

The logo for PARDI (Pearl and Aquaculture Research and Development Institute) features the word "PARDI" in white, bold, sans-serif capital letters on a dark brown rectangular background. Below the text are two curved, overlapping lines: a yellow one on top and a blue one on the bottom, suggesting a pearl or a wave.

Australian Government

Australian Centre for  
International Agricultural Research

# Pearl Industry Value Chain Review 2011: Tonga

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## Why Pearls?

- Cultured pearls are the Pacific region's most valuable and highest priority aquaculture commodity (SPC Aquaculture Action Plan, 2007).
- Pearl culture is compatible with traditional lifestyles, and provides opportunities for income generation at a number of levels, from collection and sale of juvenile oysters ('spat'), through pearl production, to handicraft manufacture.
- Pearl culture is environmentally benign and the product is small, lightweight and non-perishable and of high value; ideal as an export commodity from Pacific Island countries.
- The operation of pearl farms particularly in remote and regional areas can provide market opportunities for small farmers in local tourism and resorts and value adding of pearl shell products for handicraft markets.
- Tonga, using the winged pearl oyster, *Pteria penguin*, has an opportunity to develop a regional based handicraft and jewellery supply industry specialising in the production of half pearls and mother of pearl products.
- The development of oyster "spat" growing and supply to pearl farms for pearl culture is a direct industry development outcome that can provide livelihood opportunities for remote local communities and families.
- The potential economic and livelihood opportunities provided by pearl culture are under-developed in the western Pacific, but the scale of development in Polynesia indicates that pearl culture has the potential to generate significant export earnings for Tonga.

## Background

Pearl culture provides livelihood and income generating opportunities in Pacific Island nations. This paper provides an overview of the current (2011) status of the cultured half-pearl ('*mabé*') industry in the Kingdom of Tonga. It also provides the basis for a development plan for the Tongan pearl industry, marketing strategies and research interventions supporting sustainable development of the Tongan pearl industry.

Research and development activities were funded under the three-year ACIAR-PARDI Project "Supporting the Development of the Cultured Pearl industries in Fiji and Tonga" that began in January 2011. The Project team was composed of Paul Southgate (James Cook University), Theo Simos (University of Adelaide), Anand Chand and Suwastika Naidu (University of the South Pacific), Poasi Ngalufe (MAFF, Tonga), Tevita Taumaibeau (consultant, Fiji), the Pearl Growers Associations of Tonga and Tim Pickering of the Secretariat of the Pacific Community (SPC).

## Background to Pacific Agribusiness Research for Development Initiative (PARDI)

This research was funded by the Australian Government through the Australian Centre for International Agricultural Research (ACIAR). PARDI is a partnership involving the Secretariat of Pacific Communities (SPC), the University of the South Pacific (USP) and a consortium of Australian Universities<sup>1</sup>. PARDI seeks to create sustainable livelihood development outcomes for the forestry, fisheries (including aquaculture) and crop-based agriculture sectors in the South Pacific. The initiative undertakes supply chain reviews and market-driven strategies to identify the researchable constraints currently impeding tangible economic development, and then undertake research-based projects to develop the appropriate technologies, products and/or skill based solutions.

The University of the South Pacific research group (Suva, Fiji) and University of Adelaide Value Chain group collaborate to support PARDI projects and provide qualitative and quantitative research, value chain analysis and project oversight across many sectors. In the Fisheries and Aquaculture sector, the group worked closely with scientists and researchers from James Cook University (JCU), industry representatives, NGO`s, government agencies and SPC.

## Pearl Production in the Pacific

Pearls are the Pacific region's most valuable Aquaculture commodity with production valued at US \$176 million in 2007. The species farmed in the Pacific include the black-lip pearl oyster (*Pinctada margaritifera*), farmed for round pearls in French Polynesia, Cook Islands and Fiji, and the winged pearl oyster (*Pteria penguin*), farmed for half pearls (commonly known as 'mabé') in Tonga. Round 'black' South Seas Pearls produced in French Polynesia from *P. margaritifera* account for 98% per cent of the total value of production in the Pacific. However, the range of pearls produced in the region is diverse and, as well as *mabé* produced in Tonga, includes white South Seas Pearls from Papua New Guinea. A relatively new entrant to the industry is Fiji Islands which has developed a high quality niche export product. However, it should be noted that the size of the industry in Polynesia dwarfs the very small industries in Tonga and Fiji (Table 1).

