

**Central Institute of Brackishwater Aquaculture,
Indian Council of Agricultural Research
75, Santhome High Road, R.A.Puram, Chennai 600028**

**Strategic Plan 2010-2015 for
RFD of CIBA 2010-2011**

Introduction

Central Institute of Brackishwater Aquaculture (CIBA) is a national research institute under Indian Council of Agricultural Research, Department of Agricultural Research & Education, Ministry of Agriculture, Government of India. CIBA serves as the nodal agency for the development of brackishwater aquaculture in the country. The strategy and strategic plan for next five year (2010-2015) of the CIBA has been formulated as follows:

Section 1: Vision, Mission, Objectives and Functions

Vision

Environmentally sustainable, economically viable and socially acceptable brackishwater aquaculture, that increases the earnings of small scale fish farmer and provides quality produce to meet the diversified requirements of consumers.

Mission

Further scientific applications to develop cost-effective technologies and facilitate growth of brackishwater aquaculture in an environmentally sustainable and socially acceptable manner.

Objectives

1. Enhance aquaculture production and productivity of brackishwater aquaculture
2. Transfer brackishwater aquaculture technologies to end users

Functions

1. Develop economically viable and environmentally sustainable culture technologies for finfish and shellfish in brackishwater systems in different agro-ecological regions.
2. To meet emerging requirements of brackishwater aquaculture, carry out basic and strategic research.
3. Evaluate economically important brackishwater biological resources for their commercial utilization.
4. Provide policy and planning support for socio-economic development, through environmentally sustainable, brackishwater aquaculture.
5. Undertake human resource development and transfer of technology programmes through training and extension and to provide consultancy service.

Section 2: Assessment of the situation

2 A. What external factors will impact us?

a. Political

1. International cooperation and coordination especially in the South Asian region to deal with various issues including transboundary shrimp diseases.
2. WTO trade issues, globalization with unequal opportunities adversely affecting terms of trade of fish and fishery products especially shrimp.
3. EXIM policy of the government with respect to agriculture products and by products, as many inputs are imported and shrimps are exported.
4. Policies of state governments including centre-state coordination as fisheries are in concurrent list.
5. Political will to reduce duty structure that affects global competitiveness of shrimp farmers.

b. Economic

1. Input costs in terms of seed material, feed, fertilizers and soil and water additives, therapeutics and disease diagnostics.
2. Cost of finance ó farm credit and credit for processing and value addition.
3. Backward/forward market linkages, access to market and market information and assured price.
4. The rate of economic growth in the country is a critical factor for domestic fish market development and reduction of poverty and increased demand for fish.
5. The subsidies paid to farmers for new farm development and crop diversification are essential to attract and retain people in aquaculture.

c. Socio-cultural

1. Varying regional requirements and preferences for fish and global consumer support for organically produced shrimp and genetically modified aquaculture crops.
2. Issues pertaining to food safety and quality assurance.
3. Farming not an attractive/preferred career option.

d. Technological

1. Willingness to adopt new technologies
2. Diversified agro-eco regions, cultivation practices, leading to requirement of development of eco-region specific modules.
3. Gap between lab and land, leading to technology mismatch calling for more on- farm research.
4. Inadequate use of modern ICT communication channels like mobile and internet technologies.
5. Inadequate availability and higher cost structure of power and fuel and lack of effective alternatives such as solar and wind power.

e. Environmental

1. Unregulated development of farming: Exceeding carrying capacity of water bodies, environmental concerns
2. Water stress: pollution from other coastal land uses affecting water quality (like fly ash from thermal power plants) crop production and productivity.
3. Heat stress: Higher temperatures due to climate change/global warming
4. Soil fatigue: Pond bottom getting affected with excess feed, animal refuses, buildup of organic matter and ageing of ponds
5. Biotic and abiotic stress in terms of disease, fish parasites and climatic factors etc.
6. Green house gas emission: Mitigation strategies to reduce methane and CO₂.

f. Legal

1. Marketing and trade laws relating to export/import of fishery products.
2. Labour laws for regulating farm employment and wage issues.
3. Weak regulatory mechanism for various farm inputs like seeds, chemicals etc.
4. Sanitary and phyto-sanitary standards.

