

**UNITED NATIONS DEVELOPMENT PROGRAMME
Project of the Government of Maldives
PROJECT DOCUMENT**

Project Number: MDV/02/003/A/01/99

Project Title:
**Pearl Culture Demonstration,
Extension and Marketing Project**

Project Short Title:
Pearl Culture (PCDEMP)

Estimated Stating Date: **8 Oct 2003**
Estimated End Date: **7 Oct 2008**

Executing Agent:
Ministry of Fisheries, Agriculture and Marine Resources

Project Site: **Vaavu Atoll**
LPAC Approval Date: **30 June 2003**




<u>Summary of UNDP & Cost Sharing</u>	
<u>UNDP</u>	
TRAC (1&2)	_____
TOTAL	_____
Admin. and Operational Services	
Cost sharing	US\$ 396,000
TOTAL	US\$ 396,000

Classification Information:

ACC sector & sub- sector: 04 Natural resources 10 Water Resources, Planning and Management	Primary type of intervention: 01 Capacity building
DCAS sector & sub-sector: 03 Natural resources 014 Water resources	Secondary type of intervention: 02 Technology transfer
Primary areas of focus/sub-focus: 03 Promoting Env & Natl Resources Sustainability 019 Promotion of sustainable natural resource management	Primary target beneficiaries: 01 Target group 04 Others 036 Population at large

Brief Description:

The Pearl Culture Demonstration, Extension and Marketing Project is designed to further improve the technical and human resource capacity to develop a Penguin Shell culture and half-round pearl culture industry in the Maldives. A successful and sustainable pearl culture industry in the Maldives would make a significant contribution to the country's overall development. Its activities would bring a welcome diversification to the economy, which is presently restricted primarily to tourism and fisheries.

On behalf of:	Signature	Date	Name and title
The Government of Maldives		8 October 2003	Dr. Ahmed Shaheed Permanent Secretary, Ministry of Foreign Affairs
The Government of Japan		8 October 2003	H.E. Seiichiro Otsuka Ambassador Extraordinary and Plenipotentiary, Embassy of Japan, Colombo
UNDP		8 October 2003	Mr. Shaheem Razee, Resident Representative a.i.

ABBREVIATIONS

ADC	Atoll Development Committee
ADF	Atoll Development Fund
APR	Annual Progress Reports
EIA	Environmental Impact Assessment
FE	Faculty of Engineering
JHRDF	Japan Human Resources Development Fund
MCHE	Maldives College of Higher Education
MOFAMR	Ministry of Fisheries, Agriculture and Marine Resources
MPND	Ministry of Planning and National Development
MRC	Marine Research Centre
MT	Ministry of Tourism
MTI	Ministry of Trade and Industries
NDP	National Development Plan
PAC	Project Advisory Committee
PCDEMP	Pearl Culture Demonstration, Extension and Marketing Project
PMU	Project Management Unit
PCPP	Pearl Culture Pilot Programme
TPR	Tripartite Review
UNDP	United Nations Development Programme
UNV	United Nations Volunteers

1. CONTEXT

1.1 National Context

The Republic of the Maldives is a nation of small oceanic islands. Even by the exceptional standards of archipelagic developing countries, the physical geography of Maldives is extreme. The country is composed of nearly 1,200 coral islands, grouped into 26 natural atolls, that together forms a long narrow chain 820 km in length and 130 km at its widest point set in an area of more than 100,000 sq. km. of ocean. Almost all islands are very small, with an average land size of only 16 ha. Only 33 islands have a land area in excess of one sq. km, while just 3 islands – Gan in Laamu Atoll, Hithadhoo in Addu Atoll and Foammulah – have an area larger than 3 sq. km. In addition to being very small, all islands are low-lying coral islands. None have an elevation of more than 3m above sea level and 80 percent of the total land area of less than 300 sq. km has a mean elevation of only 1 metre. In contrast, reef and lagoon areas are substantial.

Maldives is characterised by a severe paucity of land-based natural resources. This applies not only to hard minerals – Maldives has none – but also to such basic resources as water and soil. Soils in Maldives are of extremely poor quality. They tend to be porous and highly alkaline, being notably deficient in potassium and nitrogen. Available phosphorous often interacts with calcium to form calcium phosphate, while calcium carbonate, which is often present, impedes root penetration. Land suitable for agriculture in the whole of the country has been estimated at less than 30 sq. km. This is less than 10 percent of the total land area and is equivalent to around 100-sq. m per person. In addition to being a very scarce commodity, land suitable for agriculture is very unevenly distributed throughout the archipelago. One atoll – Laamu - accounts for 16 percent of all available agricultural land and three atolls for more than 30 percent of the total. Five atolls have virtually no agricultural land, while there are additional 6 atolls in which total available agricultural land is less than 100 ha.

Maldives has no rivers, lakes or even streams. The islands have traditionally been dependent for their water supplies on the shallow layer of fresh water formed by rainfall that floats on seawater. This lens is in some islands too thin to support even shallow wells, while in all islands the freshwater lens is susceptible to rapid depletion and contamination. This combination of factors impacts negatively on agricultural potentials and on opportunities for achieving improvements in the nutritional status of island populations.

The population of the Maldives is approximately 270,000. Approximately 74,000 people are concentrated on the capital island Male'. This distribution of population gives Maldives an extremely dispersed and fragmented population with few parallels in the developing world. No less than 200 of Maldives' 1,200 coral islands are inhabited. Of the inhabited islands, 11 have less than 200 persons and 67 – one-third of all inhabited islands – have fewer than 500 inhabitants. No fewer than 144 islands, or more than 70 percent of all islands, have less than 1,000 people. Only 6 islands have more than 3,000 people. Inhabited islands are spread throughout the archipelago. Nine of the country's 20 administrative atolls have less than 10 inhabited islands, while no atoll has more than 17 inhabited islands. Away from Male', the majority of the population is disadvantaged by lack of employment opportunities, and lack of health and education facilities.

Economic progress recorded by the Maldives has been considerable and this progress finds clear expression in the indicators traditionally used to measure a nation's development. In 1998 the country reported a real GDP per capita of US\$4083¹ the highest among South Asian countries. Between 1995 and 2000 real GDP grew by 46 percent recording an annual average growth rate of over 8 percent.

This growth has not only brought increased prosperity to the people of Maldives; it has also been accompanied by considerable progress in the social fields. Marked improvements have, for example, been achieved in infant mortality, child mortality and maternal mortality rates, and several debilitating diseases, such as malaria, childhood tuberculosis, filaria and leprosy have either been eradicated or have transmission rates that are close to zero. Child immunization is nearly universal and vaccination coverage against hepatitis has reached 95 percent of the population. Far larger numbers of Maldivians today have access to medical services, potable water, sanitation and electricity. Since 1977 some 20 years have been added to the life expectancy of a Maldivian at birth, bringing it to 77 years in Male and 70 years in the Atolls, an exceptionally high figure for a least developed country. Primary education has become the basic right of almost all Maldivian children, with primary school enrolment having increased by 5 per cent per annum in the past decade to reach more than 90 per cent of the respective age group. The number of young people attending secondary school has also increased sharply, from only 9 per cent of the relevant age group in 1986 to more than one-third in 1995. Adult literacy, at 98 per cent, is among the highest for all least developed countries. The 2000 Human Development Report ranks Maldives 89th out of 174 countries with a Human Development Index of 0.725.