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<sup>1</sup> University of Queensland, University of Adelaide, University of the Sunshine Coast, James Cook University, Queensland Department of Employment, Economic Development and Innovation.

**Table 1. The value of exports of unworked pearls by the main exporting countries in 2005.**

(Tisdell & Poirine, 2007).

|    | Country          | Value<br>(\$USD millions) | Percentage of<br>total | Species utilised                            |
|----|------------------|---------------------------|------------------------|---|
| 1  | Japan            | 263.6                     | 33.2                   | Akoya ( <i>Pinctada fucata</i> )            |
| 2  | Australia        | 219.5                     | 27.6                   | Silver/gold-lip ( <i>Pinctada maxima</i> )  |
| 3  | China            | 146.5                     | 18.4                   | Fresh water mussel                          |
| 4  | French Polynesia | 128.3                     | 16.1                   | Black-lip ( <i>Pinctada margaritifera</i> ) |
| 5  | Philippines      | 15.45                     | 1.9                    | Silver/gold-lip ( <i>Pinctada maxima</i> )  |
| 6  | Indonesia        | 10.7                      | 1.3                    | Black-lip ( <i>Pinctada margaritifera</i> ) |
| 7. | Fiji (estimate)  | 0.5                       | 0.1                    | Black-lip ( <i>Pinctada margaritifera</i> ) |
| 8. | Tonga (estimate) | 0.01                      | 0.01                   | Winged/Penguin ( <i>Pteria penguin</i> )    |
|    | <b>TOTAL</b>     | <b>784.65</b>             |                        |   |

Source: Derived from United Nations (2006) United Nations Trade Statistics Detected (COMTRADE)

Notes: The data are for category H52002-7101 in the COMTRADE statistics. The percentages may not add to 10 due to rounding

Although mariculture can be risky and requires significant long run investment (Hambrey, 2011), pearl culture has been very successful and expanded greatly since being introduced to French Polynesia in the mid 1970s. However, pearl oysters are sensitive to changes in water quality conditions (Lucas, 2008) and are vulnerable to disease, predation, adverse weather conditions such as cyclones and theft. Recent attention has also been drawn to the potential impacts of climate change on pearl culture in the Pacific region (Pickering *et al.*, 2011).

## History of Pearling in Tonga

The pearl industry in Pacific Island countries is dominated by 'black' pearl production from the black-lip pearl oyster (*Pinctada margaritifera*). Pearl farming in Tonga dates back to the early 1960s but the first commercial experimental venture was set up by the Tongan government in Vava`u in 1975. Although small scale culture of *Pinctada margaritifera* for round pearl production occurred in Tonga in the 1980s and 1990s, current pearl production is based on half-pearls (also known as mabé) produced by the winged pearl oyster, *Pteria penguin*, which was imported from Japan for initial culture trials in the 1970s. In 1989 the FAO South Pacific Aquaculture Development Project (SPADP) provided assistance in carrying out stock assessment, spat collection surveys and undertaking preliminary pearl production. In 1993 the commercial feasibility of half-pearl farming in

