B-7

PILOT PROJECT

ON

P E A R L C U L T U R E

(VIZHINJAM)

1. TITLE OF THE SCHEME

'PILOT PROJECT ON PEARL CULTURE'

2. Location

VIZHINJAM

3. NAME AND ADDRESS OF THE DEPARTMENTS

1. Central Marine Fisheries Research Institute, Cochin-682018

2. Department of Fisheries, Government of Kerala, Trivandrum-695010

4. NAME AND ADDRESS OF THE HEAD OF THE DEPARTMENTS

1. Dr. R.V. Nair, Director, Central Marine Fisheries Research Institute, Post Bag No.1912, Cochin-682018

2. Shri M. Mukundan Unni, Director, Department of Fisheries, Government of Kerala, Trivandrum-695010

1. Name of the Project : PILOT PROJECT ON PEARL CULTURE

2. Products: : Cultured pearls.

   Co-products and by-products : Seed pearls, Oyster meat and shells.

3. Use of the products/by-products:

a. Cultured pearls	Used as gems in jewellery of many kinds such as pearl strings, necklaces, broaches, rings, bangles, etc.
b. Seed pearls	Used in certain pharmaceutical preparations.
c. Meat	The meat, particularly, the adductor muscle is edible.
d. Shells	In poultry feed; source of lime, shell-crafts, decorative inlay and carving works.

4. Present consumption pattern : Given in background information.

5. Estimated future demand : The pearl trade has been showing an increasing trend. The future demand may be of the order of 25-30 million rupees if indigenously produced.

6. Present market price : No market survey has been done so far.

7. Background information:

Pearls produced by the pearl oyster, Pinctada fucata are very lustrous and are in great demand in India and abroad. The pearls are

produced by a process of biological defence against the accidental entry of foreign particles of organic and inorganic origin into their tissues. This principle is made use of in the technology of inducing the pearl oyster to produce pearls by inserting or implanting shell bead nuclei in the interior aspect of the animal. These pearls are known as cultured pearls. Japan has developed this industry as a very vast commercial venture to produce pearls on a massive scale and sell them at a comparatively cheaper rate than the natural pearls. They have perfected the techniques to such an extent that the export trade of these pearls is a flourishing one. Australia also has to a large extent succeeded in establishing a pearl culture industry in collaboration with Japan. Philippines, Burma, Indonesia and Hong-Kong are the other countries to follow this method.

In India, pearl oyster resources were traditionally confined to two areas, the Gulf of Mannar and the Gulf of Kutch. Following the intermittent and unpredictable nature of the pearl fisheries of these areas attempts were made by the Central Marine Fisheries Research Institute in 1972-73 to develop the technology of producing spherical culture pearls at Tuticorin and the efforts met with success. In the wake of this break-through came the remarkable discovery by the scientists of the Central Marine Fisheries Research Institute of the settlement of spats and the probable existence of pearl oyster population at Vizhinjam along the Kerala Coast. Unlike in other areas where the oysters settle down on rocky bottom, the settlement of spat at Vizhinjam was noticed on spat collectors like nylon ropes and suspended cultch materials. This settlement, almost throughout the year, opened up a new vista for the establishment of cultured pearl industry at Vizhinjam. The majority of the pearl oysters collected here were Pinctada fucata as on the east coast and therefore ideal for culture operations. These were grown in special book-type cages suspended from rafts in Vizhinjam harbour and operated in July-August 1974 for cultured pearl production. The results have been an

unqualified success thereby indicating Vizhinjam area as a potential pearl oyster producing zone, and Vizhinjam centre a suitable place for establishing a cultured pearl industry.

The pearl markets in Bombay, Calcutta and Hyderabad are well known and there is an import and export trade of pearls (Annexures III & IV). In 1970-1971 India imported natural unworked pearls to the value of Rs. 36,79,095 from Japan and cultured pearls valued at Rs. 45,99,448, mostly from Japan. The export trade fetched Rs. 10.264 million from 35 countries. In this context the establishment of cultured pearl industry on a commercial scale at Vizhinjam assumes special significance which is bound to boost not only the export trade but also minimise the strains imposed on foreign exchange in importing cultured pearls from Japan.