2 B. Who are our stakeholders?

1. Farmers, State Agricultural Universities, State Fisheries departments, Fisheries Development corporations, and policy makers.
2. Sister organizations like DBT, DST, NFDB, MPEDA, MoEF, NGOs and private industries etc.
3. International organizations NACA and World Fish Centre are our other stakeholders with whom CIBA has collaboration to address the challenges in brackishwater aquaculture sector.

2 C. What are our strengths and weaknesses?

Strengths

1. Large potential area of 1.2 million ha brackishwater of which only 10 % is being used.
2. Potential cultivable species -10 shrimp, 8 finfish and 2 crab spp.
3. Institutional support for research and development

Weakness

1. Falling output prices and increasing input costs and limited credit flow
2. Weak dissemination of technology.
3. Single commodity focus & over dependence on export
4. Unplanned and un-scientific farm development & inadequate policy support

Opportunities

1. Increasing total fish exports
2. Increasing share of cultured shrimp contribution in exports

3. Introduction of SPF shrimp for minimizing diseases and increasing production
4. Increased incomes & purchasing power of domestic consumers ó increased willingness to pay higher prices for seafood & positive change in perception of fish as -health foodø

Threats

1. Negative public perceptions on environmental and food safety aspects
2. Trade issues ó levy of antidumping duty & global shrimp price crashes
3. Absence of quality control mechanisms for seed and feed
4. Lack of bio-security infrastructure in farms; continuous incidence of diseases like WSSV.

2 D. What do we need to learn?

Indian brackishwater aquaculture sector is currently engaged with shrimp production. The sector is dominated by small holders with low productivity. Research efforts need to be concentrated for production and effective use of economically viable technological interventions benefiting small holders to increase per unit productivity in line with growing population and demand for quality and food safety. In the meanwhile, the increasing threats like WTO issues of trade and non trade barriers, global warming, and climate changes also needs to be suitably addressed by developing prediction modules. Climate Resilient Aquaculture technologies are to be developed for empowering farmers to face climate change in general and the extreme climate events in particular.

The human resource development needs of the key stakeholders are to be attended. Modern techniques for overall productivity enhancement by development of futuristic programmes in the areas of biotechnology, new generation vaccines and diagnostics, bio-informatics, genomics, proteomics, discharge water treatment and management, value addition, modeling and forecasting for crop weather interactions and diseases; post harvest losses and demand of fishery products are to be evaluated for developing a strong policy framework.

Section 3: Outline of the strategy

Purpose of the strategy

The strategy or direction and scope of work of CIBA over the next five years would be aimed at achieving an advantage for the organization by focused use of the available manpower and other resources to solve the core challenges faced by the sector and to enable the sector to meet the needs of markets and to fulfill stakeholder expectations.

- To play the mandated role in maintaining food security in the long run.
- To adapt to newer challenges and changing environment.
- To identify clear-cut objectives and goals and try to achieve them.
- To address the concern of other line departments including farmers for sustainable aquaculture growth

Long term outcome goals

- To carry out the mandated role in maintaining a healthy long term growth rate of aquaculture production and productivity.
- To minimize production losses in farm by implementing Better Management Practices and prevention and control of diseases.
- To minimize losses due to diseases in order to reduce instability in farm production and providing livelihood security to farmers.
- To contribute to on-farm value addition to increase farm income.

SWOT analysis

As covered in Section 2C

Proposed solutions and policy options

- Increase productivity.
- Diversify species and systems.
- Improve health management.
- Increase investment in infrastructure and capacity building.
- Increase investment in post production management and value addition.
- More technology refinement and assessment programmes.
- R&D in collaboration with private sector under PPP mode.