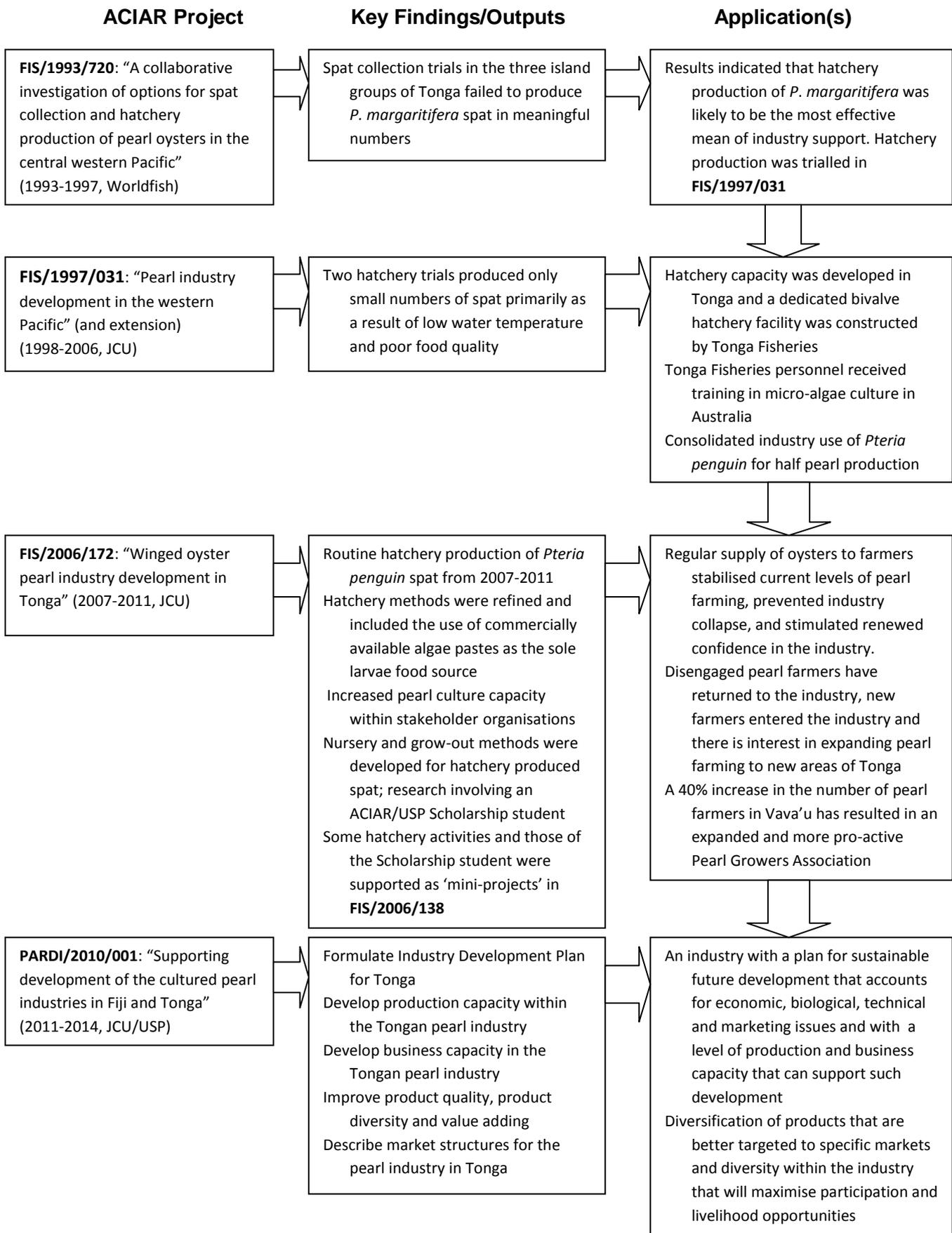
Tonga was assessed. At the time Japanese specialists estimated that an area of approximately 850 ha in the Vava'u islands could be farmed for pearl production, supporting annual production of around 750,000 pearls, with approximately 30% of these being first-grade. Assuming a value of around US \$30 each for first-grade half-pearls, potential annual revenue of around US \$7.5 million was estimated (Finau, 2005).

Whilst the industry has not reached these high expectations, the Tongan government has supported development of the pearl industry by the recent completion of a dedicated semi-commercial scale hatchery in Tongatapu. The hatchery is tasked with supplying oyster seed to pearl farmers to maintain current production levels and support industry expansion. A reliable supply of oyster 'spat' (juveniles) to pearl farmers is a cornerstone for industry development and expansion. Ongoing technical assistance to pearl farmers is also required to improve industry output and value and to increase business capabilities within the industry.

Advantages of producing *mabé* (compared to round pearls) include lower capital technological investment required to produce pearls (pearl 'seeding' can be done with simple training of the farmer and does not rely on skilled technicians), higher turnover (pearl culture requires 6-9 months not 18-24 months required for round pearl production), production of up to five pearls per oysters (compared to one round pearl), and value-adding opportunities through jewellery and handicraft production. Already there is a small but thriving niche market selling *mabé* pearls and pearl shell handicrafts to tourists in Vava'u, and in the municipal market in the capital Nuku'alofa.

ACIAR has been involved in development of the pearl industry in Tonga through a number of research projects. The key findings and outputs of these projects, as well as their applications, are detailed in Fig. 1 which also shows the relationships between this project (PARDI/2010/001: "Supporting development of the cultured pearl industries in Fiji and Tonga") and prior research.