The financial basis for the progress recorded has been the judicious exploitation of the nation's marine potentials, with fisheries and tourism having firmly established their place as the dominant sectors of the nation's economy. The total fish catch has increased in recent years – from 71,200 tons in 1989 to an estimated 124,000 tons in 1999 while the value of exports fish has grown from US\$51.8 million in 1989 to US\$69 million in 1999, representing 6.5 percent share of GDP. Between 1987 – 99 tourist arrivals increased more than threefold, resort capacity doubled and bed capacity utilisation increased from about 60 to 70 percent. It accounts for more than 33 percent of GDP.

The two main pillars of the national economy are tourism and fisheries. Tourism is now the largest contributor to GDP and to revenue for Government social development programmes. Fishing, and especially tuna fishing, although now surpassed by tourism in economic terms, it still provides the major source of employment in the outer atolls, the major source of animal protein for the Maldivians, and the major source of visible export earnings.

Despite the high rate of economic growth recorded since the 1980s, there is little evidence of a significant broadening and deepening of the nation's economic structure. On the contrary, the nation's economy has become arguably narrower and more vulnerable.

While tourism remains very buoyant, providing evidence of the strength of the Maldives tourism product, the very high rates of growth recorded a decade ago have inevitably moderated, with tourist arrivals having grown by 9 percent per annum in the 1990s compared with a annual growth rate of 16 percent in the 1980s. While

¹ Maldives Human Development Report, Challenges and Responses, Ministry of Planning and National Development, UNDP

growth potentials remain very considerable, the further growth of tourism combined with either the loss (shipping) or weakening (fisheries) of other sectors of the economy has increased the nation's dependence upon a single sector as well as the Government's dependence on the sector for its revenues. This growing dependence on a single sector adds to the nation's economic vulnerabilities.

Similarly in manufacturing, there have been few major changes in the sector in the past decade. The sector continues to be dominated by a tuna cannery (constructed in 1978 and later modernised) and five factories operating as enclaves, that produce garments for export but which have so far contributed relatively little in terms of employment and value added.

The fisheries sector, the second pillar of the Maldivian economy, has lost some of its dynamism. The number of persons employed in the sector is in decline, the manpower base is ageing, the fish catch is flat, some marine resources are being overexploited, and tuna prices have shown marked fluctuations. The contribution of the sector to GDP decreased from 11.3 percent in 1989 to 6.5 percent in 1999. While the value of marine exports is increasing and growth potentials remain considerable in both the off-shore fishery and mariculture, the Government recognizes that the sector has reached a crossroads and that a new strategy for the sector is required that will enable it to recover its growth momentum.

Within the fisheries sector, female employment declined precipitously during the 1970's due to the replacement of traditional fish processing methods by freezing and canning. More recently, male employment in fisheries has been declining as men leave their islands for 'easier' and more lucrative jobs elsewhere. While the consequent flow of remittances has ensured that island incomes do not suffer, the social disruption caused by the emigration of a large proportion of the active young male population is considerable. There is a clear need to introduce new and attractive employment opportunities in the atolls in order to slow or reverse these trends.

Both fisheries and tourism industries ultimately rely on the same healthy marine environment. In their utilisation of this environment there are many examples of both co-operation and competition between the two sectors. For example, fishermen supply reef fish for tourism consumption to resorts, but they also take sharks from specific 'shark-watching' dive sites. A past example of overlap between the two sectors was in the marine curio trade. Fishermen collected black coral, and caught turtles for their shells. These materials were fashioned into jewellery and curios by local craftsmen, notably traditional jewellers from the island of Rimbudhoo in Dhaalu Atoll, where gold smithing has been practiced for centuries. The jewellery and curios were sold to tourists. However, the collection of black coral (1995) and catching of turtle have now been banned due to the over exploitation of the resources. The fishermen and the craftsmen are now deprived of any income from the raw materials or the products, while the market for them has widened as a result of the current influx of tourists from Western Europe and Japan.

Recently the marine curio trade has used mother-of-pearl shells, *Pteria penguin* oyster shells. These shells tended to live on black coral trees, and were collected at the same time as black coral. The ban on black coral collection has had a major impact on the supply of both black coral and mother-of-pearl shell to the marine curio trade, and on the livelihood of traditional jewellers.

1.2 Prior and ongoing Assistance

Ministry of Fisheries, Agriculture and Marine Resources (MOFAMR) is responsible for the sustainable management of all living marine resources in the Maldives. MOFAMR has recognised the need to diversify fisheries sector and identify new and sustainable sources of precious and semi-precious raw materials for the marine curio trade, such as pearl and mother-of-pearl.

In January-February 1995 UNDP funded a review of the potential for pearl culture in the Maldives. The major finding of that review was that Penguin Shell, *Pteria penguin*, is common in the Maldives, and is a suitable candidate for pearl culture.

Taking into account the findings of the above review, UNDP and Government of Maldives agreed to develop a pearl culture programme. The project document of Pearl Culture Pilot Programme (PCPP) MDV/95/001 was signed between the Government of Maldives and UNDP on 27 October 1996. – The programme was funded by the Japan Human Resource Development Fund through UNDP. The executing agency is MOFAMR with the Marine Research Center (MRC) being the implementing agency. The project was carried out in Vaavu Atoll. The initial two-year programme – was extended to five years and the project was completed December 2001.

The major achievements of the PCPP includes:

- Personnel training in raft deployment and maintenance; spat collector deployment and maintenance; spat collection and rearing; juvenile and adult oyster culture; oyster inoculation; pearl culture; dive training, pearl and mother-of-pearl jewellery manufacture; and jewellery marketing..
- Deployment of nine floating rafts in three sites to carry out experiments.
- Demonstration of Penguin Shell half-round pearl.
- Establishment of preliminary economic feasibility of half-round pearl culture in Maldives.
- Preparation of training material in pearl farming and jewellery manufacture.

Lesson learned from the PCPP includes the following:

- Pearl culture is a long-term continuous activity
- Weather conditions need to be take into close consideration in planning pearl farm operations
- As thought at the preparatory stages of the project, commercial pearl culture in Maldives is possible only through oyster breeding or spat collection
- Culture of unstressed oyster is essential to the culture of quality pearl
- Penguin Shell spat can be collected in large quantities.

All the targeted outputs were successfully completed by the project. The Pilot Project has developed pearl culture techniques, demonstrated the technical feasibility of pearl culture in the Maldives, and established preliminary economic feasibility of pearl culture. This proposed Pearl Culture Demonstration, Extension and Marketing Project (PCDEMP) will further develop these findings and lay the foundation for a pearl culture industry in the Maldives.

Annex 1 illustrates how the existing facilities and remaining financial resources of the previous Programme would be transferred to the next Project in order to achieve the future outputs of pearl culture.

