

Marine Pearl Culture as an Alternate Income Generation Activity For Fisher Folk – A Model

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ABSTRACT

The Gulf of Mannar (GoM) is rich in biodiversity and bio-resources. Annually about one lakh tons of fishes comprising fin fishes, prawns, crabs and lobsters are being harvested from the Gulf of Mannar. Approximately 1.5 lakh fisher folk living in about 90 fishing hamlets on the shore of the GOM depend on this fishery and seaweed resources for their livelihood. However, owing to over fishing and increased fishing population and damage to the coral reefs, sea grass beds and other ecosystems by trawlers, the fish catch is declining, leading to poverty among the fisher folk. Additional income for the fisher folk could be achieved by adopting some of the mariculture technologies perfected by R & D organizations as co-activity. Marine pearl culture is suggested for this purpose.

This paper deals with the basics of marine pearl culture, collective discussions of NGO's, beneficiary and R&D institutions for encouraging fisher folk on the usefulness of the programme and to form cooperatives, detailed responsibilities of the participating agencies, schematic programme schedule of pearl culture and a model economic implication and returns.

Keywords: Pearl culture; *Pinctada fucata*; income generation activity; fisher folk

INTRODUCTION

The Gulf of Mannar is rich in biodiversity and bioresources. An estimate says that about 3,600 species of flora and fauna exist in the Gulf of Mannar, which include extensive coral reefs, sea grass meadows, seaweed beds, pearl oyster and chank beds and mangrove wetlands (MSSRF, 2003). Apart from this, the Gulf of Mannar acts as a home for the endangered marine mammal sea cow and marine turtles.

The breeding and feeding grounds created by these ecosystems and complex food web formed by various marine flora and fauna resulted in high fishery production.

Annually about one lakh tons of fish including fin fishes, prawns, crabs, lobsters etc., are harvested from the Gulf of Mannar (Anon, 2003). About 1.5 lakh fishers living in about 90

fishing hamlets depend on this fishery resources and seaweed resources for their livelihood. However, on account of over fishing and increased fishing population and damage to the coral reefs, sea grass beds and other ecosystems by trawlers, fish catch is declining, leading to poverty among the fisher folk.

Creating alternative livelihoods and additional sources of income for the poor fisher folk is one of the means for the sustainable management of the fishery resources and conservation of the biodiversity of the Gulf of Mannar apart from raising the economic status of the fisher folk.

Alternative income source for the fisher folk could be achieved by adopting some of the mariculture technologies perfected as a co-activity of their livelihood *i.e.*, fishing. There are a few technologies readily available with the

R & D institutions in India. One among them is marine pearl culture.

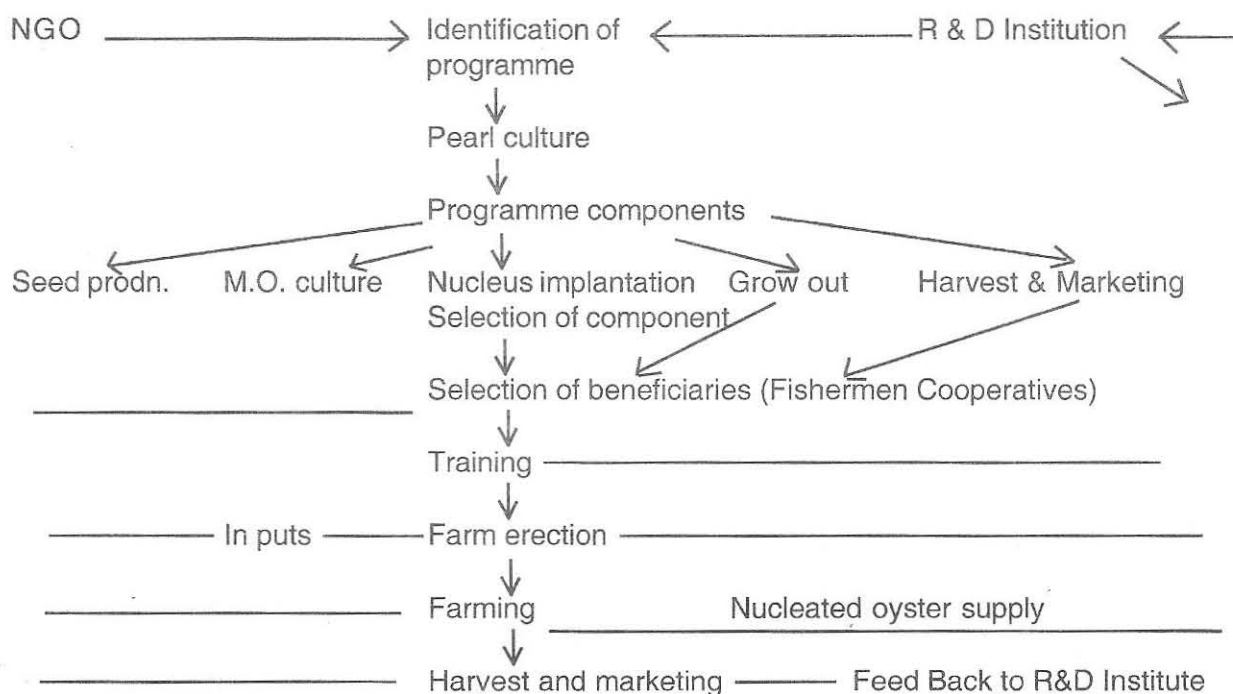
Marine pearl culture - a theoretical look