**Fig. 1. The role of ACIAR-funded research Projects in developing pearl culture in Tonga**

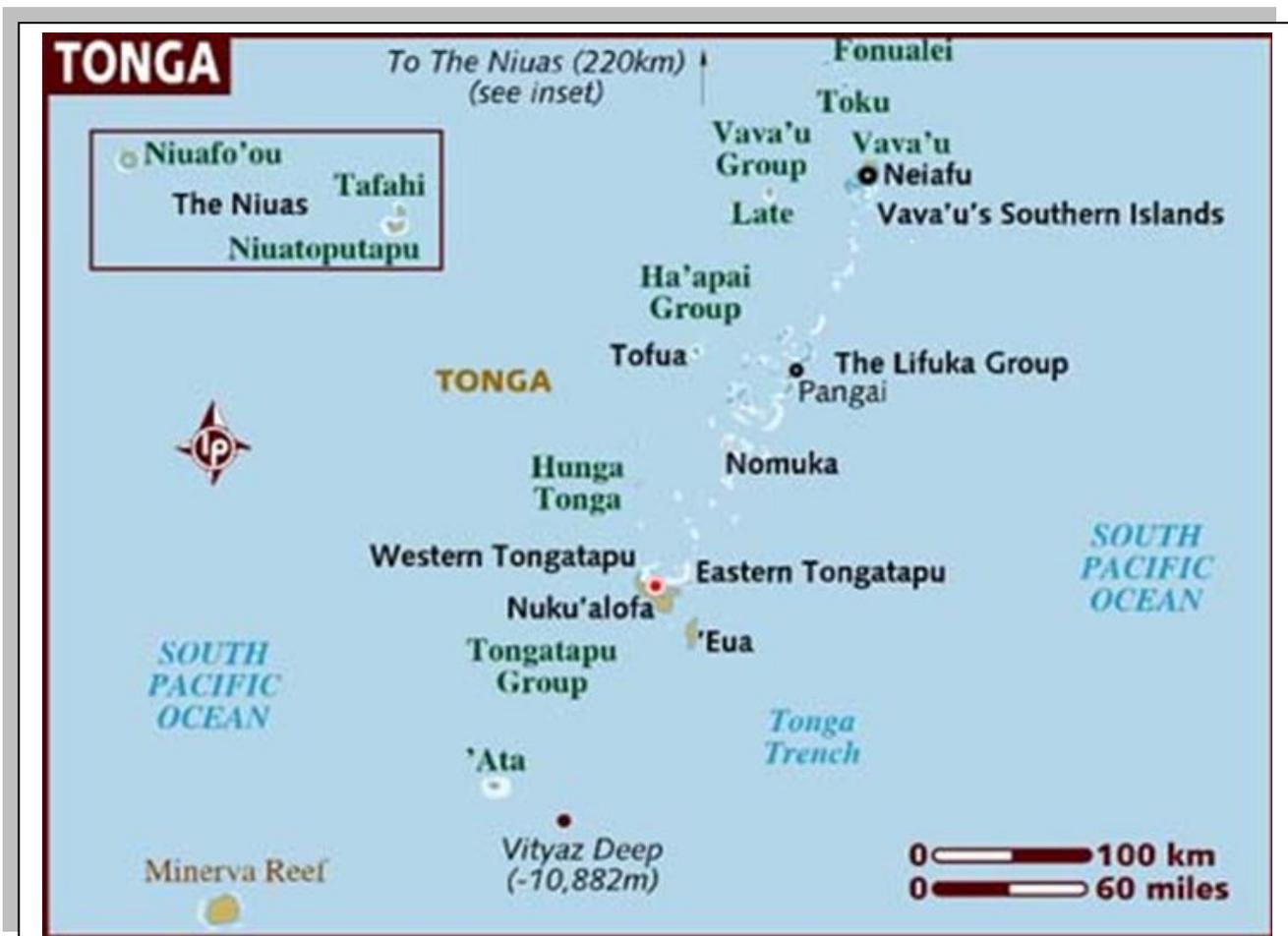


## Research Methodology

This research explored the market structure for *mabé* (Fig. 2) and mother-of-pearl (MOP) shell jewellery in Tonga. Based on initial interviews with pearl farmers, pearl sellers and officers from the Tongan Fisheries Department, two separate questionnaires were developed for: (1) pearl farmers, pearl sellers; and (2) wholesalers and retailers. Questionnaires were designed to collect both qualitative and quantitative data. They were pilot-tested with two pearl farmers and pearl traders, wholesalers and retailers and then used in interviews conducted by staff and select students from the University of the South Pacific

## Research Findings

In February 2011, there were seven pearl farms in Tonga, all situated in the northern island group of Vava'u (see map). The government hatchery that supplies spat to pearl farmers is located in Nuku'alofa on the main island of Tongatapu. Current pearl farms are listed and described in Table 2, which also lists their major requirements for further development.



