

- Upgradation of technologies for effluent treatment in fish farms and fish processing industries
- Formulation of package of practices for achieving HACCP, SSOP, GMP etc. in capture and onboard handling, fish farming, processing and marketing
- Preparation of appropriate GIS of groundwater and fisheries in relation to typical hazards
- Development and upgradation of processing machinery for fish products from inland and marine sources
- Design and development of combination vessels for fishing
- Development of instrumentation for fish processing, quality control and performance evaluation of fishing craft and gear
- Technology assessment and refinement and impact assessment of technologies developed and marketing studies of the domestic and overseas sectors
- Statistical and econometrical studies in problems related to fishing and fish processing
- Human resource development in fisheries sector through training programmes, technology transfer etc.

9. PROGRAMMES AND PROJECTS ON TIME SCALE FOR FUND REQUIREMENT

Sl. No.	Programme	2007-12	2012-17	2017-25
1	Improved craft and gear materials			
	<ul style="list-style-type: none"> Continued evaluation of materials for fishing vessel construction 			
	<ul style="list-style-type: none"> Continued evaluation of materials for fishing gear construction 			
	<ul style="list-style-type: none"> Corrosion protection 			
	<ul style="list-style-type: none"> Prevention of biodeterioration 			
2	Fishing vessel design optimisation			
3	Hydraulic/electric gear handling and deck equipments for fishing vessels			
4	Development of cost-effective innovative responsible fishing techniques for inland, marine coastal and deep sea fisheries			
	<ul style="list-style-type: none"> Continued optimisation of fishing gears for aquaculture and inland resource systems, and marine resource systems in the Indian EEZ and beyond 			
	<ul style="list-style-type: none"> Cost reduction in fish harvesting 			
	<ul style="list-style-type: none"> Selective fishing gear and practices 			
	<ul style="list-style-type: none"> Environmental impact of fishing gear systems 			
	<ul style="list-style-type: none"> Fish behaviour 			
	<ul style="list-style-type: none"> Application of satellite remote sensing and GIS in fisheries 			
	<ul style="list-style-type: none"> Fisheries acoustics 			
	<ul style="list-style-type: none"> Fisheries electronics 			
	<ul style="list-style-type: none"> Scientific inputs for evolution of fisheries legislation for management of Indian fishery resources 			
	<ul style="list-style-type: none"> Evaluation of traditional fishing systems and improvement in terms of efficiency, energy consumption and ecological impacts 			
	<ul style="list-style-type: none"> Documentation of fishing gear systems in the traditional as well as in the mechanized sectors in different states of India and its updation every five years 			

Sl. No.	Programme	2007-12	2012-17	2017-25
5	Academic and training programmes			
	<ul style="list-style-type: none"> Post graduate academic programme in Fishing Technology 			
	<ul style="list-style-type: none"> Short-term training in responsible fishing 			
6	Freezing preservation of farmed fishes			
	<ul style="list-style-type: none"> Development of appropriate techniques for preservation and transportation of both farmed and wild fresh water fish 			
	<ul style="list-style-type: none"> Development of value added products from IMC (Indian Major Carps) such as ready to cook products, battered and breaded products etc. 			
7	Development of appropriate packaging materials for different newly developed products for rural, urban and international market			
8	Development of ready to eat products in flexible pouches and thermoformed containers			
9	Development of products of high protein content for community health care programmes like mother and child care – using farmed fish and bycatch			
10	Cured, dried and smoked products from different species of farmed fish to suit the demand of consumers from different parts of India			
11	Modification of the traditional smoking techniques to produce high quality smoked products			
12	Development of products like ready to cook and ready to serve products to suit the requirements for urban population and overseas market with more emphasis on farmed fishes so as to make fish farming more remunerative			
13	Development of products from processing wastes so as to make use 100% either for human consumption or live stock feed which will be addressing the problem of environmental threat fully. Preparation of biodegradable edible films from chitin and chitosan. Application of chitosan as a bacteriostatic agent and in enhancing shelf life of food products			
	<ul style="list-style-type: none"> Development of value added products from the byproducts already developed 			