8. Description of the process, its specific advantages and scope of its present and potential application:

The process of pearl culture could be broadly divided into (1) farming of mother oysters and (2) operation and production of cultured pearls. For mother oyster culture, oysters are collected by the process of setting up spat collectors in the Vizhinjam Harbour area and collecting spats. The process of diving for oysters by engaging professional divers is dispensed with in this case and artificial hatchery method of producing oyster spat also becomes unnecessary in view of the fact that natural spat settlement is profuse and can be relied upon to provide the necessary stock. The oysters are put in special type of frame nets and suspended from floating wooden rafts which will be anchored in a selected locality inside the Vizhinjam Harbour basin. The oysters are grown in this way until they reach a size suitable for producing pearls in them. The growth of the spat in this area appears to be very fast unlike along the east coast.

In the second stage, the oysters are brought to the laboratory and conditioned before operation. Spherical shell bead nuclei are implanted within the tissues of the oyster along with suitable graft tissue pieces prepared by cutting the mantle edge. The oysters are allowed a period of rest and revival after operation in the laboratory and then returned to the rafts in the farm area. They are grown for a further period of 6 to 24 months as may be desired at the end of which cultured pearls could be harvested.

The process described above has been tested already and proved successful both at Tuticorin and Vizhinjam and therefore can be relied upon for a commercial venture. A very high percentage of pearl yield (70%) has been obtained even in these preliminary work.

In the light of the trends of work in this line the project is sound and will stand the test of time.

9. Laboratory and preliminary work:

a. Scale of investigations:

Preliminary work has been carried out at Tuticorin and Vizhinjam and has been successful. Farming of about 2,000 oysters in each locality has given a very high percentage of pearl yield. About 400 oysters had been operated in Tuticorin and a lesser number at Vizhinjam and these have been partly examined for pearl production at various intervals, ranging from 30 days to 180 days. The average success could be expected to be 70% of the operated oysters.

b. Quantity of product prepared:

The experiments were not production-oriented but were undertaken for the development of technology and know-how.

c. Are you able to supply adequate quantities of the product as samples to entrepreneurs?

If the present scheme is approved and put through it is definitely possible to do so. A demonstration of the entire process was given in 1974 to VIPs.

d. Date of laboratory investigation with respect to operating conditions, approximate consumption of raw materials and utilities, yields, man-power etc.

A pearl culture farm was set up in Vizhinjam in 1974. The experimental work was done by Central Marine Fisheries Research Institute with limited laboratory and field facilities. The operations were done by a small team of scientists and supporting staff. The raw material used was limited and was collected from spat collection ropes and grown in cages. There are at present 2,000 oysters in the farm which can be operated for pearl production. More numbers are being collected. By implementing a separate scheme, the spat collection work can be intensified and large quantities can be collected and reared in the farm.

e. Designs and data collected:

Designs of rafts, buoying and anchoring devices, cages, nets, collection of oysters, farming procedures, surgical operations, nucleus preparation etc. have been worked out. These data have given the required knowledge for expansion of the activities both for research purpose and for pilot scale production of pearls.

f. Quality of products:

There is no specification, I.S.I. or others for the Indian cultured pearls. Although no testing has been done so far, the

products are comparable to the imported pearls. The products have not been sent to the market as yet and hence no consumer acceptability report on products is available.

10. Pilot project:

a. Suggested capacity:

About 3,00,000 oysters are to be used for farming and production of pearls in the 5 year period. The rate of stocking will be 75,000 oysters per year for the first 4 years.

b. Layout of the project:

A good laboratory building to be taken on rent at Vizhinjam for the establishment of production laboratory, stores, storage of by-products etc. The farm will be established in the Vizhinjam Harbour basin in the proximity of the eastern breakwater wall. This small area will have to be declared out of bounds for fishing boats traffic and buoyed.

c. Raw materials:

Pinctada fucata and other suitable species of pearl oysters. The shell bead nuclei will be imported at present.

d. Availability:

(i) Indigenous: Pearl oysters will be collected by laying special spat collectors in Vizhinjam harbour area and the necessary stock raised by this technology.

(ii) Imported: About Rs. 10,000/- worth of shell bead nuclei will be imported annually from Japan for the entire period of 4 years. This is to enable us to implement the project without delay. When large-scale indigenous production of suitable nuclei is accomplished, these can be utilised.

11. Equipment for the project:

(a) Indigenous: The equipment will consist of operation tools, filtering units, holding tanks, motors etc. The operation tools are of special types and will be made locally.

(b) Imported At least 10 sets of operation tools are to be imported from Japan during the initial stages of the project which will involve a foreign exchange of Rs. 10,000/-.