**Table 2: Summary of Pearl Farms in Vava'u, Tonga**

| Pearl Farm<br>(Location)                         | Brief Description   | Requirements/Comments   |
|--|---|---|
| Vaipua Pearl Farm<br>(Vaipua Bridge)             | <ul style="list-style-type: none"> <li>• Years of farming: 30</li> <li>• Stock: 100 oysters</li> <li>• Spat source: Collects from wild</li> <li>• Market: Jewellery/handicrafts sold in Vava'u market</li> </ul>                          | <ul style="list-style-type: none"> <li>• Improved spat supply</li> <li>• Training in pearl seeding</li> <li>• Training in pearl farming methods</li> </ul>  |
| Neiafu Pearl Farm<br>(Neiafu)                    | <ul style="list-style-type: none"> <li>• Years of farming: 3</li> <li>• Stock: 600 oysters</li> <li>• Spat source: Government hatchery and spat collection</li> <li>• Market: Sells shells locally</li> </ul>                             | <ul style="list-style-type: none"> <li>• Training in pearl seeding</li> <li>• Training in pearl farming methods</li> </ul>  |
| Kisikisi Pearl Farm<br>(Olo'uf)                  | <ul style="list-style-type: none"> <li>• Years of farming: 12</li> <li>• Stock: 200 oysters</li> <li>• Spat source: Collects from wild</li> <li>• Market: Sold to Nagalu</li> </ul>   | <ul style="list-style-type: none"> <li>• Improved oyster supply</li> <li>• Training in pearl seeding</li> <li>• Training in pearl farming methods</li> <li>• Increased tourist market</li> <li>• No interest from younger generation in pearl farming</li> </ul>  |
| Hallelujah Pearl Farm<br>(Neiafu)                | <ul style="list-style-type: none"> <li>• Years of farming: 10</li> <li>• Stock: 200 oysters</li> <li>• Spat source: collects from wild</li> <li>• Market: Vava'u market and handicraft shop</li> </ul>                                    | <ul style="list-style-type: none"> <li>• Improved oyster supply</li> <li>• Training in pearl seeding</li> <li>• Training in pearl farming methods</li> <li>• Increased tourist market</li> <li>• No interest from younger generation in pearl farming</li> <li>• Fisheries fund allocation not transparent</li> </ul> |
| Ofu Pearl Farm<br>(Ofu Island)                   | <ul style="list-style-type: none"> <li>• Years of farming: 9</li> <li>• Stock: 200 oysters</li> <li>• Spat source: Collects from wild and from Fisheries and own hatchery</li> <li>• Market: Vava'u market and handicraft shop</li> </ul> | <ul style="list-style-type: none"> <li>• Improved oyster supply</li> <li>• Needs technical assistance from Fisheries for the hatchery operation</li> </ul>  |
| Fineleahaka Tofe Pearl Farm<br>(Utungake Vava'u) | <ul style="list-style-type: none"> <li>• Years of farming: 2</li> <li>• Stock: 380 oysters</li> <li>• Spat source: Fisheries hatchery</li> <li>• Market: Nukualofa handicraft centre</li> </ul>   | <ul style="list-style-type: none"> <li>• Improved oyster supply</li> <li>• Training in pearl seeding</li> <li>• Training in pearl farming methods</li> <li>• No interest from younger generation in pearl farming</li> </ul>  |
| No name (Neiafu Harbour, Vava'u)                 | <ul style="list-style-type: none"> <li>• Years of farming: 34</li> <li>• Stock: 72 oysters</li> <li>• Spat source: Collect from wild</li> <li>• Market: Michael Hill Jeweller NZ; sold 170 half-pearls</li> </ul>                         | <ul style="list-style-type: none"> <li>• Improved spat supply</li> <li>• Tourist market too small</li> </ul>  |