2. OUTLINE OF THE NATIONAL PROGRAMME

2.1 Justification

PCPP has achieved the primary objective of demonstrating the production of reasonable commercial quality pearls from oysters grown from natural spats. This favourable result justifies the continuation of Penguin Shell pearl culture. Collection of systematic quantitative data is required for refining pearl culture techniques and further developing pearl culture in the Maldives. The PCDEMP aims to collect quantitative data and at the same time to attract private sector into the pearl culture business.

It will be essential during PCDEMP to focus on collecting data on oyster growth, mortality, depth preference and peak settlement period. It was not possible to collect these data during the Pilot Programme, which aimed mainly at culturing quality pearl, as data collection involves frequent measuring, counting, checking bite signs and other close observations by hauling the oyster lines close to the surface, all of which stress the oysters. As oyster handling led to stress on the animals, and affects pearl quality, such operations were avoided or kept to a minimum during the Pilot Programme.

The experience of successful pearl culture countries suggests that pearl culture is a long-term development activity. It is a continuous process that can produce successful results gradually. Maldives has initiated this development process. This proposed PCDEMP will ensure the continuity of this development.

The collection of black coral in Maldivian waters was banned from 1 January 1995, in order to protect the remains of the overexploited resource. The majority of mother-of-pearl shells used in Maldives for marine curio trade are Penguin Shells, *Pteria penguin*. These oysters tend to live on black coral trees, and are usually collected at the same time as black coral. The ban on black coral collection is therefore likely to have a major impact on the supply of both black coral and mother-of-pearl to the marine curio trade, and on the livelihood of traditional jewellers. Pearl culture will revive the marine curio production and trade, and diversify marine-based income generation activities in the fisheries sector.

2.3 Development Objectives and Immediate Objectives

The development objective of PCDEMP is to increase income and job opportunities for rural populations, and diversify marine-based economic activities. The previous PCPP has set the stage to achieve this objective, and this proposed Programme further contributes to the objective. The immediate objectives set to achieve the development objective are outlined below together with lower level objectives designed to achieve the immediate objectives. Output verifiable indicators follow each output.

2.3.1 Immediate Objective 1 (Research Component):

Oyster and pearl productions increased, and pearl quality improved through refined culture techniques.

Output 1

A comprehensive assessment of the biology and ecology of pearl oysters made and best practices of oyster and pearl culture established through commercial and research activities.

Indicators

- A report on the biology and ecology of pearl oysters available in year 5.
- A report on the comparative efficiency of the initial and refined pearl culture techniques available in year 3.
- Best Practices Farm Management Manual, containing biology and ecology of pearl oysters and the refined oyster and pearl culture techniques, available in year 4.

Activities

- Biologist/ ecologist contracted (Year 1)
- Computer hardware and software purchased and installed (Year 1).
- Experiments designed and data processing methodology identified (Year 1).
- Experiments conducted in oyster survivability, growth, substrate and depth preference, peak settlement; and best positioning of nucleus in the oyster (Year 1 to year 5).
- Spat collection and oyster culture techniques refined and further field-tested (Year 1 to year 3).
- MRC staff trained to conduct experiments and surveys to collect biological data relevant to oyster culture and pearl culture (Year 1).

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- Best Practices Farm Management Manual, containing biology and ecology of pearl oysters and refined oyster/pearl culture techniques, prepared and published (Year 3).
 - Research report prepared and published (Year 5).

2.3.2 Immediate Objective 2 (Commercialisation Component):

Pearl farming activities commercialised on small, medium and large scales.

Output 1

Economics of small, medium, and large-scale commercial farms calculated; economic models developed for each; and these findings made known to the public.

Indicators

A comprehensive report on the economic feasibility of pearl culture in the Maldives within Year 2 of the project.

Activities

- Economic data collection methodology and schedule finalised (Year1) and data collected according to the plan (Year1 to year 3).
- Economics and market assessment survey conducted (Year 3).
- Best Practices Farm Management Manual, containing economics of pearl culture, published (Year 3) and utilised in project training, education, and awareness programmes (Year 3 to year 5).
- Education and awareness campaign utilising the economic models conducted, targeting the Maldivian private sector and encouraging them to invest in the pearl industry (Year 3 to year 5).
- Education and awareness campaign utilising the economic models conducted in islands in close collaboration with Atoll Development Committee (ADC) to encourage community level participation in pearl culture. (Year 1 to year 5).

Output 2

The number of pearl farms and pearl jewellery businesses in the Maldives increased through transfer of technology and knowledge in oyster/pearl culture, business management training; and ongoing technical support services and supervisions throughout project life.

Indicators

- One small-scale private pearl farm established in Vaavu Atoll, which is to be monitored by ADC, and one more private farm established in another, atoll, which is to be monitored by MRC in year 1 under a loan from the project.
- One totally private earned commercial pearl farm established in any suitable atoll in Year 3 with technical assistance from the project.
- A comprehensive training programme developed and a training manual published in year 3 for the transfer of oyster and pearl culture techniques, and conducting small business management training,
- Pearl and mother-of-pearl jewellery on sale in tourist souvenir shops in high-end tourist resorts, Male' Vaavu Atoll by year 3.
- MOFAMR extension unit and MRC technical team available to conduct oyster/pearl culture and small business management training, and supervise pearl farming by year 2.

Activities

- Identification of prospective pearl farmers from Vaavu Atoll to work in the atoll in collaboration with the ADC, and other farmers to work in collaboration with MRC in another atoll (Year 1).
- Identification of a party to start a totally private pearl farm (Year 3).
- Education and awareness campaign conducted in Vaavu Atoll on opportunities in the pearl industry (Year 1).
- Small business management consultant employed (Year 1 and 3).
- Training of 10 MRC staff and 3 MOFAMR extension staff as trainers for conducting pearl culture and small business management training. (Year 1)
- Training of 30 prospective farmers and businesspersons in small business management, pearl farming and farm management (Year 1 and year 3).
- MOFAMR extension unit establish links with financial institutions and other investors to facilitate credit for solid business plans from private pearl business enterprises (Year 3)

Output 3

Environmental impact assessment made for a typical pearl farm and environmental guidelines established for pearl farming in the Maldives.

Indicators

- Environmental guidelines for pearl farm management available in year 2 and included in Best Practices Farm Management Manual in year 3.
- A comprehensive report available on the environmental impacts of pearl culture in year 2.

Activities

- A survey team from Marine Research Centre and Environmental Research Centre organised (Year 1).
- Data collection methodology and schedule finalised (Year 1).
- Environmental survey conducted (Year 1 and year 2) and EIA report prepared (Year 2).

2.3.3 Immediate Objective 3 (Commercialisation Component):

Support and major activities developed for post-harvest phase of pearl farming.

Output 1

Quality assurance mechanism established for assuring the quality of pearls cultured in the Maldives.

Indicators

- A register of pearl farmers and jewellers from year 1 onwards, authenticity certificates for pearl products, and regulations regarding the use of the certificate from year 3 onwards available at Ministry of Trade and Industries (MTI)
- Two people, one from MRC and one from MTI trained abroad to assess pearl quality within the first six months of the project.
- Suitable quality control equipment available in year 1.
- Five representatives of pearl farms, one from each existing farms in project life – three ADC-monitored, one MRC-monitored related and one totally private farms - trained in quality assurance scheme in Year 3.