Sl. No.	Programme	2007-12	2012-17	2017-25
	<ul style="list-style-type: none"> Development of functional and nutraceutical products 			
	<ul style="list-style-type: none"> Development of products from unconventional marine resources 			
	<ul style="list-style-type: none"> Development of extruded products using low value fish 			
14	Development of rapid DNA based detection kits for bacterial and viral pathogens implicated in fish and shellfish diseases in aquaculture systems			
15	Bio-security of farm environments and farmed products			
16	Surveillance studies for emerging pathogens in marine, brackish and fresh water systems and predictive modelling for hazardous micro-organisms in seafood and aquatic environment			
17	Refinement in the detection methods for antibiotic residues/bacterial inhibitors in farmed/ processed seafood and aquaculture environments			
18	Genomic studies on tropical aquatic micro-organisms of importance, with emphasis on spoilage bacteria and hazardous bacteria			
19	Development and maintenance of National Collection of Aquatic Fish Bacteria (NCAFB) with supporting genomic data base to meet the world trade regime			
20	Research in the field of quality assurance for traditional as well as novel value added products including development of rapid methods			
21	Evaluation/testing of defects and hazards in seafood, water, other ingredients for seafood processing as well as food in general			
22	Devising remedial measures to exclude defects/ hazards during farming, harvesting and processing of food products			
23	Development of appropriate standards for fish and fishery products, formulating SSOP, GMP, GLP and HACCP for food processing plants/mineral water plants and development of suitable criteria for organic farming and organic products			

Sl. No.	Programme	2007-12	2012-17	2017-25
24	Water testing and certification as per IS-251, IS-14543, EU norms etc. and devising treatment measures to rectify the defects, if any			
25	Evaluation of industrial and farm effluents and devising treatment measures to make them environment friendly/free from pollution			
26	Bioactive substances of pharmacological, nutritional and industrial importance. Identifying bioactive substances and their sources, developing technologies for the commercial production of these substances			
27	Basic studies on the molecular structure and sequencing of the bioactive substances with a view to modify/derivatise these to enhance their activity. Application of tools like bioinformatics			
28	Biochemical and immunological aspects of fish disease to help in monitoring and control of disease			
29	Monitoring nutrients, pollutants and toxicants in the context of food safety, nutrition labelling and nutritional security			
30	Development of cost effective and eco-friendly solar driers for fish preservation			
31	Development of processing machines for production of fish products from farmed fresh water fishes and low value marine fishes			
32	Development of image pearl nucleus in different designs, shapes and sizes for quality improvement and value added image pearl production			
33	Development of cryogenic engineering technology systems for fish processing			
34	Development of protruding bows for medium class and small fishing vessels to reduce resistance			
35	GIS data base for Indian fishing fleet			
36	Innovative species specific vessel design for the Indian fishing fleet			
37	Improvement of main propulsion engines and deck equipment for the fishing fleet			
38	Instrumentation for aquaculture, fish processing and quality control, performance evaluation of craft and gear for aquaculture			

Sl. No.	Programme	2007-12	2012-17	2017-25
39	Techno-economic impact assessment studies in respect of technologies developed			
40	Optimisation studies for fishery management			
41	Sampling and estimation in fishing and fish processing			
42	Statistical quality control of fishery products			
43	Statistical microbiology in fisheries			
44	Statistical and economic engineering in fisheries			
45	Production and marketing research			
46	e-extension			
47	Application of Information Technology in fishing and fish processing			
48	Training needs assessment and organisation of training programmes for stakeholders			

TOTAL FUND REQUIREMENT ANTICIPATED DURING XI PLAN PERIOD: RS. 48.42 CRORE
(INCLUDING - WORKS: RS. 12.52 CRORE & EQUIPMENTS : RS. 12.00 CRORE)

10. LINKAGE, COORDINATION AND EXECUTIVE ARRANGEMENTS

For effective coordination and linkage of the activities of the Institute with other Institutes, universities, NGOs etc. the Heads of the concerned Divisions will be responsible, under the overall guidance of and monitoring by the Director.