Source: Interviews by Anand Chand, Suwastika Naidu and Scott Mactier - Feb 2011

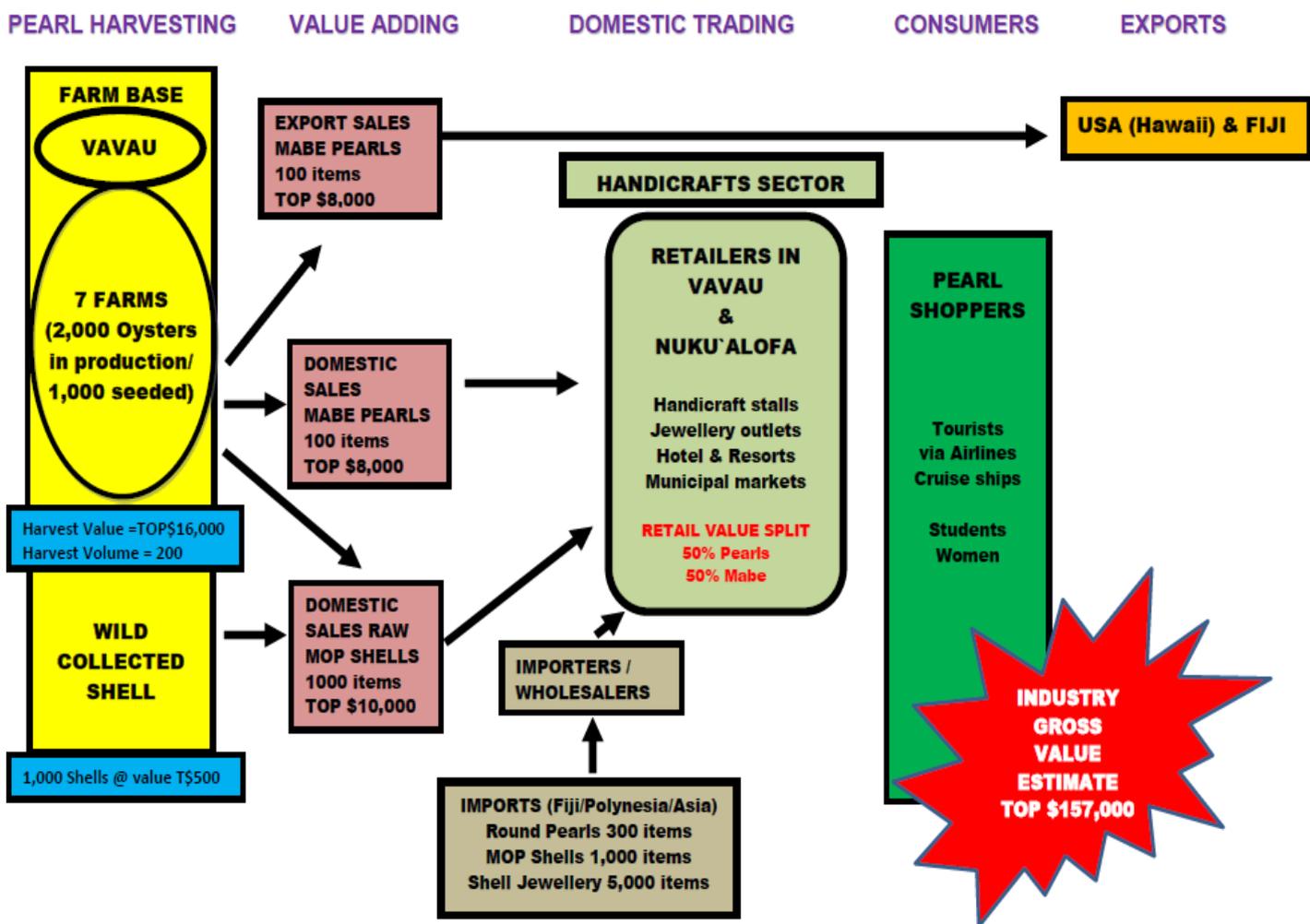
**Fig. 2. Tongan mabé (half) pearls.** Photo: Anand Chand & Suwastika Nadiu USP, Fiji.



# Process flow and Industry Structure

The value chain map was developed for the Tongan pearl industry from information gathered via interviews with industry and channel participants. It identifies industry structure and the flow of farmed pearls to export markets, domestic trade channels and consumer segments. Values are estimated as production outputs are difficult to identify and validate. The movement of pearl materials into and out of Tonga is not accurately captured by the relevant government agencies and farmers are hesitant to supply commercial information. The analysis identifies the flow of imported pearl products from French Polynesia as well as from major producers in Asia and this would have both negative and positive impact on farming returns and future investment in Tonga.