The success story of marine pearl production in India was achieved way back in early 1970s. Breakthroughs achieved in pearl oyster seed production and cultured pearl production are the main arteries of the technology. (Alagarswami *et al.*, 1983, Alagarswami, 1987).

In brief, pearl culture technique involves three different components. They are

- Hatchery seed production of pearl oysters, farming and mother oyster production
- Surgical implantation of nucleus
- Post-operative culture and production of pearls

Schematic diagram of the societal programme - Marine pearl culture



All these operations need trained manpower and a high degree of technical competency. Hence, taking up marine pearl culture as a whole needs higher inputs, manpower and money. To overcome these difficulties, a model was devised to take up marine pearl culture as a societal programme by fisher folk involving additional two components namely, a NGO for funding, overall planning and execution and R&D Institutions for the technical planning, training and technical guidance and periodical monitoring of the programme.

Marine pearl culture societal programmes in Gulf of Mannar

Fishermen and CMFRI

Marine pearl culture as a societal programme has been thought of and implemented by CMFRI way back in 1993 at

Valinokkam on a small scale involving Fisherman and CMFRI (Victor, et al., 1995). A floating raft of 6 x 6 m size was floated with 100 cages suspended from it. A total of 9,414 oysters were nucleated and cultured. The detailed economics of the programme is given in **Table 1**.

Fishermen, NGO and CMFRI

As an improvement of the above activity, during 2002-03, a societal programme consisting the above three partners was conceived and successfully demonstrated at Mundalmunai Village, Pamban, Ramnad District.

Lead discussion

As a beginning to the implementation of the programme, the NGO namely, M.S. Swaminathan Research Foundation, Chennai held detailed discussions with the Scientists of

Table 1 : Data on economics of pearl culture – Valinokkam experience 1993 Method: Cages suspended from a 6 x 6 m raft

<i>Input cost (for two years)</i>		Rs.
1.	Cost of teakwood poles, floats, anchor chains	13,000
2.	Cages (100 nos.) for rearing 10355 oysters	10,000
3.	Cost of 10355 pearl oysters at Rs. 1.40/seed	14,500
4.	Cost of 9494 shell bead nuclei at Re 1/bead	9,500
5.	Cost of menthol, glasswares, plastic wares, surgical instruments etc.	5,000
6.	Labour charges for pearl oyster surgery	3,000
Total Rs.		55,000
<i>Production and Revenue</i>		
Total pearls produced		Nos 1849
1.	Sale proceeds of 1296 pearls (wt. 138.28g)	73,133
2.	Cost of 250 pearls distributed to fishermen in lieu of their labour	12,500
Total earnings Rs.		85,633

the CMFRI on the various aspects of marine pearl culture, its technicalities, input components and possibility of handling by the fisher folk. After a couple of meetings and discussions, a schedule of activities was designed and responsibilities were assigned to each of the participating units.

Mind set conversion of fisher folk

In general, fishermen are mostly conservative and are reluctant in involving themselves in such activities. Further, their financial status also do not encourage them to venture into new avenues. Hence, they have to be first convinced, and their doubts cleared through group discussions with the NGOs on matters of the possible financial and other assistance that could be provided to them, and with the scientists, on all the day-to-day technical activities of the programme.