Activities

- Pearl farms and jewellers registered at MTI for the purpose of quality control (From year 1).
- A suitable pearl company/institution identified for the quality assessment training (Year 1)
- Pearl quality assessment trainees identified and trained (Year 1).
- Quality control equipment purchased (Year 2).
- Appropriate arrangement established to examine pearl products by the quality controller of MTI (Year 3).
- Authenticity certificate for Maldivian made pearl products prepared and issued by MTI (From year 3).
- Quality control training provided to farmers by the trained quality controllers (Year 3).

Output 2

A local association of pearl farmers and jewellers formed and linkages established between this association and similar regional/international associations

Indicator

A functioning pearl farmers and jewellers association existing by year 5.

Activities

- Project staff, pearl farmers, jewellers, and buyers and sellers meeting conducted annually throughout the Programme duration to discuss the development and management of the growing pearl industry (Year 1 to year 5).

Output 3

Expand the capacity and participation of the island communities, including women, in post-harvest pearl culture activities, through training programmes in shell curving, and pearl and mother-of pearl jewellery designing, finishing, labeling, presenting, packaging and branding.

Indicators

- Comprehensive training programme available for training of jewellers and craftspeople in jewellery designing, finishing, labelling, presenting, packaging and branding in year 3.
- Two local jewellers sent abroad for training in year 2

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- Two training workshops held in suitable locations for mother-of-pearl craftspeople in year 2.
 - One training workshop held in a suitable location for pearl jewellers (goldsmiths) in year 3.
 - Three small business enterprises in pearl jewellery manufacture established in year 3.

Activities

- Trainees for receiving pearl jewellery manufacture training identified and sent abroad (Year 2).
- Training program designed, curriculum established and materials produced for training of jewellers and craftspeople with the assistance of the Faculty of Engineering/Maldives College of Higher Education (MCHE) (Year 2).
- Training workshops conducted in the atolls to train local jewellers and craftspeople in pearl (Year 3) and mother-of-pearl jewellery manufacture (Year 2) by the jewellery personnel trained abroad.
- Small businesses in pearl jewellery making developed and supported by UNDP Atoll Development Fund (ADF) and UN Volunteers (UNV) (Year 3).

2.3.4 Immediate Objective 4 (Commercialisation Component):

The sale of pearl and mother-of-pearl products to all tourism related and other captured markets maximised.

Output 1

Target markets for pearl products developed as well as the Maldivian handcrafts expanded through an education and awareness programme.

Indicators

- Target markets for pearl jewellery and associated pearl products identified and penetrated in year 2.
- Marketing strategy presented in year 2
- Promotional materials including video, TV clips and brochures produced in year 3.

Activities

- Public Relations through media (From year 1).
- Possible markets identified in the atolls that will use the raw pearls and oyster shells in jewellery and handicrafts (Year 2).
- Links established with high-end tourist resorts for marketing the highest quality pearl jewellery (Year 2 and 3)
- Links established with major destination-Maldives airlines for marketing Maldives pearl jewellery as "destination gifts "(Year 2 and 3)

(This is the first step in international marketing of Maldives pearls, which will commence in full scale when the pearl industry has been well established)

- Conduct economics and market assessment survey on schedule (Year 3).
- Design marketing tools, brochure/booklet, to be used by the MTI and Ministry of Tourism (MT), and producers (Year 3).
- Advocacy/information dissemination to encourage locals, tourists and visitors to purchase Maldivian handicrafts and Maldivian made products (From year 3 to year 5).

Output 2

Design a programme to provide nation wide coverage of pearl products and associated handicraft products to the Maldivian public and tourism industry.

Indicator

- TV and radio programmes, and articles on pearl and handicraft products available in year 3.

Activities

- Register of handicraft people kept by MTI (From year 3).
- Conduct campaign to raise awareness of a new industry for the Maldives targeting the identified markets (From year 3).
- Promote the benefits of buying local Maldivian crafts, including pearl jewellery and mother-of-pearl crafts, on Video, Radio, Television and in print (From year 3).
- Labelling of Maldivian handicrafts, including pearl products, endorsed by MTI (From year 3).

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- MT endorses the campaign and encourages Maldivian products in the Resorts (From year 3).

2.3.5 End of Project Status

At the end of this present five year Programme, Maldives will have sufficient scientific knowledge and skills necessary for half-round pearl culture, and three commercial pearl culture demonstration farms functioning that investors will be motivated to establish more commercial pearl culture farms in the Maldives, using the outputs of the project (Knowledge of biology and ecology of pearl oysters, economics of pearl farming, environmental guidelines for pearl culture, pearl quality assurance mechanism, trained personnel, links among pearl culture personnel, the developed markets for pearl products).

2.4 Programme Strategy

The pearl culture component of the programme will continued to be implemented in Vaavu Atoll as the availability of floating rafts from previous PCPP and the presence of MRC research base in this atoll will facilitate pearl culture activities. Although most of the Programme activities will be carried out in Vaavu Atoll, the coverage of the PCDEMP is notational.

The key components of PCDEMP are research to refine pearl culture techniques that have been established in PCPP and commercialisation of pearl culture based on the previous and present Programme outputs. Personnel training are a common activity for both components.

The established oyster/pearl culture techniques in PCPP involves soaking spat collectors for 6 months, removing the juveniles on the collectors and attaching them freely to lines and hanging the lines from floating rafts for oyster growing for 12 months, inoculating the 18 month old oysters, and growing the pearls for 12 to 18 months. This technique gives the oysters maximum freedom when they hang in water. The oysters receive water and food without any blockage, and hence the conditions for oyster growth are very suitable. The disadvantages of the technique are that oysters are easily attacked by predators, and during rough weather oysters get detached from the lines and get lost. Oyster survival can be increased by protecting them in nets, but this means creating less favourable conditions for oyster growth. Alternative oyster/pearl culture techniques can be tested by the proposed new Project. These techniques are aimed at increasing oyster survival and growth, improving pearl quality, and improving raft design to withstand rough weather conditions.

The study of biology and ecology of pearl oysters will be continued and project staff trained to collect biological data under the guidance of a qualified biologist/ecologist. The training will enable the staff to carry out research for further improvement of pearl culture in the Maldives.

Using the findings of PCPP, potential small pearl farmers will be trained in the first year of the project, and some of these farmers will establish three small-scale pearl farms with technical and financial assistance from the Proposed PCDEMP. Funds remaining from the previous Programme will be used to fund one farm, and funds available from the present Project will be used to fund other two farms. Two farms are expected to be in Vaavu Atoll and the other farm in some other suitable atoll. It is proposed that the two Vaavu Atoll farms are handed to the Atoll's ADC, which will loan the farm to a contracted private party, who will run the farm. The remaining farm, which is going to be in some other atoll, will be loaned to a private party directly through MRC. The repayments from the three farms will allow the establishment of additional farms.

