## Tongareva Marine Research Centre (TMRC), Penrhyn Atoll, Northern Cook Islands: an update on the modifications to the *Pinctada margaritifera* hatchery, seawater systems and activities

The TMRC was made possible as a component of USAID's Pacific Islands Marine Resource programme, the centre being planned and set up between August 1991 and 30 September 1995 by the contractor, RDA International, Inc. The end of the contract was somewhat premature, since USAID's South Pacific Office closed. Therefore, the present ADB TA was planned, taking into account the need for in-house expertise and an equipment budget to allow the facility to function more efficiently.

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The TMRC (Figure 1) is powered by a hybrid system (4 computer-operated solar arrays and a generator). It is proposed to add a wind generator to assure more stability to the system, since the tradewinds blow quite regularly here. The major modifications have been with the seawater systems: ocean system with a 23.2 t FRP reservoir tank, a 1.5 kW electric pump and sand filter to assure filtered water to the hatchery by gravity feed; lagoon system with a sub-sand intake filter box to exclude



Figure 1 General layout of TMRC and seawater systems

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larvae but allow some phytoplankton and nutrients to enter. This system will service the  $4 \times 10$  t raceways for land-nursery culture of pearl spat. The water will be pumped by a 4 kW electric pump placed on a coral jetty closer to the intake, and then go to a 40 t reservoir tank with liner near the raceway.

The first larval culture tanks were 0.15 and 0.6 t FRP tanks. These have mainly been replaced with larger

tanks (1.6, 3.2, 4 and 5 t plastic and FRP tanks), as shown in the TMRC hatchery floorplan (Figure 2). The larger tanks minimise temperature variation in this open-sided hatchery. The mass algal culture capabilities have been increased with the addition of more 80 l and 250 l transparent algal cylinders, and hygiene has been improved with the use of cartridge filters to fill the cylinders directly with as little exposure to air as possible.



Changes have taken place in the Algal Culture Lab as well with the Protocol used to care for stock cultures and working cultures to carboys. The TMRC hatchery floorplan (Figure 2) shows several rectangular FRP tanks used for mass algal culture to feed spat; one of these tanks is used as a waterbath during spawning (buckets with spawning oysters are held in the bath to minimise water-temperature variation) and as a broodstock conditioning tank if it is decided to feed them for 7 to 10 days prior to spawning induction—often broodstock are spawned the same day they are brought from the lagoon. The Figure 2 shows the drain going to a seawater pit; although this has not yet been completed, most of the materials are now here for this improvement.

The seawater delivery pipe from the ocean reservoir tank to the hatchery runs on the ground and on the floor of the hatchery so that multiple tanks can be filled quickly by gravity. The previous system utilised suspended seawater pipes, which required the 48 V pump to run nearly continuously to fill or flush tanks, but did not allow for enough flow to rapidly fill multiple tanks at one time. A shadecloth canopy will be placed over the entire block of raceways to cut down on water overheating and reduce filamentous algae.

Two independent pearl-oyster stock surveys have been made in Penrhyn Lagoon, which indicate that there are between 2 and 3 million stock in the lagoon. At the present time, many fishermen are freediving for shell and methodically cleaning out shell to depths of up to 25+ m. TMRC is now collecting broodstock from 10 sections of the lagoon, tagging these broodstock and banking them at the Ministry of Marine Resources experimental site on sub-surface coral rocks. To assure a good mixture of broodstock contributing to gametes during a spawning, the TMRC will be able to choose oysters from different sites. Other projects include the setting out of spat collectors each month at replicate treatment (down-current of pearl-farm longlines) and replicate control longlines (away from the effect of pearl farms), and sediment collectors set at treatment and control areas (5 m and 10 m).



# Pacific Island pearl oyster resource development

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The following is extracted from Information Paper 18 that was presented at the Twenty-Sixth Regional Technical Meeting on Fisheries, South Pacific Commission, Noumea, New Caledonia, 5–9 August 1996.

#### Introduction

This project (PN 9131 Pacific Island Pearl Oyster Resource Development) was funded by the Australian Centre for International Agricultural Research (ACIAR) and was formally commenced in July 1993. The major focus of the project was Kiribati although the technology generated from the project is widely applicable to other Pacific Island countries and territories. James Cook University (JCU) was the commissioned Australian institution for the project and collaborating institutions were the Ministry of Environment and Natural Resource Development (MENRD) in Kiribati, Queensland Department of Primary Industry (QDPI), Australia, ICLARM Coastal Aquaculture Centre (ICLARM-CAC), Solomon Islands and the South Pacific Commission (SPC).

### **Objectives**

The major objectives of the project were :

- 2. To develop appropriate low-technology methods for hatchery culture and nursery culture of blacklip pearl oysters, allowing resplenishement of natural stocks, the development of a sustainable wild population and sufficient spat for culture operations;
- 3. To improve the yield of gem-quality and average-quality pearls through better bead insertion and oyster management practices.

Survey work conducted as part of Objective 1 was undertaken in Kiribati by Fisheries Division staff. Survey work in Fiji was undertaken by Fiji Fisheries staff and was coordinated by SPC. Research conducted towards Objective 2 was conducted primarily at JCU. It included collaboration with the

<sup>1.</sup> To assess the natural stocks of pearl oysters in Kiribati and Fiji and the rates of spatfall (newly settled juveniles) of blacklip pearl oysters in the atoll lagoons of Kiribati.

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