Institutions in Cochin (*Other than ICAR Institutes*)

- Marine Products Export Development Authority
- Export Inspection Agency
- Naval, Physical and Oceanographic Laboratory
- Fishery Survey of India
- National Institute of Oceanography
- Central Institute of Fisheries Nautical Engineering and Training
- Matsyafed
- Integrated Fisheries Project
- Kerala State Pollution Control Board

National Institutes and Agricultural Universities

- Agricultural Universities
- Ministry of Agriculture
- Ministry of Food Processing Industries
- Department of Ocean Development
- Department of Biotechnology
- Department of Science and Technology
- Department of Electronics
- Indian Institute of Technology, Chennai/Kharagpur
- State Fisheries Departments
- Union Territory of Lakshadweep
- Kerala Water Authority
- ICAR Institutes
- Science and Technology Entrepreneurship Development Project (STED)
- Bureau of Indian Standards
- Industries Department, Andaman & Nicobar Administration

International Institutions

- Natural Resources Institute (NRI), U.K.
- Food and Agriculture Organization (FAO), Rome
- Bay of Bengal Programme (BOBP)
- Asia Pacific Fisheries Commission (APFC)
- University of Bristol (U.K.)
- INFOFISH

Extension and Development Agencies

- Central Social Welfare Board
- Kannur Dist. SC/ST Women Industrial Fish Products Manufacturing Co-operative Society Ltd.
- South Indian Federation of Fishermen Societies, Trivandrum (SIFFS)
- Amala Mahila Samajam, Puthuvypu, Cochin
- AFPRD, Hyderabad
- Kanyakumari Dist. Fishermen Sangam's Federation
- Madonna Rural Development Society, Kumarakom
- Centre for Research and Training in Poverty Alleviation and Women Welfare (CRATPAW)
- Centre for Management Development, Trivandrum

- Bharat Sevak Samaj, Trivandrum
- Small Industries Development Bank of India (SIDBI)
- Matsya Mahila Vedi, Chellanam
- Alleppey Diocesan Charitable and Social Welfare Society, Alleppey
- Vanitha Matsya Thozhilali Bank, Neendakara
- Kerala Industrial and Technical Consultancy Organisation (KITCO)
- Avani Agro Society, North Paravur, Ernakulam
- Common Facility Service Centre, Changanacherry
- Kerala State Women's Development Corporation Ltd., Trivandrum
- Chellanam Panchayat SC/ST Co-operative Society
- Fishermen Youth Welfare Association, Gangavaram P.O.
- Development Action through Self Help Network (DARSHN)
- Agency for Development of Aquaculture in Kerala (ADAK)

II. CRITICAL INPUTS

- Adequate scientific and technical manpower has to be provided to fill the vacancies created due to retirement of large number of experienced scientist and staff on superannuation.
- Urgent revision of the cadre strength is needed to overcome the shortage of staff in research programmes.
- Research Centre for work on inland, riverine and reservoir fisheries have to be established to undertake research in those areas.
- Purchase or lease additional land from the Port Trust (Ministry of Surface Transport). Land contiguous to the campus is right now available.
- New academic programmes should be introduced in harvest technology to keep pace with the latest developments in the relevant areas.
- The Research Centres have to be strengthened with adequate number of scientific and other personnel, providing infrastructural facilities and adequate budget.
- Research Centres have to be provided with amenities like residential quarters for the staff of the Institute.
- Extension machinery is to be strengthened.
- A strong economics, statistics and marketing division to be established to ensure effective commercialisation of new technologies developed.
- Better facilities for design, testing and fabrication of improved fuel efficient fishing vessels.
- Human Resource Development for scientists in modern fishing technologies, resource conservation, remote sensing and GIS methodology, emerging fish processing technologies for value addition, waste utilisation and packaging, computational fluid dynamics, fuel efficient fishing vessel designing, processing engineering, bio-chemistry, bio-technology,

nano-technology, bio-informatics, toxicology, natural resource economics, environmental impact assessment, econometric modelling, modern marketing, new concepts in transfer of technology, quarantine, advanced safety and quality evaluation approaches.

