

A Value Chain on Murrel Production in Tamil Nadu and Orrissa

Environmental and Social Safeguards Management

A. Basic Information

1. Project statistics:

Component code	:	2
Name of Consortium Leader	:	Rev. Dr. Alphonse Manickam S.J.,
Name of CPI	:	Dr. M. A. Haniffa
Name of CoPI	:	1. Dr. B. John De Britto (SXC)
		2. Dr. A.K. Sahu, Dr. Kuldeep Kumar,
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Consortium partners	:	1. St. Xavier's College (SXC), Palayamkottai, Tamil Nadu
		2. Central Institute of Freshwater Aquaculture
		(CIFA), Bhubaneswar, Orrissa– 751 002
		3. The New College (TNC), Chennai – 600 014
2. Date of Start	:	22 August 2008
3. Planned duration	:	3.10 years
4. Project cost	:	Rs. 302.13 Lakhs

5. Project objectives:

1. To refine and replicate mass seed production techniques under research and development to increase survival (R&D) and upscaling of murrel seed production at farmers level.
2. To standardize the procedure and process of producing mass culture of live feed

organisms and formulation of microencapsulated diet and semi moist feed using agrowaste and medicinal herbs (R&D) for grow out culture of murrels.

3. To enhance the knowledge, skills and attitude of target communities in sustainable use of stakeholders ponds and ultimately under utilized ponds for murrel farming for their socio economic upliftment.
4. Strengthening of weaker chains (eg, disease management) and rectification of missing links (eg, seed production, larviculture, grow out culture and transport as frozen/chilled flesh and value added products) in PCS through R&D and Marketing by Government and Private Partners.

6. Brief project description:

Air breathing fishes form about 13% of the marketable freshwater fishes in India and among them murrels are highly priced (Rs.200-300/kg) for their quality, taste, flavour and nutritive, recuperative and medicinal properties in the states of Assam, Punjab, West Bengal and Madhya Pradesh (CIFRI Bulletin No.53, 1988) and all over India as well as southeast Asia (Haniffa et al., 2004). Among air breathing fishes, murrels belonging to the genus *Channa* constitute a unique group of food fishes perching high market value (Haniffa et al 2004). Murrels are air breathers and survive in oxygen depleted water bodies and hence are suitable for profitable culture in shallow systems. About 28 to 30 *Channa* species have been reported in the global scenario and 8 to 10 species in India with taxonomic ambiguity. Giant murrel (*C. marulius*) and striped murrel *C. striatus* are regarded as excellent table fish due to their large size in India as well as in South East Asia (Chakrabarthy, 2006). Hence considerable scope exists for augmenting the supply of murrels to markets and tourist hotels and ultimately exports by undertaking large scale culture in our country.

Unfortunately Indian fish farmers are unable to culture murrels due to non availability of seeds as well as feed. Moreover larviculture of murrels is a Herculean task since they are Carnivorous, Piscivorous and Cannibalistic. The fish farmers who have attempted murrel farming often encounter failures due to sudden outbreak of diseases like Epizootic Ulcerative Syndrome (EUS). After Murugesan (1978), Murugesan and Kumaraiah (1976, 1977, 1978, 1980, 1982), Parameshwaran (1975), Parameshwaran and Kumaraiah (1984) and Parameshwaran and Murugesan of CIFRI (1975, 1976a, 1976b) efforts were not made for breeding and culture of murrels in India in the past three

decades. When compared to Thailand, Malaysia, Vietnam and Philippines we are far backward in murrel farming.

Present Status:

Our Indian subcontinent has a vast number of ponds and tanks (2.36 million ha). But only one third has been utilized (0.8-0.9 million ha) for aquaculture that too mostly for carp culture. But till date most of the fresh waterbodies are underutilized for murrel culture due to want of technologies especially for production of seeds and feeds of murrels. The stakeholders who have ponds in their premises are also unable to practice murrel farming at present. Currently they prefer African catfish (*Clarius gariepinus*) culture and Thai catfish (*Pangasius sutchi*) culture illegally due to short term benefit irrespective of ban by Government of India. Hence the present project proposal deals with Production to Consumption System (PCS) models for murrel culture by utilizing the stakeholders ponds of about 25 ha (maximum stocking density for 1 ha is 10000 murrels) initially in the second year. It is proposed to produce 30000 murrels (*C. striatus*) with each weighing 750 g (22500 kg) (Tirunelveli, Tamil Nadu and Bhubaneswar and ultimately all over India), later with an aim of enhancing the socio-economic status of target groups (fish farmers, fisherman, unemployed youths and socially weaker sections). The success of this project will be a unique model for murrel culture for ensuring proteinaceous diet and sustainable livelyhood development in rural areas. When compared to the annual demand of murrels of 3 lakhs tonnes in Tamil Nadu the existing supply by capture fisheries is only about 0.16 lakhs tonnes otherwise < 20%. At this juncture murrel farming could be promoted among fish farmers through upscaling of seeds in their ponds and availability of semi moist pelleted feed incorporated with probiotics and medicinal herbs for grow out culture. Regarding seed production, it is proposed to produce 3 lakhs seeds in stakeholder ponds in Tamilnadu and 2 lakhs seeds in Bhubaneswar.

At present murrels are sold immediately after capture as live fish due to consumer preference. No doubt, the consumer demand for live murrels is increasing day by day and hence there is no difficulty with regard to marketing. Since there is high market demand as live fish hardly there is chance for processed murrels. The target production for the second year is about 25tonnes. Regarding the expenditure, brood fish will be supplied to fish farmers free of cost since they will attempt upscaling. For Bhubaneswar the target fixed for giant murrel is 20000 in number (each 1 kg and total 20000 kg). Initially for the second year target is 25 tonnes / year in Tamil Nadu and Orissa which will be ultimately

increased to 100tonnes/year in Tamil Nadu by covering more ponds. Attempts will be made to transport the fish as live as well as frozen with the help of marketing partners. Excess production of murrel will be supplied to consumers as frozen fish or value added products like pickle. Production to Consumption System (PCS) will be strengthened by establishing two cooperative centres one at Tirunelveli and another in Chennai to facilitate and help the fish farmers for murrel production, feed supply, management of farms, credit facilities and marketing. These centres will provide technical knowledge and will act as model centres for capacity building. These centres will also help in the sustainability of murrel farming after completion of the project.

7. Environmental category issues in the subproject

- Social:
- Environmental

8. Safeguard policies triggered (World Bank policies)

Safeguard Policies Triggered (World Bank Policies)		
	Yes	No
Environmental Assessment (OP/BP 4.01)	[X]	[]
Natural Habitats (OP/BP 4.04)	[]	[]
Pest Management (OP 4.09)	[]	[]
Cultural Property (draft OP 4.11-OPN 11.03 -)	[]	[]
Involuntary Resettlement (OP/BP 4.12)	[]	[]
Indigenous Peoples (OD 4.20)	[]	[]
Forests (OP/BP 4.36)	[]	[]
Safety of Dams (OP/BP 4.37)	[]	[]
Projects in Disputed Areas (OP/BP 7.60)	[]	[]
Projects on International Waterways (OP/BP 7.50)	[]	[]

B. Risk analysis and related issues

1. Captive breeding experiments may not be a success throughout the year. Various factors viz, Environmental conditions and fish maturity will decide the response. Some times unknown factors also play a major role. In that case seed availability may be a problem. Sudden outbreak of EUS also may occur in murrel farms.
2. Wound caused by injection of hormones may lead to abrasion of skin and ultimately death by EUS disease.
3. Water availability at stakeholder ponds depends on water table and monsoon. Monsoon can not be predicted and hence consequently failure may affect murrel growout culture
4. Lack of transport facilities to markets may result in dead fish.
5. Consumers of Orissa do not prefer *C.marulius* due to religious taboo. They presume *C. marulius* as God's fish due to chakra like marking in the tail.
6. Consumers do not prefer dead fish for food
7. Stakeholders response may not be positive to share profit of murrel farming with PIU – NAIP

8. St. Xavier's College does not have fish farm except a small aqua garden at CARE inside the College premises. Hence revenue by SXC is questionable.