Pearl from these farms will come into the local tourist market starting from the third year of the project. Farm economics will be calculated based on the performance of the commercial and research farms. The Programme also expects one totally private farm to be established by a private entrepreneur within the Project duration. This farm will be technically supported by the project. These modalities of establishing commercial farms will allow the Project to compare efficiency of differently managed pearl farms.

As pearl production continues, local jewellers and craftspeople will get training in the manufacture of pearl and mother of pearl jewellery. Pearl farmers and jewellers will also be trained in pearl quality assessment and quality control. An education and awareness campaign will keep the public informed of the gradual development of the pearl culture industry in the country.

While PCDEMP finances small-scale pearl farm development, the Project looks forward for some other source of funding for small business development in pearl jewellery manufacture. The UNDP ADF is a possible source of funding for small business development, and a UNV can be contracted to conduct small business management training.

2.5 Target Beneficiaries

The coverage of PCDEMP is national, and it is particularly targeted at the communities of outer atolls, who are experiencing development disparities. The Project has a wide range of beneficiaries, which include:

- Women who will be trained in cleaning and inoculation of oysters, cleaning and making spat collectors, and rope work.
- Potential pearl farmers, who would be trained in oyster culture and pearl culture techniques, and small business management.
- Traditional local jewellers, including women, whose capacity would be enhanced through training in pearl jewellery techniques and small business management; and who would be supported to establish small businesses in pearl jewellery making.

- Newcomers, including women who want to engage in mother of pearl jewellery making after being properly trained.
- Local business people who would be linked to pearl farmers to market the cultured pearls.
- MRC and MOFAMR, staff who would be trained as pearl culture research and extension workers.

Benefits of PCPP have already reached to some of the above beneficiaries, such as MRC staff, traditional jewellers, newcomers to mother-of-pearl jewellery, and local business people, through training and awareness activities. PCDEMP would ensure that benefits are reached to more and wider range of people through training, education, awareness, and financial assistance activities of the present Phase.

2.6 Problems and Risks

Legal Status of Lagoon Facilities

As Maldives has extensive lagoon areas, and the dependency on the marine resources is clear to the people, the installation and use of lagoon structures is not expected to create conflicts among the economic sectors. Laws and regulations exist regarding the installation and use of structure in lagoons. The fisheries law is being reviewed, and the revision addresses the legal aspects of marine aquaculture. With the existing legal framework and new legal developments, Maldives will be able to address the gradually developing marine aquaculture activities, including pearl culture. A

3 MANAGEMENT ARRANGEMENTS

3.3 Institutional Framework

3.3.1 Project Advisory Committee

The Executing Agency for the Project is MOFAMR who will have the overall responsibility for the project while the Implementing Agency is MRC. A Project Advisory Committee (PAC) will be established. It will provide policy guidance and direction to the Project, approve work plans, and monitor and evaluate project implementation.

The committee will be chaired by MOFAMR. In addition to MOFAMR, the committee should include the following members or representatives:

- Marine Research Centre
- Ministry of Trade and Industries
- Ministry of Atolls Administration

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- Ministry of Tourism
 - Faculty of Engineering/Maldives College of Higher Education
 - Ministry of Planning and National Development
 - 1-2 Representative from the private sector to represent pearl farmers, jewellers and pearl businesses

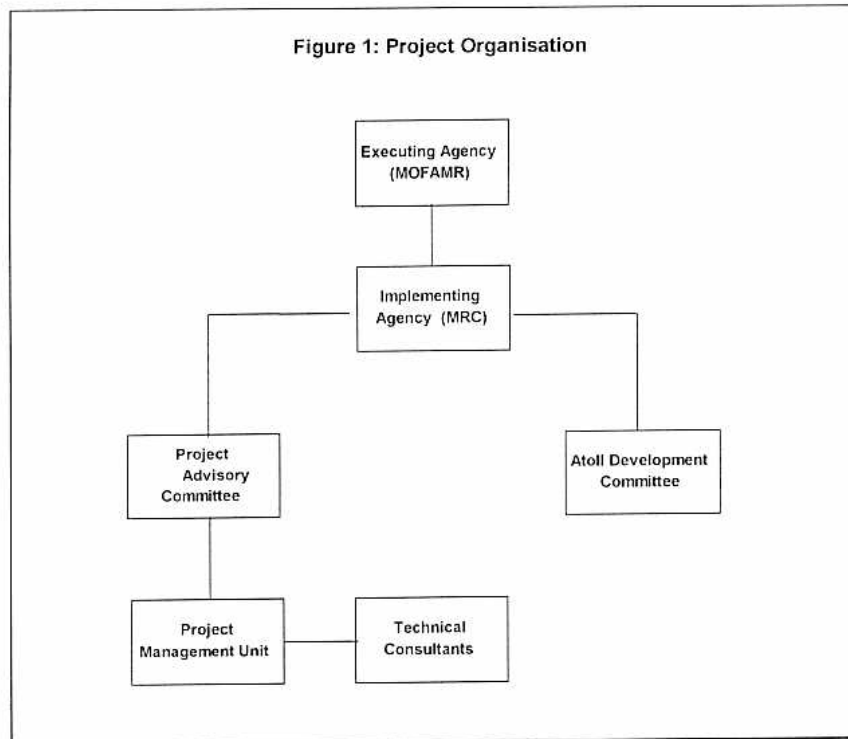
Table 1 outlines the proposed responsibility of each institution.

Table 1. Agencies Responsible for Implementing Project Activities

Activity	Responsible agency
Study biology/ecology of oysters	
Contract biologist/ecologist	UNDP, MOFAMR, MRC
Purchase and install computer hardware and software	MOFAMR, MRC
Design oyster culture experiments and identify data processing methodology	MRC
Conduct oyster culture experiments	MRC
Refine and further field test spat collection and oyster culture techniques	MRC
Train MRC staff to conduct experiments and surveys to collect biological data relevant to oyster culture and pearl culture	Biologist/ecologist, MRC
Prepare relevant component of Best Practices Farm Management Manual	MOFAM, MRC
Utilise relevant component of Best Practices Farm Management Manual	MOFAM, MRC
Prepare final report	MRC
Calculate farm economics and disseminate information	
Finalise data collection methodology	MOFAM, MRC, Business leader
Collect data	MOFAM, MRC
Conduct economics and market assessment survey	MOFAM, MRC
Conduct education and awareness campaign to encourage participation of island community in pearl culture	MOFAM, MRC
Prepare relevant component of Best Practices Farm Management Manual	MOFAM, MRC
Utilise relevant component of Best Practices Farm Management Manual	MOFAM, MRC
Conduct education and awareness campaign using economic model, targeting private sector	MOFAM, MRC, MPND
Carry out pearl farming	
Identify prospective pearl farmers from Vaavu Atoll and other atolls to work with ADC and MRC	MOFAM, MRC, ADC
Identify prospective private sector investors in pearl culture	MOFAM, MRC
Conduct education and awareness campaign to encourage participation of island communities of Vaavu Atoll in pearl culture	MOFAM, MRC
Employ small business management consultant to conduct training	UNDP, MOFAMR
Train MRC and MOFAMR staff as trainers for conducting pearl culture and small business management training.	Consultant, MRC
Train prospective farmers and business persons in small business management, pearl farming and farm management	Consultant, MRC
Establish links with financial institutions and other investors to facilitate credit for pearl business enterprises	MOFAM, MRC
Repair existing pearl rafts	MRC
Deploy additional pearl rafts	MRC
Collect and grow spats	MRC
Harvest pearl	MRC
Conduct Environmental impact assessment	
Form survey team	MRC

