder and GPS
- *CIFTECH-1* : 15.5 m LOA, 125 hp, with split level deck construction for trawling, gillnetting and lining; with Echosounder and GPS
- *Rita I* : 4.57 m LOA, FRP Dinghy powered with 12 hp Evinrude OBM
- *Rita II* : 4.57 m LOA, FRP Dinghy powered with 12 hp Evinrude OBM

3.2 BUDGET

(Rs. Lakhs)

Plan period	Plan	Non-plan	Total
IV Plan	122.64	69.84	192.48
V Plan	198.97	146.43	345.40
VI Plan	251.84	365.43	617.27
VII Plan	211.22	893.72	1104.94
VIII Plan	650.00	2286.17	2936.17
IX Plan	1999.00	3321.15	5320.15
X Plan	2150.00	4500.00	6650.00
XI Plan (projection)	4842.01	9000.00	13842.01

3.3 MANPOWER

Plan period	Scientific	Technical	Administrative including auxiliary and supporting	Total
VI Plan	147	169	209	525
VII Plan	142	154	285	581
VIII Plan	101	179	245	525
IX Plan	101	177	243	521
X Plan	100+1	140	181	422

Staff position as on 31st December 2006

	Sanctioned	Filled	Vacant
Scientific	101	63	38
Technical	140	125	15
Administrative	90	84	6
Auxiliary	6	6	-
Supporting	85	78	7
TOTAL	422	356	66

Approved Cadre Strength (As on March 2004)

Sl. No.	Discipline	Sanctioned Strength				Proposed as on Dec. 2005
		Sci	Sr. Sci	Pr. Sci	Total	Total
1.	Fish Processing Technology	21	5	3	29	**35**
2.	Fish & Fishery Science	16	2	1	19	**14**
3.	Microbiology (A.S.)	7	2	1	10	**10**
4.	Biochemistry (A.S.)	9	1	1	11	**11**
5.	Biotechnology (A.S.)	2	1	1	4	**6**
6.	Organic Chemistry	1	0	0	1	**3**
7.	Agricultural Statistics	2	1	0	3	**2**
8.	Agricultural Extension	5	0	0	5	**4**
9.	Agricultural Economics	2	1	0	3	**2**
10.	Electronics & Instrumentation	2	1	1	4	**4**
11.	Electrical Engineering	1	1	0	2	-
12.	Chemical Engineering	1	1	0	2	-
13.	Mechanical Engineering	1	1	0	2	-
14.	Naval Architect	0	1	1	2	**3**
15.	Computer Applications	2	1	0	3	**1**
	Total	**72**	**19**	**9**	**100**	**95**