9. Impact assessment:

1. Income generation to fish farmers by providing technology transfer in an industrially backward area which has not been practiced murrel culture systematically so far

10. Potential indirect and/ or long-term Impacts due to anticipated future activities in the project areas (assessment of anticipated conflict/ complimentary with the current as well as those proposed for the next five years in the areas of activities of the sub-project):

1. Diversification in promoting inland aquaculture instead of coastal and marine farmers
2. Promoting murrel culture as substitute for traditional carp culture in Tamil Nadu as well as in other states of India.
3. Promotion of live fish marketing
4. Generating employment for unemployed youths, socially weaker sections especially women
5. Eco friendly without causing any pollution, since no pesticides will be used.
6. Sustainable murrel farming in stakeholders ponds and ultimately underutilized ponds.
7. Since murels are air breathing they can be cultured in shallow water bodies
8. Domestic and suitable food fish due to few intra muscular spines, taste and medicinal value; farming production could be promoted for domestic and export markets.

11. Identify the key stakeholders and describe mechanisms for consultation with and to them done/ disclosure so far done including pre-project consultations with stake holders workshop before formulating the full proposal, discussing the full proposal with some stakeholders before submission to the PIU:

Public Institutions

1. Directorate of Fisheries, Tamilnadu
2. Fish Farmer Development Agency (FFDA), Tamilnadu
3. National Horticultural Mission, Tirunelveli
4. Valzhandu Kattuvom Project, Tamilnadu
5. Collectorate, Tirunelveli District
6. National Bureau of Fish Genetic Resources of India (NBFGR), Lucknow
7. Central Institute of Fisheries Education (CIFE), Mumbai
8. Madras University, Chennai
9. Lady Doak College, Madurai
10. Centre for Cell and Molecular Biology (CCMB), Hyderabad

Non Government Organization (NGO)

1. Tirunelveli Social Service Society, Tirunelveli

Private Praters

1. Arasan Group of Companies, Tirunelveli
2. M/S Kader Investments, Tuticorin
3. Srinivasa Hatchery, Hyderabad
4. Millennium Exports, Chennai
5. Pandian Aquafarm, Dindugal
6. Surya Aquafarm, Erode
7. Nirupa Aquafarm, Mettupalayam

International institutes:

1. Asian Institute of Technology, Thailand
2. Network of Aquaculture Centres in Asia-Pacific, Bangkok
3. Flinders University, Adelaide, Australia
4. Univ.of Dhaka,Bangladesh
5. Kasetsart University, Bangkok
6. Universidad National Autonoma de Mexico, Mexico
7. Centro de Investigation en Alimentacion Y, Mexico
8. Alexandria University, Egypt
9. Cantho University, Vietnam
10. Silsoe Research Institute, United Kingdom

12.Chronology of meetings/ activities held in connection with preparation of the concept note & full proposal

Sl.No.	Date & Location	Programme	Participants	Remarks
1	19th Sep.2007 LDC Lady Doak college	Brainstorming meeting on NAIP consortium on murels	CPI, CoPIs, CA and RSC	Discussion on collaborative research of murels
2	25th Sep.2007 LDC Lady Doak College	Brainstorming meeting on NAIP consortium on murels	CPI, CoPIs, CA and RSC	Discussion on component 2
3	29th Sep.2007 MSU M.S University	Discussion on present needs of fish farmers	CPI, CoPIs & CA	Discussion on consortium partners
4	4th Oct.2007 LDC Lady Doak College	Brainstorming meeting on NAIP consortium on murels	CPI, CoPIs, CA & RSC	Preparation of concept note
5	29th Nov.2007 CARE St Xavier's College	Meeting with fish farmers	CPI, CoPIs, CA & RSC	Discussion about selection of concept note under component 2
6	14th Dec. 2007 KGS	Discussion with stakeholders	CPI & CoPIs	Discussion on murrel status in Kerala

7	20th Dec. 2007 CARE, St Xavier's College	Brainstorming meeting on NAIP consortium on murrels	CPI, , CoPIs, CA & RSC	Preparation of full proposal
8	3rd Jan. 2008 CARE St.Xavier's College	Stakeholders Interaction Workshop	DC, POTC,CL,CPI, CoPIs, & RSC	Preparation of full proposal
9	4 th Jan.2008 LDC Lady Doak College	Discussion on Environmental and Social issues	CPI, CoPI & CA,	Preparation of full proposal
10	10 th Jan.2008 CARE, St. Xavier's College	Discussion on full proposal	CL, CPI, CoPIs, CA & RSC	Submission of full proposal

13. Measures to Address the Issues:

Issues related to technical and financial progress have been documented from the start of the sub-project and brought to the knowledge of CAC. The suggestions and recommendations to overcome the constraints have been submitted to the PIU for approval. Fish farmers workshop was conducted and the issues related to seed production, larval rearing and growout culture of murrels were discussed. CDs have been preferred for seed production, farming and treatment of diseases.