(c) Likely suppliers: Indigenous equipment can be procured locally in Kerala State from industrial establishments. The likely suppliers of operational tools both in India and in Japan will be found out after preliminary enquiries.

One or two sets of operational tools are available (personal sets with scientists). The fabrication of tools could be done with these tools as prototypes with suitable modifications.

Procurement and manufacture can be completed within a period of one year (i.e. the first year of the commencement of the project).

12. Economics:

Please see Annexures V-XIV for details.

13. Marketability of products and addresses of firms: Technical collaboration:

Marketing of pearls could be taken up with the co-operation and help of "The Gem & Jewellery Export Promotion Council, D-15, Commerce Centre, 4th Floor, Tardao, Bombay-400034".

The project is financed by the Fisheries Department of Kerala State and the Project Officer who will be in overall charge of the scheme will be from the Central Marine Fisheries Research Institute.

14. Safety considerations, if any:

It would be necessary to declare the farm area as 'protected' for preventing fishing boats traffic in the area. Proper notification can be issued by Kerala Government.

15. Anticipated effluents waste and pollution problems:

There will not be any pollution problem arising out of the pilot project.

16. Any difficulty anticipated in implementation:

Collection of required quantity of pearl oysters from spat collection work would largely decide the full implementation of the proposal. This work will have to be effectively carried out.

17. Detailed phased programme of work along with funds required, please indicate the total period required to complete the work:

Total period required: 5 years

Phased programme of work:

First year: Collection of spats and culture at Vizhinjam. Construction of temporary laboratory accommodation; procurement of boats, equipments etc.

Second year: Collection of pearl oyster spats and rearing; farming; conditioning of oysters; nucleus implantation; post-operative culture; market survey; releasing the product.

Third year: Programme same as in the previous year.

Fourth year: Programme same as in the previous year.

Fifth year: Programme same as in the previous year; completion of the project.

Funds required : Please see Annexures V-VIII.

18. Processes which involve production of equipment, instrument etc.

a) Has any prototype been prepared? If so, number of prototypes already made:

b) Have the prototypes been operated successfully?

c) Have the prototypes been demonstrated satisfactorily to the entrepreneurs?

d) How many more prototypes would be needed before production could be established?

e) Have you a set of drawings for making prototypes?

f) What is the suggested number of pieces for production of a commercial scale?

g) Estimated requirement of capital?

h) What is the estimated cost of the item when produced on commercial scale?

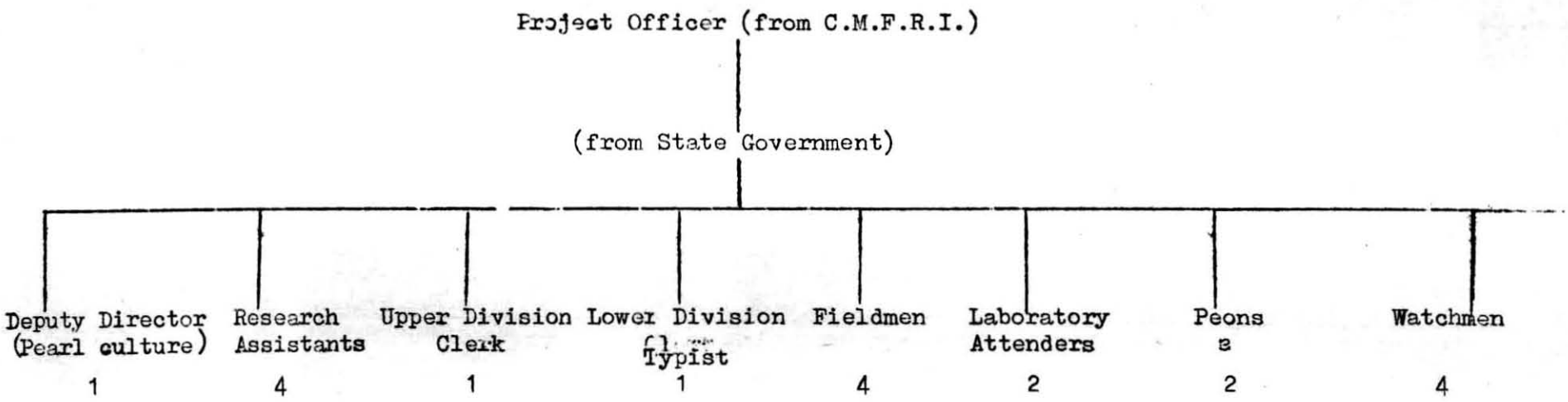
The special equipment and instruments which are required in the project, apart from those readily available in the market, are (1) the instruments for operation and (2) machinery for production of nuclei. Regarding the instruments, we are now using foreign-made ones. These are proposed to be made indigenously with the help of suitable instrument manufacturers. A process for the production of nuclei has already been developed using an ordinary bench drill with suitable modifications. These developments are being made separately and will not involve funds from the proposed pilot project.