Finalise data collection methodology and schedule	MRC
Conduct environmental survey	MRC
Prepare EIA report	MRC
Maintain quality of Maldives pearl	
Register pearl farmers and jewellers at MTI	MTI
Identify a pearl company/institution for pearl quality assessment training	MRC
Identify and train quality assessment personnel	MRC
Purchase quality control equipment	MOFAMR, MRC
Make arrangements for inspecting pearl products by MTI quality controllers	MTI, MOFAMR
Prepare and issue authenticity certificates for pearl products	MTI, <i>Business leader</i>
Provide quality control training for pearl farmers	MRC
Maintain regular contact among pearl industry personnel	
Conduct regular annual meetings	MOFAMR, MRC
Conduct pearl and mother-of-pearl jewellery training	
Trainees identified and trained abroad	MOFAMR, MRC
Design training programme and prepare training materials	FE/MCCE
Conduct training workshop on mother-of-pearl jewellery manufacture	FE/MCCE
Conduct training workshop on pearl jewellery manufacture	FE/MCCE
Develop small business in pearl jewellery making	MTI, MOFAMR, MRC, UNDP
Conduct marketing campaign	
Maintain a good public relation for the growing pearl industry	MOFAMR, MRC, <i>Business leader</i>
Identify pearl and mother-of-pearl jewellers in the atolls who can process raw pearls and oyster shells	MOFAMR, MRC
Establish links with high-end tourist resorts for marketing the highest quality pearl jewellery	MOFAMR, MRC
Establish links with major destination-Maldives airlines for marketing Maldives pearl jewellery as "destination gifts"	MOFAMR, MRC
Conduct economics and market assessment survey	MOFAMR, MRC
Design marketing tools	MOFAMR, MRC, MTI
Conduct buy-Maldives-handicraft campaign	MOFAMR, MRC, MTI, MT
Conduct education and awareness campaign	
Register handicraft people at MTI	MTI
Conduct awareness campaign on the new pearl industry	MOFAMR, MRC
Conduct buy-Maldives-handicraft campaign	MOFAMR, MRC, MTI, MT
Endorse labelling handicraft and pearl products by MTI	MTI
Endorse buy-Maldives-handicraft campaign by Ministry of Tourism and conduct the campaign in resorts	MT

The PAC will be involved in the PCDEMP in an advisory capacity. It will ensure appropriate liaison among agencies involved in project implementation. The PAC will meet once every six months. Figure 1 outlines the proposed management arrangements.



3.3.2 Project Management Unit

A Project Management Unit (PMU) should be established in MRC headed by a Project Manager recruited under the project. The Manager is answerable to the Project Director, who is assigned by MOFAMR. Two MRC staff will support the Project Manager. Technical consultants funded by the project will provide support to the PMU and the implementing agency.

The PMU will be responsible for implementing and managing the Project according to schedules and deadlines established. Its main responsibilities will be to:

- Plan and co-ordinate the implementation of the Project to achieve the desired project outputs.
- Procure consulting services, materials and equipment and ensure that all contracts are awarded and completed on time.
- Manage and control Project implementation, including the preparation of progress reports.
- Ensure that all documentation for UNDP disbursements has been provided and that local counterpart funds are available to the Project and released on time. This will be undertaken in co-ordination with the Executing Agency

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- Coordinate the inputs from other Ministries especially those related to training, marketing and business development.

3.4 Monitoring and Reporting of Progress

Financial monitoring and reporting will be the responsibility of the PMU and will follow standard policies and procedures for UNDP-assisted nationally executed programmes. The Project will be subject to a Tripartite Review of all parties including the donor partner at least once a year and a Final Tripartite Review prior to the completion of the project.

International experts will be required to submit reports of their activities and their recommendations to the PMU and to UNDP prior to leaving the country. The Project Manager will be responsible for producing quarterly technical reports as well as the production of Annual Progress Reports and a terminal report at the end of the project.

The Project Manager under the supervision of the PAC will be responsible for establishing benchmark and indicators at the beginning of the program. At the same time the Program Support Implementation Arrangements will be prepared.

3.5 Review and Evaluation

A Tripartite Review (TPR) will be held every 12 months, attended by MOFAMR as the executing agency, the Department of External Resources representing the Government of Maldives, the donor partner and UNDP. The planned program duration is 60 months. If any of the parties feel at the first TPR that there is serious cause for concern regarding the programme, an evaluation exercise should be undertaken as soon as possible. A terminal Evaluation will be undertaken within three months of the final TPR, if deemed necessary by the three parties concerned.

The PMU will be responsible for the production of substantive briefing documents for the parties attending TPR. The briefing document will be prepared in the form of an Annual Progress Reports (APR), following prevailing guidelines. Such additional materials will supplement the APR, as the PMU feels appropriate.

3.6 Financial Records

In accordance with Government procedures, the expenditures of both national and external funds will be accounted by MOFAMR and communicated to PMU. The external funds and any co-financed components will additionally be accounted for in accordance with UNDP financial rules and regulations.

3.7 Prior Obligations, Prerequisites and National Commitment

There is a high level of national commitment to establish a pearl culture industry in the Maldives. There is a growing interest in the private sector to start commercial mariculture activities, such as pearl culture. The past and present sixth National Development Plans have recognized the opportunities for mariculture in the country.

In addition to the above documented example of national commitment to pearl culture and other mariculture activities, Government commitment can be seen in the

implementation of PCPP itself. During the period 1996-2001, PCPP was one of the high priority projects in the programmes of MRC. Of MRC projects, PCPP received the highest level of Government funding during this period.

4 INPUTS

4.3 Government

The Government shall provide the following inputs in kind to the project.

• Project Advisory Committee.		
• Project Management Unit.		
• Land and lagoon areas required for the project		
• Dive equipment		8,600
• 6-member dive team service, 30 M/M		14,118
• 2 part-time staff to support Project Manager, 60 M/M		6,635
• 5 full time staff for project implementation, 300 M/M		59,600
• 1 medium size I fibreglass boat		14,000
• Local transport		78,430
Total	US \$	181,383

4.4 UNDP

UNDP shall provide the following inputs to the project.