Responsibilities of each of the participating groups

MSSRF (NGO)

The primary and lead agency was the M.S Swaminathan Research Foundation, Chennai, which is responsible for overall planning and execution, identification of beneficiaries and logistic supplies, The detailed responsibilities of NGO were detailed below;

1. Mobilize the community and organize them into a pearl culture society
2. Developing an organizational structure and management procedures for the proper functioning of the society
3. Getting necessary permission from the Tamil Nadu Forest Department to construct pearl farm in the Gulf of Mannar
4. Providing financial support to the society for training, purchase of implanted pearl oysters and farming inputs.

CMFRI

The Central Marine Fisheries Research Institute (CMFRI) is responsible for technical planning, training and guidance throughout the programme. The responsibilities are:

1. Helping MSSRF in mobilizing the villagers by providing technical and economic details of pearl culture to the villagers
2. Providing technical inputs and in identifying suitable sites for pearl farming
3. Providing training on pearl farming to the villagers
4. Providing technical inputs for preparing a micro plan for pearl farming
5. Providing technical inputs for constructing pearl culture farm
6. Supply of required number of nucleated pearl oysters to the society on payment
7. Periodical supervision of the farm and technical advise till harvest of pearls

BENEFICIARY (Fishermen Cooperatives)

The fishermen cooperative is the backbone of the programme and is completely involved in executing the activities in consultation with the other two units. The following were the detailed responsibilities:

1. Constructing and managing pearl farm
2. Growing nucleated pearl oysters in the farm
3. Protecting pearl oysters against predators, growth of epiphytes and epifauna
4. Protecting pearl oysters from poaching
5. Protecting pearl farm from natural calamities like cyclone
6. Harvesting and marketing of pearls with the help of MSSRF

Implementation and progress of the programme

As a first step, a village level society namely, "Mundalmunai Pearl Culture Society" was formed and registered with the help of MSSRF. Twenty members of the society were given one week hands-on training at CMFRI, Mandapam Laboratory mainly on farm construction, farming of implanted oysters, precautions to be taken, farm management and harvest and preservation of cultured pearls. A suitable site for pearl culture, located near the village was identified and recommended to the society. Necessary permission for construction of culture structures (racks - 15x10 m area) was obtained from the Tamil Nadu Forest Department. Periodically, oysters were operated at CMFRI laboratory and transplanted to the farm at Mundalmunai village for further growth and pearl production. The members of the society involved themselves in the routine farm management. Periodical harvests were made as per the harvest schedules charted out by CMFRI.

Anticipated outcome of the societal programme

The experience gained and successful completion of such societal programme would enable many such units to venture for similar programmes and all such units could unite together to form a total cooperative structure consisting supplies of inputs, farming and production of cultured pearls and purchase and marketing of pearls. Apart from monetary benefits for the fishermen cooperatives, trained manpower development; local employment generation is also foreseen in this venture.

Working economics and anticipated sustainability of the model

By adopting the suggested model, a large

scale cooperative marine pearl farm of ten units of 30 sq.m. (300 sq.m. rafts) could be erected and farming can be done by investing Rs. 15.0 lakhs as capital obtained through a bank loan/ NGO support.

The farm can hold at a time 100,000 nucleated oysters. Each culture duration would be 8 months. Initial lag period is 10 months and after that regular pearl harvest at monthly interval. The post operative survival would be 55% (55,000 nos) and 15% of saleable pearl production out of the surviving oysters is expected. An average of about 8,250 pearls can be produced over a period of 10 months. The average selling price of commercial grade pearls is set at Rs. 100. Total annual revenue of Rs. 9,90,000 is expected to be generated. The programme becomes self-supporting after a period of 10 years by repaying the entire amount of Rs. 15.0 lakhs at a rate of Rs. 3.0 lakhs/year apart from an annual net profit of Rs.2.0 lakhs. Table 2 to 2.4

Constraints

Any societal programme is a difficult job to begin and implement successfully. The Mundalmunai attempt is one such thing. Added to this, the prevailing law enforcement in the State also proves to be a stumbling block. In the absence of clear-cut policies and guidelines from the state government with regard to the usage of waterfront, construction of culture structures in the area and modalities for collection of wild pearl oysters from the natural bed, this programme is bound to be a failure. Hence, a high level meeting of scientists, planners and administrators of state government should sit together and work out the modalities and guidelines for such programme as oysters and seafront are the monopoly of the state.