19. Any other point not covered by the above which you wish to bring out:

Anticipated revenue: The total anticipated receipt is Rs. 25,96,000. This is worked out on the following basis. Of the 75,000 oysters stocked in one year, at least 70% would survive to the next year, of these at least 70% (36,750 numbers) can be expected to produce pearls. Fifty percent of the oysters would give at least one pearl each and the rest, two pearls each. In other words, from the second year onwards the annual production would be about 55,000 pearls; of these 30% may be expected to be of good quality (A grade), 40% of medium

quality (B grade), and 30% poor quality (C grade). The value per pearl of A grade, B grade and C grade would be approximately Rs. 25/-, Rs. 10/- and Re. 1/- respectively. Thus the annual income from the pearls would be Rs. 6,49,000 from second year onwards. The total revenue from the second to the fifth year would therefore be Rs. 25,96,000. The total estimated expenditure, including interest on capital is Rs. 11,33,000. The estimated profit, excluding its value of assets after depreciation is Rs. 14,63,000.

ANNEXURE - I : STAFF PATTERN



ANNEXURE-II: STAFF REQUIREMENTS

Sl. No.	Name of the post	Scale of pay	No. of posts required	Essential qualifications
1.	Project Officer	Rs.1100-50-1600	1	M.Sc. in Zoology/Fishery Biology/Marine Biology with at least 10 years experience in fisheries investigations, preferably 2 years in culture of molluscs.
2.	Deputy Director	Rs.750-50-1150-50/2-1250	1	M.Sc. in Zoology/Fishery Biology/Marine Biology with at least 5 years experience in fisheries investigations, preferably 1 year in culture of molluscs.
3.	Research Assistant	Rs.405-15-540-20-560-20/2-660	4	M.Sc. in Zoology/Fishery Biology/Marine Biology with at least 2 years experience in fisheries investigations
4.	Upper Division Clerk	Rs.275-11-330-13-460-13/2-525	1	Qualifications as prescribed
5.	Lower Division Typist	Rs.230-6-236-7-257-8-345-8/2-385	1	
6.	Fieldman	Rs.215-5-225-6-237-7-258-8-330-8/2-370	4	
7.	Laboratory Attender	Rs.210-4-218-5-228-6-270-7-305-7/2-340	2	
8.	Peon	Rs.196-3-229-4-245-4/2-265	2	
9	Watchman	Rs.196-3-229-4-245-4/2-265	4	

ANNEXURE-III: IMPORT AND EXPORT OF PEARLS INTO AND FROM INDIA
(Values in 1000 Rupees)

Commodity	IMPORT				EXPORT			
	1968-69	1969-70	1970-71	1971-72	1968-69	1969-70	1970-71	1971-72
Natural pearls								
Unworked	1,973	5,312	3,679	3,080	5,992	7,483	5,158	6,293
Worked	214	74	nil	nil	884	1,560	4,535	7,398
Cultured pearls								
Unworked	6,538	3,942	4,599	3,295	221	153	398	124
Worked	nil	7	68	36	34	62	173	543
Total	8,725	9,335	8,346	6,411	7,131	9,258	10,264	14,358

Source:- "Monthly Statistics of the Foreign Trade of India" published by the Directorate General of Commercial Intelligence and Statistics.

ANNEXURE-IV: IMPORTS OF PEARLS INTO INDIA

(1968-69 to 1970-71)
Value in Rs.