Training		
• Pearl quality control training abroad(2)		7,200
• Pearl jewellery training abroad(2)		10,800
• Pearl jewellery workshop		
2,500		
• Mother-of-pearl jewellery workshop		1,590
• Training pearl farmers(30)		1,500

Personnel

• 1 Biologist/ Ecologist, 10 M/M	81,800
• 1 Oyster and pearl culture expert, 6 M/M	49,080
• 1 Local Project Manager, 60 M/M	37,000
• 1 Local Pearl and Mother-of Pearl Jeweller 2 M/M	1,180
• 10 field assistants, 600 M/M	68,000

Subcontracts

• Economics and market assessment survey	2,350
• Environmental survey	5,000

Equipment

• 1 Laptop computer	2,000
• 1 Desktop computer	1,500
• Quality control equipment	5,000
• Research equipment	35,000
• 1 Small fiberglass boat	3,500
• Floating rafts (2 of size 150x50m each)	31,000

Others

50,000

Total

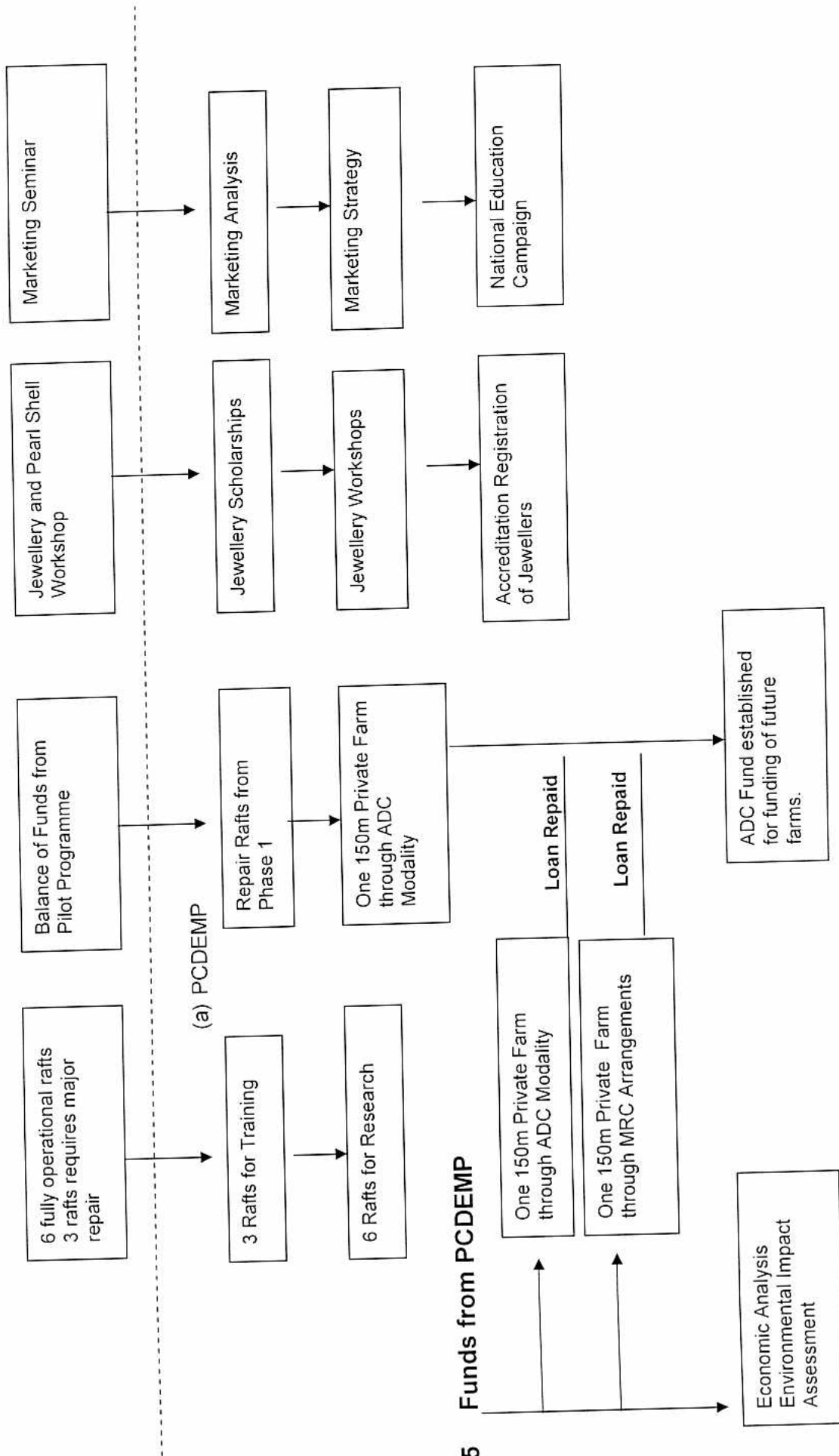
US\$ 396,000

5 BUDGET

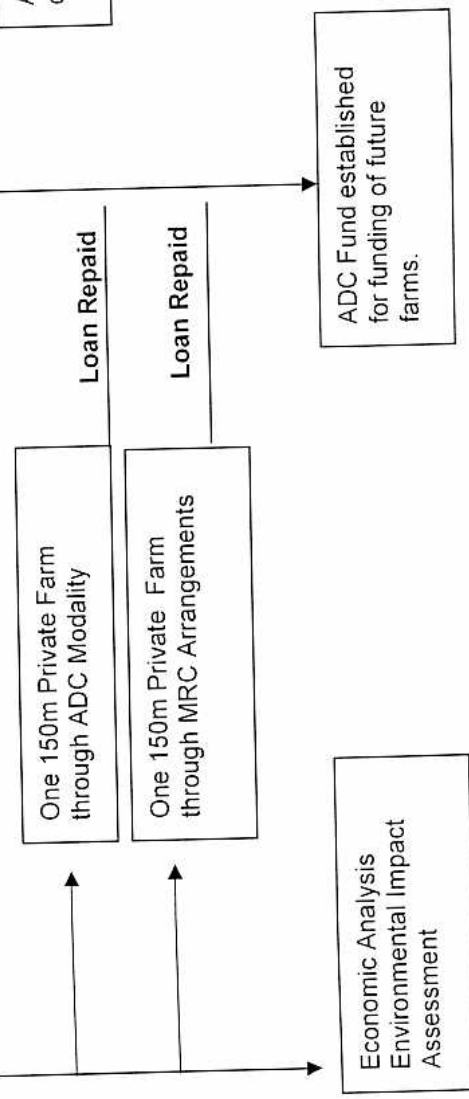
The detailed UNDP budget for the project is attached.