Table 2 – Detailed working economics of a cooperative marine pearl farm**Infrastructure**

a)	Amount (Rs)
Nucleation laboratory	
Nucleus implantation laboratory (30 sq.m.)	
construction cost	75,000
Cost of erecting culture structure	80,000
Air conditioners	20,000
Air compressors	25,000
Surgical sets (5 nos)	50,000
Furniture/glass/plastic wares	50,000
	3,00,000

Table 2. 1 Cost involvement for culture operation (one culture)

Type of expenditure	Amount (Rs.)	Nature
Cost of oysters @Rs.1.00/no. (100,000 nos.)	Rs . 1,00,000	Recurring/culture*
Cost of shell bead nucleus (4 mm)	Rs. 1,25,000	Recurring/culture
Cost of culture cages @ Rs. 75/cage (1250 nos)	Rs. 1,00,000	Recurring/ 2 cultures
Repair/rack maintenance	Rs. 50,000	Recurring/ 3 rd culture
Charges for nucleus implantations (3x Rs.3,500/month)	Rs. 1,26,000	Recurring/yearly
Others nets/ropes etc.,	Rs. 50,000	
Small boat	Rs. 50,000	Once in 5 years
Miscellaneous running expenses/year	Rs. 10,000	Recurring/yearly
Total	Rs. 5,61,000	

* 25% of the harvested oysters can be reused after 3 months for grafting

Table 2.2 Year-wise production and revenue

Year	No. of pearls	Expected revenue on sale
One	3x 825 = 2,475	Rs. 2,47,500
Two	12x825 = 9,900	Rs. 9,90,000
Three	12x825 = 9,900	Rs. 9,90,000
Four	12x825 = 9,900	Rs. 9,90,000
Five	12x825 = 9,900	Rs. 9,90,000
Six	12x825 = 9,900	Rs. 9,90,000
Seven	12x825 = 9,900	Rs. 9,90,000
Eight	12x825 = 9,900	Rs. 9,90,000
Nine	12x825 = 9,900	Rs. 9,90,000
Ten	12x825 = 9,900	Rs. 9,90,000
Total income by the end of tenth year		Rs. 91,57,500

Table 2.3 Year-wise expenditure

Year	Type	Amount	Total
One	Infrastructure	Rs. 3,00,000	
	Culture operation	Rs. 5,11,000	Rs. 8,11,000
Two	Culture operation	Rs.3, 61,000	Rs. 3,61,000
Three	Operation/repair of racks	Rs. 5,11,000	Rs. 5,11,000
Four	Operation	Rs. 3,61,000	Rs. 3,61,000
Five	Operation/ repair of racks/boat	Rs. 5,61,000	Rs. 5,61,000
Six	Operation	Rs. 3,61,000	Rs. 3,61,000
Seven	Operation/repair of racks	Rs. 5,11,000	Rs. 5,11,000
Eight	Operation	Rs. 3,61,000	Rs. 3,61,000
Nine	Operation/repair of racks	Rs. 5,11,000	Rs. 5,11,000
Ten	Operation	Rs. 3,61,000	Rs. 3,61,000
	Total		Rs.47, 10,000

Table 2.4 Loan repayment

Yr.	Principal	Interest (9.5%)	Total	Repayment	Balance
1	15,00,000	1,42,00	16,42,500	0	16,42,500
2	16,42,500	1,56,038	17,98,538	3,00,000	14,98,538
3	14,98,538	1,42,361	16,40,899	3,00,000	13,40,899
4	13,40,899	1,27,385	14,68,284	3,00,000	11,68,284
5	11,68,284	1,10,987	12,79,271	3,00,000	9,79,271
6	9,79,271	93,031	10,72,302	3,00,000	7,72,302
7	7,72,302	73,369	8,45,670	3,00,000	5,45,670
8	5,45,670	51,839	5,97,509	3,00,000	2,97,509
9	2,97,509	28,263	3,25,772	3,00,000	25,772
10	25,772	2,448	28,221	28,221	0

** On tenth year the complete loan taken by the cooperative society will be repaid fully .

Conclusion

From the experiences, it is evident that 'Pearl culture' can be adopted as a societal programme for alternate income generation of the fisher folk. The interest and involvement shown by the fisher folk in making the programme successful are encouraging and

exemplary. The successful completion of a few similar programmes, will infuse confidence in farming "Cooperative Societies for Marine Pearl Farming" in Gulf of Mannar area. This would enable improving the economy of the poor fisher folks of this area.

ACKNOWLEDGEMENTS

The authors thank Dr. Mohan Joseph Modayil, the Director, CMFRI, Kochi for permitting to publish the paper and Dr. K.K. Appukuttan, Head, Molluscan Fisheries Division, CMFRI, Kochi for his encouragement. They also thank the ICAR, New Delhi for the financial grant under ICAR Revolving Fund scheme.

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