Country of origin and articles	1970-71	1969-70	1968-69
PEARLS PRECIOUS AND SEMI-PRECIOUS STONES WORKED OR NOT			
PEARLS NOT SET OR STRING NATURAL UNWORKED			
Cong. Brazil	--	13,876	--
Czechoslavakia	5,000	--	--
Dubai	5,260	--	--
Japan	36,68,835	51,08,084	15,94,923
Muscat	--	81,499	1,79,811
Qatar	--	1,08,165	1,71,528
Thailand	--	--	18,698
U.S.A	--	--	1,913
Venezuela	--	--	5,775
Total	36,79,095	53,11,624	19,72,648
NATURAL WORKED			
Japan	--	74,020	--
S. Arab	--	--	2,14,436

Contd....

ANNEXURE-IV (Continued)

CULTURED UNWORKED			
Brazil	--	11,392	13,46,958
Australia	--	--	5,475
Czechoslavakia	33,651	19,317	3,684
Hong Kong	--	11,809	--
German F.R.P.	2,057	--	--
Japan	45,58,804	38,99,237	51,76,607
Poland	4,936	--	--
Switzerland	--	--	5,680
Total	45,99,448	39,41,755	65,38,404
CULTURED WORKED			
Belgium	5,580	--	--
German F.R.P.	950	--	--
Japan	5,123	6,641	--
Switzerland	31,985	--	--
U.K.	24,577	--	--
Total	68,215	6,641	--
Grand Total	83,46,758	93,34,040	87,25,488

Source :- "Monthly Statistics of the Foreign Trade of India" published by Directorate General of Commercial Intelligence and Statistics.

ANNEXURE-V: RECURRING EXPENDITURE: PAY OF OFFICERS AND ESTABLISHMENT

Sl No	Designation	Scale of pay	No.of post	1st year Rs.	2nd year Rs.	3rd year Rs.	4th year Rs.	5th year Rs.	Total Rs.
1.	Project Officer	Rs.1100-50-1600	1	13,200 (1)	13,800 (1)	14,400 (1)	15,000 (1)	15,600 (1)	72,000
2.	Deputy Director	Rs.750-50-1150-50/2-1250	1	9,000 (1)	9,600 (1)	10,200 (1)	10,800 (1)	11,400 (1)	51,000
3.	Research Assistant	Rs.405-15-540-20-560-20/2-660	4	19,440 (4)	20,160 (4)	20,880 (4)	21,600 (4)	22,320 (4)	1,04,400
4.	Upper Division Clerk	Rs.275-11-330-13-460-13/2-525	1	3,300 (1)	3,432 (1)	3,564 (1)	3,696 (1)	3,828 (1)	17,820
5.	Lower Division Typist	Rs.230-6-236-7-257-8-345-8/2-385	1	2,760 (1)	2,832 (1)	2,916 (1)	3,000 (1)	3,084 (1)	14,592
6	Fieldman	Rs.215-5-225-6-237-7-258-8 330-8/2-370	4	10,320 (4)	10,560 (4)	10,800 (4)	11,088 (4)	11,376 (4)	54,144
7	Laboratory Attender	Rs.210-4-218-5-228-6-270-7-305-7/2-340	2	5,040 (2)	5,136 (2)	5,232 (2)	5,352 (2)	5,472 (2)	26,232
8.	Peon	Rs.196-3-229-4-245-4/2-265	2	4,704 (2)	4,776 (2)	4,848 (2)	4,920 (2)	4,992 (2)	24,240
9.	Watchman	Rs.196-3-229-4-245-4/2-265	4	9,408 (4)	9,552 (4)	9,696 (4)	9,840 (4)	9,984 (4)	48,480
	Total			77,172	79,848	82,536	85,296	88,056	4,12,908

ANNEXURE-VI: RECURRING EXPENDITURE-ALLOWANCES, HONORARIA ETC.

Sl. No	Item	1st year	2nd year	3rd year	4th year	5th year	Total
1.	Dearness allowances	12,000	12,400	12,800	13,200	13,320	63,720
2.	House rent allowances	6,660	6,815	6,940	7,080	7,295	34,790
3.	Travelling allowances	2,000	2,000	2,000	2,000	2,000	10,000
4.	Other allowances, Honoraria etc.	2,000	2,000	2,000	2,000	2,000	10,000
	Total	22,660	23,215	23,740	24,280	24,615	1,18,510