- HRD for technicians in modern analytical procedures, electronic instrumentation and maintenance, computer applications, gear fabrication, vessel maintenance, application of statistical software, operation and maintenance of audio-visual aids and equipment.
- HRD for administrative staff: Modern administrative and management techniques including auditing.

12. RISK ANALYSIS

- Insufficient human resource.
- Shift in policy and priorities in the sector.
- Change in political scenario.
- Inadequate funding of research programmes.
- Changing world scenario vis-à-vis globalisation.
- Natural calamities including outbreak of new diseases in fish.
- Change in environmental factors due to global warming.
- Shift in consumer preferences.

13. PROJECT REVIEW, REPORTING AND EVALUATION ARRANGEMENTS

(a) Project review

- Project Monitoring and Evaluation Cell constituted at the Institute level evaluates the quarterly progress of all the ongoing projects and make suitable recommendations.
- The Staff Research Council (SRC) monitors the annual progress of the projects and evaluates the outcome.
- The Research Advisory Committee (RAC) reviews the progress in respect of research every year.
- Quinquennial Review Team (QRT) reviews the work done (every five years) and suggests corrective measures if any.
- Besides these, the externally funded projects are reviewed by the respective funding agencies also.
- Periodic institute-industry meets are held to know the needs of the industry for taking up additional programmes needed.

(b) Monitorable parameters

- Patents
- Technologies developed
- Technologies transferred

- Publications brought out
- Sale of publications
- Services
- Consultancies
- Training programmes
- Interaction with farmers/industry/weaker section

14. RESOURCE GENERATION

Sources of resource generation are

- Conduct of training programmes
- Analysis of products and materials
- Testing of marine engines, craft and gear materials etc.
- Supply of designs and publications
- Technical consultancies
- Sales of fish products through ATIC

Details of resource generation

(Rs. Lakhs)

IX Plan - Actual	X Plan - Actual	XI Plan - Anticipated
308.45	457.92	503.71

15. OUTPUTS OF THE R&D PROGRAMMES

- New eco-friendly, economically viable technologies for the fishing industry.
- Design of modern, fuel efficient, multi-purpose fishing vessels.
- Nano-technology based research in craft and gear materials.
- New harvesting technologies for aquaculture, reservoir and riverine systems.
- Mechanical and electronic engineering equipments for aquaculture systems.
- Modernisation of existing traditional craft with new material.
- Modern fishing techniques for enhancing fish harvest.
- Vessel monitoring system using satellites based communication.
- Modern, indigenous fish processing equipments.
- Technologies for new value added products for diversification of industry.
- Effluent treatment and water management waste utilisation technologies.
- Modern packaging for ready-to-consume and other novel fishery products.
- Safety and quality standards for fish and fishery products

- HACCP implementation in the fisheries harvest and post harvest sectors.
- Appropriate technologies for reduction of harvest and post harvest losses.
- Rapid bio-technological methods for management of pathogens and bio-security of farm systems.
- Gene constructs.
- New pharmaceutically important compounds from aquatic resources.
- GIS based decision support systems for the fishing and fish processing industries.
- Database on fishing and fish processing sectors.
- National level surveys, forecasts and econometric modelling on demand and supply, production, export, economic contribution etc. for planning purposes.
- Marketing strategies.
- Policy guidelines for conservation and effective utilization of resources.
- Publications
- Patents
- HRD
- Enhanced resource generation

16. OUTCOME OF THE R&D PROGRAMME

- Enhanced fish production in marine, riverine and reservoir systems.
- Increased contribution of fisheries sector to the GDP.
- Socio-economic upliftment of coastal communities and weaker sections of the society.
- Development of fisheries in NEH region and Islands.
- Conservation of resources.
- Diversification of the seafood processing industry.
- Increased exports of value added fishery products including deep sea fishes.
- Regulation and optimisation of fishing effort and fish processing capacity.
- Enhanced quality standards in the fisheries sector.
- Wealth from waste.
- Nutritional security of the population.
- Human Resource Development.
- Comprehensive Fisheries Policy formulation.
- Better management of water resources in the highest water consuming food processing industry viz. fish processing.