Prioritization

S. No.	Strategy	Prioritization of Programme			
		Low	Medium	High	Rating %
1.	Diversification of aquaculture systems and species			ç	15
2.	Production system management for enhancing productivity			ç	7.5
3.	Health management			ç	10
4.	Production and support for quality seed supply			ç	20
5.	Soil water health management and developing climate change adaptation strategies		ç		7.5
6.	Farm production and marketing economics & Impact assessment		ç	ç	15
7.	Human resource development			ç	10
8.	Strengthening of technology assessment and refinement			ç	10
9.	International linkages		ç		5

Implementation framework

The strategy is to be implemented by assigning clear cut responsibilities to each of the five Research Divisions of the CIBA. Creation and sustenance of linkages with the State Governments and sister departments, as also with international organizations are an important element of the implementation research framework planned. Greater involvement of other stakeholders, especially with NGOs and the private sector, is vital for technology incubation and transfer. Regular monitoring and review of the progress in this direction is conducted at the Institute level, as follows:

- Monthly divisional meetings
- Six Monthly Review of R&D Work done by each scientist by DG, ICAR
- Quinquennial Review by experts
- Research Advisory Committee meetings
- Bi- annual Institute Research Council meetings
- Stakeholder/Interface meetings with line departments and sister organizations

Section 4: Implementation plan

The basic and strategic research will be carried out primarily by specific divisions in the Institute, and centres. National level and issues involving mandates of sister institutes will be addressed through Network Projects. Commodity-specific research will be done by the two commodity-specific divisions, Crustacean Culture Division,(CCD) & Finfish Culture Division, (FCD) in collaboration with Aquatic Animal Health and Environment Division, AAH&ED, Nutrition, Genetics and Biotechnology Division, NGBD and Social Sciences Division (SSD). Basic research as well as coordinated and network projects will also be partly implemented through the State Agricultural Universities/other ICAR Institutes. Location-specific problems will be addressed through centres and outreach programmes. Efforts will be made to commercialize the technologies developed and for their large-scale application. Refinement and assessment of technologies will also take place with joint efforts with coastal KVKs. Timely weather-based agro-advisories will be issued to line departments and the farmers. Land use plan for aquaculture development will be prepared and supplied to all the stakeholders. Greater exploitation of ICT including mobile telephony would be attempted. Aquatic animal disease monitoring surveillance and forecasting modules would be developed and supplied to line departments.

The output would be reviewed through six-monthly assessment of each scientist and through quarterly, six-monthly reports and with bi-annual research council meets at the Institute and interface meetings with the line departments.

Stakeholder engagement:

State Governments and farmers are represented in Institute Management Committees. By conducting specific interface meetings, Kisan Melas and farmers meets, regular interaction with the line departments and international institutions, sister organizations, like DBT, DST, MOEF and by participation in ICAR-industry meet stakeholder engagement is ensured. Interactive user-friendly website, mobile advisory services, programmes through media will also be appropriately engaged.

Learning agenda:

The two way gaps in the Institute - farmer loop, the gap in the lab-to-land transfer of technologies and the gap in bringing the feedback from the stakeholders to the Institute, are to be suitably filled. Learning gaps in inter-disciplinary research (including across various sciences) and bringing in immediate stakeholder relevance at real time to the long term goal oriented research agenda have also to be filled.

Resources required:

There is strong need to develop out-of-box thinking science managers, scientists, and open-minded farmers for better output. To achieve faster growth rate there is a need to strengthen existing resources in terms of manpower, well equipped modern laboratories and sufficient budgetary provisions to manage them. Common access facilities will be created at each Research Division for smooth work flow. Information Technology infrastructure will be fortified for ease of access to global online research resources to all the scientists.

Milestones:

Some of the thrust areas and activity milestones are given in Annexure.

Section 5: Linkage between strategic plan and RFD

The CIBA has well established linkage with sister institutions, state agricultural / veterinary universities, other research and development organizations like DST, DBT, NFDB and NABARD in order to have strong research support to develop robust technology for sustainable development of coastal aquaculture sector. Further strong linkage with private industries and foreign organizations particularly in the area of seeds, value added products, vaccines, diagnostics, feed formulation and socio economics analysis exists. ICAR is having standing MoUs with several international organizations like FAO, WFC, NACA institutions to bridge the gap between the technology generation and technology dissemination through the use of IT. Through its out reach and network projects, the CIBA has developed a strong linkage with SAUs, SVUs and NGOs in addressing the region specific problems in a mission mode approach. The entire programme will be periodically monitored effectively through the mechanism already put in place as detailed at Section IV (v).