ANNEXURE-VII: RECURRING EXPENDITURE - CONTINGENCIES

Item	1st year	2nd year	3rd year	4th year	5th year	Total
Farming material	75,000	1,00,000	25,000	25,000	10,000	2,35,000
Tools, nuclei etc.	20,000	20,000	20,000	20,000	5,000	85,000
Chemicals/Glassware	10,000	10,000	10,000	10,000	10,000	50,000
Casual labour	10,000	10,000	10,000	10,000	10,000	50,000
Rent for office	3,500	3,500	3,500	3,500	3,500	17,500
Other contingencies	15,000	15,000	15,000	15,000	15,000	75,000
Total	1,33,500	1,58,500	83,500	83,500	53,500	5,12,500

ANNEXURE-VIII: TOTAL RECURRING EXPENDITURE

Sl. No.	Item	1st year Rs.	2nd year Rs.	3rd year Rs.	4th year Rs.	5th year Rs.	Total Rs.
1.	Pay of Officers and establishment	77,172	79,848	82,536	85,296	88,056	4,12,908
2.	Dearness allowances	12,000	12,400	12,800	13,200	13,320	63,720
3.	House rent allowance	6,660	6,815	6,940	7,080	7,295	34,790
4.	Travelling allowances	2,000	2,000	2,000	2,000	2,000	10,000
5	Other allowances, honoraria etc.	2,000	2,000	2,000	2,000	2,000	10,000
6.	Contingencies	1,33,500	1,58,500	83,500	83,500	53,500	5,12,500
	Total	2,33,332	2,61,563	1,89,776	1,93,076	1,66,171	10,43,918
	or	2,33,300	2,61,600	1,89,800	1,93,100	1,66,200	10,44,000

ANNEXURE-IX: NON-RECURRING EXPENDITURE

Sl. No.	Nature of expenditure	1st year Rs.	2nd year Rs.	3rd year Rs.	4th year Rs.	5th year Rs.	Total Rs.
1.	Cost of Fibre glass boats	18,000	--	--	--	--	18,000
2.	Cost of Outboard motors	16,000	--	--	--	--	16,000
3.	Cost of motor and pump	6,000	--	--	--	--	6,000
4.	Furniture	10,000	--	--	--	--	10,000
5	Temporary sheds for Oyster tanks	15,000	--	--	--	--	15,000
	Total	65,000	--	--	--	--	65,000

ANNEXURE-X: TOTAL RECURRING AND NON-RECURRING EXPENDITURE

	Recurring Rs.	Non-recurring Rs.	Total Rs.
Total of Annexure-VIII	10,44,000	--	10,44,000
Total of Annexure-IX	--	65,000	65,000
Total	10,44,000	65,000	11,09,000

ANNEXURE-XI : HARVEST PATTERN

Years	Oysters in Farm	Mortality	Operated	Production			
1st year	--- - - - - - - - - - - - nil- - - - - - - -						
2nd year	75,000	30%	52,500	70%	36,750	50%	2 pearl each
					18,375	50%	1 pearl each
3rd year	75,000	30%	52,500	70%		-do-	
4th year	75,000	30%	52,500	70%		-do-	
5th year	75,000	30%	52,500	70%		-do-	

ANNEXURE-XII: GRADING TABLE

	A	B	C
Percentage in pearl	30%	40%	30%
Value:	@ Rs. 25/- each	Rs. 10/- each	Re. 1/- each

ANNEXURE-XIII: ANTICIPATED RECEIPT FROM THE PILOT PROJECT

1st year Rs.	2nd year Rs.	3rd year Rs.	4th year Rs.	5th year Rs.	Total Rs.
Nil	6,49,000	6,49,000	6,49,000	6,49,000	25,96,000

ANNEXURE-XIV: CASH FLOW STATEMENT

1st year	Expenditure	2,98,300	
	Add interest @ 8%	23,864	
		3,22,164	
2nd year	Expenditure	2,61,600	
	Add previous year expenditure	3,22,164	
		5,83,764	
	Deduct receipt	6,49,000	
		65,236	PROFIT
3rd year	Expenditure	1,89,800	
	Deduct profit of previous year	65,236	
		1,24,564	
	Deduct receipts	6,49,000	
		5,24,436	PROFIT
4th year	Expenditure	1,93,100	
	Deduct profit of previous year	5,24,436	
		3,31,336	PROFIT
	Add receipts	6,49,000	
		9,80,336	PROFIT
5th year	Expenditure	1,66,200	
	Deduct profit of previous year	9,80,336	
		8,14,136	
	Add receipts	6,49,000	
		14,63,136	TOTAL PROFIT FOR 5 YEARS

N.B: The project becomes a self-financing one from the second year onwards.