13. Consultation/ disclosures to be done in future:

Disclosure was made through news papers. Periodical visits were made to villages to meet stakeholders. A net work of fish farmers is maintained and the stakeholders have a free access to visit the lead institution and they are provided murrel culture brochures and VCDs. Attempts will be made to present reports of the project on the website. Periodical meetings are held for stakeholders to discuss the various aspects of the project. In addition video shows are also provided to them and feed back were collected. The project finding will be disclosed time to time by website.

Linkages to popularize murrel culture in other states

Popularization of murrel farming will be made not only in Tamilnadu and Orissa but all over India. Linkages will be made with FFDA and Fisheries Departments of different states. Collaboration will be made with NGOs of Tamilnadu to popularize murrel farming for income generation.

Consortium PI

National Coordinator

National Director

Annexure I: Environmental safeguard: Activities, issues, impact and mitigation measures

Activities	Issues	Anticipated Level of Impacts		Mitigation Measures	
		Positive	Negative		
Mass seed Production	Natural supply is not adequate to meet the demand of fish farmers	3	Required quantity has to be produced	-	Water quality management, pathogen and predator free environment and Brood fish nutrition
Murrel larviculture	Poor survival of young ones	3	Providing cost, effective solution to fish farmers	-	Refinement of larviculture technology
Adult feed	No separate adult feed for murrels available in the market	3	Agrowaste is used for producing feed as semi moist as well as dry pelleted feed	-	Murrels do not accept dry feeds. Hence they will be trained
Transportation	Mortality during transport	2	-	-	Producing novel anesthetizing techniques to solve the problem; proper measures to keep fish alive and processing by frozen techniques
Marketing	Supply of table size is inadequate to meet demand	4	-	-	Production will be increased for export and tourism industry. Value added products like pickle will be tried.
Workshop and Information	Murrel farmers have no centres for information and training	4	-	-	Lead centre will provide this regularly
Captive breeding	Murrel species under threat due to anthropogenic stress	4	-	-	Conservation of threatened species

Annexure II: Social safeguard: Activities, Issues, Impact and mitigation measures.

S.no	Activities	Issues	Anticipated level of impacts		Mitigation measures (Negative impact)
			Positive	Negative	
1	Baseline survey	Availability of information inadequate	4	-	Data collection will be carried out
2	Survival of economically important murrels in different states of India	Information not available at present	4	nil	Contact will be made with Fisheries Organizations of different states
3	Diversification of murrel culture from carp culture by Indian fish farmers	Murrel; culture not familiar among fish farmers	4	nil	Changes in occupation by culture in neglected water bodies. Income generation supply of model to Indian fish farmers
4	Production consumption value addition	Supply not enough to meet the present demand.	4	nil	Market Assurance.
5	Promoting murrel food. Medicinal and recuperative values	Malnutrition	4	nil	Solve malnutrition and to promote human health
6	Giant murrel culture	Religious taboo in few states for giant murrel	3	Consumer preference less	Supply to adjacent states like Kerala and Andhra Pradesh as alive or frozen flesh
7	Processing formalities	Readymade frozen murrel not available in the market	4	-	Frozen murrels will be supplied
8	Value added products	Nil till date	4	-	Attempts will be made for products like pickle.
9	Sale of table size murrel	No proper marketing.	4	-	Profit/income generation
10	Entrepreneurship development of stakeholders for murrel farming	Lack of techniques.	3	-	Self employment
11	Nutritional status of murrel food for convalescence persons	Consumers have no idea.	4	-	Clinical studies will be made.
12	Murrel food for enrichment of omega 3 fatty acid	Consumers not familiar.	4	-	Clinical studies will be made.