Linkage with RFD

CIBA has identified the following major objectives under RFD of the department

1. Develop and refine seed production protocols
2. Develop and refine grow-out culture protocols for fin fishes and crustaceans
3. Design and test environmental and nutritional interventions
4. Monitor and manage diseases attacks and value addition
5. Document and improve and use aquatic genetic resources
6. Extend support to farmers and conduct policy/ socio-economic/ gender analyses for effective transfer of technology and
7. Make quality inputs and technology available to farmers and entrepreneurs

The major programs reflected in the strategic plan will be fragmented into activities in the subsequent RFDs and would be achieved in a time frame. The priorities of the programmes would change depending on the various external factors as detailed in Section 2 and need mid course corrections in terms of activity milestones.

Inter se Priorities among Key Objectives, Success indicators and Targets

Objective	Weight %	Actions	Success Indicator	Unit	Weight %	Target / Criteria Value				
						Excellent	Very Good	Good	Fair	Poor
						100%	90%	80%	70%	60%
1. Enhancing production and productivity in brackishwater aquaculture sector	65%	Develop/refine seed production protocols for fin fishes and crustaceans	Seed production cycles	No.	5	12	9	6	3	1
			Breeding cycles	No.	5	12	9	6	3	1
		Develop/refine grow-out culture protocols for fin fishes and crustaceans	On-station/ on-farm grow out testing cycles	No.	8	12	9	6	3	1
			Design and test environmental and nutritional interventions	Environment and nutrition yard evaluations/ interventions	No.	6	7	6	5	4
		Monitor disease incidence and develop disease management tools	Dietary interventions for shellfish and finfish species under high and low saline regimes	No.	6	7	6	5	4	1
			Disease surveillance surveys	No.	5	15	12	10	8	6
		Explore aquatic genetic resources for promoting 'high growth and high health' in fin fishes and crustaceans	New/ refined prophylactic & diagnostics protocols; therapeutics & detection of causative factors for transmission and virulence of fish diseases	No.	5	6	5	4	3	2
			Genotyping of families/ challenge tests/ bio-active compounds/ novel microbes	No.	5	14	12	9	6	4
		Extend support to farmers and conduct policy/ socio-economic/ gender analyses for effective	Stakeholder interactions, trainings, technical advisories & extension materials.	No.	10	14	12	9	6	4

Objective	Weight %	Actions	Success Indicator	Unit	Weight %	Target / Criteria Value				
						Excellent	Very Good	Good	Fair	Poor
						100%	90%	80%	70%	60%
		transfer of technology	Field study reports on socio economic issues/ adoption of SHGs.	No	5	7	6	5	4	2
			Impact assessment of brackishwater aquaculture on mangroves & climate change/ natural calamities on aquaculture (districts)	No	5	8	6	4	2	1
2. Transfer of brackish water aquaculture Technologies to end users	24%	Make quality inputs and technology available to farmers and entrepreneurs	Finfish/ crustacean seed (lakhs)	No.	10	20	16	14	12	10
			Technologies developed/ demonstrated; Products and technologies commercialization; Patents & PPP linkages	No.	14	3	2	1	0	0
3. Efficient functioning of RFD system	11%	Timely submission of draft for approval	On-time submission	Date	2	31/3/2011	1/4/2011	2/4/2011	3/4/2011	4/4/2011
		Timely submission of results	On-time submission	Date	3	25/3/12	27/3/12	28/3/12	20/3/12	31/3/12
		Identify potential areas of corruption related to organization activities and develop an action plan to mitigate them	Finalize an action plan to mitigate potential areas of corruption	Date	2	Dec.10, 2011	Dec.10,2011	-	-	-
		Implementation of Sevottam	Create a Sevottam compliant system to implement, monitor and review Citizen's Charter	Date	2	Dec.10, 2011	Dec.10, 2011	-	-	-
			Create a Sevottam complaint system to redress and monitor public grievances	Date	2	Dec.10, 2011	Dec.10, 2011	-	-	-

Section 6: Cross-departmental and cross functional issues:

1. For the action plan one, developing and refining seed production protocols with Central Institute of Brackishwater Aquaculture (CIBA) facilities, timely approvals and release of funds from project funding agencies like National Fisheries Development Board (NFDB), Department of Bio Technology (DBT) and Department of Science and Technology (DST) are necessary. This support will make the project units to complete the physical and financial targets as envisaged as many of the action plans proposed involve external funds also.
2. For the action plans (2, 3 and 4) on development and refinement of technologies for fish culture, environmental and nutritional interventions and disease management to result in desirable outcomes of increased yields at farmers fields and lead to other positive socio economic impacts, constructive policy support for brackishwater aquaculture enterprise is required from Ministry of Agriculture, Ministry of Environment and Forests and State Pollution Control Boards.
3. Commercial Banks should actively lend to sector and National Bank for Agricultural and Rural Development (NABARD) should enhance the ground level credit flow to aquaculture to make the research efforts on new aquaculture crops and technology refinements to reach the sector. Since most of the National Fisheries Development Board (NFDB) subsidies can benefit only farmers who are able to avail bank loans, credit flow from commercial bank is to be ensured for new aquaculture crops and technologies to reach farmers fields.
4. State Fisheries Departments need to give required extension support and should take active part in mass contact programmes organized by CIBA.
5. Coastal Aquaculture Authority /National Fisheries Development Board/ Marine Product Export Development Authority / State Department of Fisheries should proactively make their staff to participate in CIBA stakeholder interactions and training programmes.

Section 7: Monitoring and review arrangements:

The output would be reviewed through periodical reports submitted to PME cell, six-monthly assessment of each scientist and through periodical Institute Research Council meetings at Institute and interface meetings with the line departments. Besides, the in-built review mechanism as detailed in Section 3 would also form part of monitoring system.

Annexure

Overall plan and milestones

The milestone is to develop technologies which can sustain under unfavourable climate, have mass scale application, address the future needs of producer and consumer and provide both nutritional, livelihood and socio-economic security to the resource poor farmers. Considering the thrust areas of research based on the national and global need, the strategic plan document has been prepared for the next five year and the detailed activities are provided in the table below :

Programmes	Activity	Milestone				
		2010-11	2011-12	2012-13	2013-14	2014-15
Environment friendly and cost effective brackishwater culture technologies with focus on techniques suitable for adoption by small scale farmers.	<ul style="list-style-type: none"> ▪ Understanding microbial and nutrient flow dynamics of pond to improve farming practices. ▪ Demonstrations of low input shrimp culture. ▪ Identifying adaptive mechanisms and developing mitigations strategies for climate change. ▪ Evaluation of different bioremediation approaches. ▪ The role and potential of reservoirs and ETP to be evaluated. 					
Comprehensive health management to address the existing and emerging diseases in shrimp and fish production systems.	<ul style="list-style-type: none"> ▪ Refining diagnostics for viral and bacterial diseases of fish and shrimp. ▪ Epidemiological and biotechnological investigations of WSSV and other pathogens for developing remedial measures. ▪ Evaluating disease risks at farm level. 					
High-health and high-growth shrimps through application of genetic and biotechnological tools.	<ul style="list-style-type: none"> ▪ Development of captive breeding technology for monodon based on hormonal and genomic interventions. ▪ Genomics and Phenomics investigations to understand genes responsible for disease resistance in shrimp. 					
Diversification of species and systems for development of sustainable brackishwater aquaculture.	<ul style="list-style-type: none"> ▪ Demonstrations of nursery and grow-out culture technologies for crab at West Bengal. ▪ Development and standardization of seed production and culture technologies for candidate species. ▪ Demonstration of nursery and grow-out feed for crab. ▪ Farm level evaluation of feeds for seabass with fish meal replacement and use of 					

	<ul style="list-style-type: none"> additives. ▪ Demonstrations of low input shrimp culture. ▪ Development of culture package for vannamei suitable for small scale farmers. ▪ Public private partnership with entrepreneurs for increased culture of new candidate species ▪ Market studies to evaluate the potential of new species in domestic market. 					
Evaluation and utilization of economically important brackishwater resources	<ul style="list-style-type: none"> ▪ Microbe mining for bioactive compounds. ▪ Evaluation of natural resources for producing novel products. 					
Socio-economic analysis and policy support for sustainable brackishwater aquaculture development	<ul style="list-style-type: none"> ▪ Socio-economic evaluation of small scale farmers. ▪ Development GIS, RS and decision support systems tools. ▪ Capacity building and transfer of technologies to women SHGs. ▪ Use of ICT for effective extension of aquaculture technologies. ▪ Evaluation of domestic market. ▪ Entrepreneurship 					