2.4

ANNEX 1. TRANSITION FROM PILOT PROGRAMME TO PCDEMP



2.5 Funds from PCDEMP



ANNEX 2. ACTIVITY SCHEDULE

Activity	Y1	Y2	Y3	Y4	Y5
Study biology/ecology of oysters	X	X	X	X	X
Contract biologist/ecologist	x				
Purchase and install computer hardware and software	x				
Design oyster culture experiments and identify data processing methodology	x				
Conduct oyster culture experiments	x	x	x	x	x
Refine and further field test spat collection and oyster culture techniques	x	x	x	x	x
Train MRC staff to conduct experiments and surveys to collect biological data relevant to oyster culture and pearl culture	x				
Prepare relevant component of Best Practices Farm Management Manual			x		
Utilise relevant component of Best Practices Farm Management Manual			x	x	x
Prepare final report					x
Calculate farm economics and disseminate information	X	X	X	X	X
Finalise data collection methodology	x				
Collect data	x	x	x		
Conduct economics and market assessment survey			x		
Conduct education and awareness campaign to encourage participation of island community in pearl culture	x	x	x	x	x
Prepare relevant component of Best Practices Farm Management Manual			x		
Utilise relevant component of Best Practices Farm Management Manual			x	x	x
Conduct education and awareness campaign using economic model, targeting private sector			x	x	x
Carry out pearl farming	X	X	X	X	X
Identify prospective pearl farmers from Vaavu Atoll and other atolls to work with ADC and MRC	x				
Identify prospective private sector investors in pearl culture			x		
Conduct education and awareness campaign to encourage participation of island communities of Vaavu Atoll in pearl culture	x				
Employ small business management consultant to conduct training	x		x		
Train MRC and MOFAMR staff as trainers for conducting pearl culture and small business management training	x				
Train prospective farmers and business persons in small business management, pearl farming and farm management	x		x		
Establish links with financial institutions and other investors to facilitate credit for pearl business enterprises			x		
Repair existing pearl rafts	x				
Deploy additional pearl rafts	x		x		
Collect and grow spats	x	x	x	x	x
Harvest pearl			x	x	x
Conduct Environmental impact assessment	X	X			
Form survey team	x				
Finalise data collection methodology and schedule	x				
Conduct environmental survey	x	x			

Prepare EIA report		x			
Maintain quality of Maldives pearl	X	X	X	X	X
Register pearl farmers and jewellers at MTI	x	x	x	x	x
Identify a pearl company/institution for pearl quality assessment training	x				
Identify and train quality assessment personnel	x				
Purchase quality control equipment		x			
Make arrangements for inspecting pearl products by MTI quality controllers			x		
Prepare and issue authenticity certificates for pearl products			x	x	x
Provide quality control training for pearl farmers			x		
Maintain regular contact among pearl industry personnel	X	X	X	X	X
Conduct regular annual meetings	x	x	x	x	x
Conduct pearl and mother-of-pearl jewellery training		X	X		
Trainees identified and trained abroad		x			
Design training programme and prepare training materials		x			
Conduct training workshop on mother-of-pearl jewellery manufacture		x			
Conduct training workshop on pearl jewellery manufacture			x		
Develop small business in pearl jewellery making			x		
Conduct marketing campaign	X	X	X	X	X
Maintain a good public relation for the growing pearl industry	x	x	x	x	x
Identify pearl and mother-of-pearl jewellers in the atolls who can use raw pearls and oyster shells		x			
Establish links with high-end tourist resorts for marketing the highest quality pearl jewellery		x	x		
Establish links with major destination-Maldives airlines for marketing Maldives pearl jewellery as "destination gifts"		x	x		
Conduct economics and market assessment survey			x		
Design marketing tools			x		
Conduct buy-Maldives-handicraft campaign			x	x	x
Conduct education and awareness campaign			X	X	X
Register handicraft people at MTI			x	x	x
Conduct awareness campaign on the new pearl industry			x	x	x
Conduct buy-Maldives-handicraft campaign			x	x	x
Endorse labelling handicraft and pearl products by MTI			x	x	x
Endorse buy-Maldives-handicraft campaign by Ministry of Tourism and conduct the campaign in resorts			x	x	x

ANNEX 3. PROVISIONAL TERMS OF REFERENCE FOR INTERNATIONAL CONSULTANTS

Biologist/Ecologist

The Biologist /Ecologist is responsible to collect data on biology and ecology of pearl oysters in the Maldives. Data is to be collect both from natural oyster populations and cultured oysters on rafts. The collected data should allow refinements of the existing pearl culture techniques. Experiments should be conducted to determine the following:

- Peak spat settlement period
- Depth and substrate preference by settling spats
- Oyster growth rate
- Comparative growth rates of juvenile oysters taken from reef and spat collection rafts.
- Spat loss and mortality rate during spat collection
- Oyster loss and mortality rate during oyster culture and pearl culture
- Types of predation and predation rate
- Oyster species composition on spat collection rafts
- Dominant organism on spat collection rafts
- Physical, chemical and biological water quality parameters relevant to spat collection and growing
- Train project staff in data collection and analysis

Duty Station: Vaavu Atoll, Maldives

Duration: Total 10 months; 2 months every year over a 5-year period.

Qualification: Must hold an M.Sc. degree minimum in a relevant field. At least 10 years experience in experimental aquaculture/mariculture

Oyster/Pearl Culture Expert

The oyster/pearl culture expert is expect to improve the existing oyster and pearl culture techniques in order to increase pearl production and quality. Specific tasks include the following:

- Review the existing oyster culture and pearl culture techniques and make necessary recommendations.
- Test culture half-round pearls to assess quality improvement
- Train project staff in oyster culture and pearl culture techniques

Duty Station: Vaavu Atoll, Maldives

Duration: Total 10 months; 2 months every year over a 5-year period.

Qualification: At least 10 years experience of tropical pearl culture. Must have a sound understanding of oyster and pearl culture. Must have an expert understanding of pearl inoculation techniques, and of pearl extraction and finishing.

Pearl and Mother-of-Pearl Jewellery Expert

A Local Pearl and Mother-of-Pearl Jewellery Expert, preferable one of those who completed jewellery study tour abroad, is contracted to conduct pearl and mother-of-pearl jewellery training workshops. Specific tasks include the following:

- Familiarize workshop participants with jewellery manufacture equipment and safety measures needed when operating them
- Train workshop participants in pearl quality assessment and matching pearl to the jewellery to be made
- Train workshop participants in the basics of pearl jewellery manufacture
- Train workshop participants in the basic of mother-of-pearl jewellery manufacture

Duty Station: A suitable atoll

Duration: Total 2 months; 3 workshops, each 20-day duration.

Qualification: At least 10 years experience in goldsmithing and mother-of-pearl jewellery manufacture.

ANNEX 4. PROVISIONAL TERMS OF REFERENCE FOR THE PROJECT MANAGER AND FIELD ASSISTANTS

Programme Manager

The Project Manager is local, full-time and is expected to be familiar with government and UNDP structures and procedures. Specific tasks for the Project Manager include:

- Day to day management of the PMU.
- Co-ordination of the tasks of the consultants
- Maintenance of records of the progress of Project implementation.
- Preparation of regular Project progress reports for the Government and UNDP.
- Supervise the procurement of necessary equipment.
- Preparation of operation and maintenance schedules and budgets for all Project components.
- Coordination of inputs of all government agencies.

Duty Station: Male', and Vaavu Atoll

Duration: 5 years .

Qualification: Must hold a B.Sc. degree in a relevant management field. At least 10 years professional experience in a management position.

Project Field Assistants

The Programme will have 10 local field assistants, who will carry out the following tasks, depending on the job they are assigned to and training they have :

- Take part in raft deployment and maintenance.
- Take part in spat collection, oyster culture and pearl culture
- Collect data under the direction of research personnel
- Dive with MRC dive team
- Maintain equipment in proper order
- Take part in extension activities

Duty Station: Vaavu Atoll

Duration: 5 years .

Qualification: Grade 7-10 standard.