## Pearl Industry VALUE CHAIN MAP "Tonga" 2011



The map also highlights the prominence of essentially small *mabé* pearl farms in both size and earnings capacity. Our interviews and site visits highlighted that many farms are struggling to increase *mabé* pearl production because of an acute shortage of wild oyster stocks, exacerbated by poor farm site selection, no alternative commercial spat supply options and constrained cash flows and low farming/business management skills. On a positive note, small farmers are able to collaborate in the areas of farm maintenance and pearl seeding.

## **Pearl and MOP shell jewellery market structures of Tonga**

This section identifies the various market channels (wholesale and retail) where raw and finished *mabé* pearl and jewellery related products are distributed and sold in domestic channels in Tonga. A particular emphasis on future planning for development was to identify the importance of the domestic market and sales to tourists. The pearl market survey was conducted in Vav'au and Nuku'alofa from 7-14 February, 2011. Interviews were conducted with various stakeholders.

### **1. Handicraft shops in the municipal market-Nukualofa**

There were 15 stalls selling imported cheap white pearls and pearl related products at the municipal market in Nuku'alofa. Some of the products on sale were mats with MOP shells, hand bags with pearl shells, shell chains, handbags, waist mats, freshwater pearl necklaces and chains made out of mother pearl shells. The mother-of-pearl shells used to make handicrafts were purchased from local fisherman in Tonga. The pearl and non-pearl products sold at the municipal market stalls are bought both by locals and tourists. The basket, handbags and fans are made from local *Tapa* materials bought from the market. The pearl shells are bought from fisherman for TOP \$20 for 100 shells. The majority of the buyers are tourists visiting Tonga.

### **2. Flea Market- Nuku'alofa**

There were 7 stalls selling imported cheap white pearls and non-pearl products. Of these, two stalls had a wide range of pearl products. Some of the products on sale were necklaces, bracelets, ear rings, mats with pearl shells and pearl chains. Fake plastic 'pearls' are also sold in the flea market. Most of these products were made from low grade pearls imported from Hawaii and mainland USA and New Zealand. The main suppliers for the pearl products were family members living in these countries. The major buyers are tourists from cruise ships, tourists coming by plane and some

locals. Most of these pearls were low grade freshwater white pearls and freshwater dyed pearls. The vast majority of the freshwater pearls had 'circle' defects and a lot of surface blemishes. For pearl necklaces (strands) the prices ranged from TOP \$20-\$60. Pearl ear-rings ranged from \$10-\$30, pearl chains ranged from TOP \$20-\$40, and pearl bracelets ranged from TOP \$20-\$40. In some stalls they had a set of necklace, ear rings and bracelets which was sold for TOP \$100. This market is only open on Saturdays but sells pearl products on days when the cruise boats come to Nuku'alofa. Some of the stall pearl sellers can make from TOP \$400 to TOP \$1000 a month. Sometimes, the cruise boat sellers can make from TOP \$200 to \$800 in one day. Pearl sales in the flea market are fairly small and there is opportunity for further growth of this market.

### **3. Handicraft stalls at the municipal market in Vava'u**

Six handicraft shop owners at the Vava'u municipal market were interviewed. The majority of these stalls have existed since the 1980s. Some of their owners are also pearl farmers and they sell jewellery that they themselves have crafted from *mabé*. Owners who do not own pearl farms have little knowledge about the pearl and the pearl products that they sell. The *mabé* is also locally referred to as 'plaster' pearls in Vava'u. The mother of pearl shells used to make jewellery is bought from the local farmers for \$20 per bag; each bag contains 60-90 oysters. The range of pearl products on sale includes:

- Freshwater earring
- Mats made out of mother of pearl shells.
- Fans made out of mother of pearl shells.
- Handbags made out of mother of pearl shells
- Freshwater necklaces and chains
- Handicrafts made out of mother of pearl shells.

Most sellers mentioned that they would like assistance with jewellery making, crafting and marketing of their pearl products.

### **4. 'Up-market' shops within hotels**

The occupiers of four small shops in hotels (International Dateline Hotel, Loumaile Lodge and Little Italy) were interviewed. These shops sell both freshwater pearls and 'black' South Sea Pearls imported from the Cook Islands. They sell individual loose pearls and pearl necklaces, bracelets and pearl ear rings. They also sell jewellery made from mother pearl shells which they buy from

handicraft shops from the Nuku'alofa market. These shops target hotel guests and upper class Tongans. Their price range is higher than those in the flea market and the municipal market. Pearlham International Limited (from Cook Islands) comes once a year to sell pearls to the up-market stores in the hotels in Nuku'alofa. The Chinese shop owner at the International Dateline Hotel also imports pearls from China (sent by family members). In another shop at the Loumaile Lodge, freshwater pearls are sent by family members from the USA.

## 5. Shops at the Airport

Two duty free shops at the Fua'amotu Airport Nuku'alofa, Leiola and Look Sharp Tonga retail seawater pearl necklaces, chains and ear rings. The seawater pearl products sold by Look Sharp Tonga were bought from Tappoos in Fiji. Prices of these products ranged from TOP \$345-\$3,867. Leiola is a handicraft shop at the Fua'amotu Airport departure lounge. Some of the products on sale included handbags and fans made from mother of pearl shells. The prices of these handicrafts sold at Leiola were 25% higher than those for similar handicrafts sold at the Nuku'alofa market.

## 6. Retail Shops in Nuku'alofa

Some stores, such as Langa Founa Handicraft and Souvenirs, sells pearl products such as freshwater pearl chains, freshwater pearl necklaces, *mabé* pendants, uncut *mabé* shells, mother of pearl shell attached to handbags and fans (see photos below). This shop is a co-operative whereby women bring their home made handicrafts and products to be sold to locals and tourists. After the products are sold, 15% is deducted by the shop as commission and the remaining 85% is returned to the ladies who made the handicraft. This is one of the oldest retail shops in Nuku'alofa which started in the 1956. Banana Blue Nuku'alofa is another retailer which sells seawater black round pearls (seawater pearl chains, necklaces and ear-rings) imported from the Cook Islands and Hawaii. This is an up-market shop with prices ranging from TOP\$1,000 –TOP\$2,000.

## Handicrafts carved from MOP shell

A Cook Islander, Mr Tokerau Jim, visited Tonga to run a workshop on pearl shell carving and pearl shell handicraft making in Vava'u as part of a prior ACIAR research project (FIS/1997/031: "Pearl industry development in the western Pacific – see Fig. 1). A problem facing a developing pearl shell handicraft industry is the lack of supply of *mabé* and pearl shells, which limits handicraft production

(Interviews with handicraft sellers in Va'vau and Nuku'alofa). An example of Tongan MOP shell carving is shown in Fig 3.

**Fig. 3. Locally made mother-of-pearl shell carving sold at the Vava'u municipal market.**



## Constraints for growth of pearl production in Tonga

Based on interviews with pearl farmers in Tonga, the major constraints to expansion of pearl farming in Vava'u include:

- lack of spat
- lack of finance by farmers
- lack of proper farm management
- need for leasing/licenses

There is currently no mechanism for issuing aquaculture leases or licenses in Tonga. This lack of provision for tenure over marine spaces is a constraint to establishment of aquaculture activities, especially pearl farming. There is an urgent need for a high-level policy decision which will allow for the establishment of a system so that aquaculture licenses can be issued by the Ministry of Fisheries. Such a system will require close coordination and agreement between the Ministry of Fisheries (which has legal responsibility for management of living marine resources and of the aquaculture industry) and the Ministry of Lands (which currently has the legal authority to issue all

leases in Tonga). This arrangement will also require establishment of a system to register and physically demarcate the areas in which aquaculture is licensed.

## Conclusions

Unlike French Polynesia (Tahiti), Cook Islands and Fiji, Tonga produces only half pearls (*mabé*) from the winged pearl oyster, *Pteria penguin*. The Tongan half pearl industry is at a fledgling stage and growing very slowly. Routine hatchery production undertaken during the ACIAR project FIS/2006/172: “Winged oyster pearl industry development in Tonga”, and increased hatchery output supported by this PARDI project (Fig. 1) have helped address this issue but further guarantee of oyster supply is required by farmers along with technical support, policy support and improved business skills to further develop this industry. Of the seven pearl farms in the Vava’u area, only two produce good quality *mabé*. Most of them are sold in the Vava’u municipal market to tourists. In the capital, Nuku’alofa, mostly imported MOP shell jewellery is sold along with cheap white pearl jewellery imported from Asia. There would appear to be considerable opportunity for import replacement.

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