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Abbreviations

ACIAR Australian Centre for International Agriculture Research
FAO Food and Agriculture Organisation
FGD Focus group discussion
FJD Fiji dollars
IAS Impact Assessment Study
MAFFF Ministry of Agriculture, Forestry, Food and Fisheries (Tonga)
MF Ministry of Fisheries (Fiji)
MOP Mother of Pearl
MSF Marama Shell-craft, Fiji
PFA Pearl Farmers Association
PICW Pearl Information Centre and Workshop
WEAI Women's Empowerment in Agriculture Index
USC University of the Sunshine Coast
USP University of the South Pacific (Fiji)
USD US dollars

2 Executive summary

This document presents the findings of ACIAR SRA FIS/2018/029, an evaluation and impact assessment of two ACIAR funded aquaculture half-pearl (mabé) livelihood projects in Tonga and Fiji between 2018 and 2020. The purpose of the study was to extend an understanding of the social, economic and gendered impacts resulting from projects:

- FIS/2014/060 Developing pearl-based livelihoods in the western Pacific (2015-2021) (only the Fiji component was evaluated).
- FIS/2016/126 Half-pearl (mabé) industry development in Tonga and Vietnam (2016-2021) (only the Tonga component was evaluated).

These projects aimed to increase livelihood and socio-economic opportunities from mabé pearl culture and handicrafts and support the further expansion of community-based pearl farming in the Pacific. ACIAR-funded research has addressed spat and mabé culture (Fiji), hatchery techniques (Tonga) and provided extensive training and capacity development to partners in Ministries of Fisheries, spat and mabé farmers and mother-of-pearl (MOP) handicraft makers on production techniques.

This current impact assessment study (IAS) (FIS/2018/129) aimed to gain a deeper understanding of differentiated benefits and impacts for men, women and youth as a result of participation in spat and mabé production and MOP handicrafts. In addition, the study examines how the ACIAR-funded projects may have contributed to women's empowerment and the capacity of partner agencies and communities to engage in monitoring and evaluation.

Unlike many impact assessments the study was conducted during the life of the projects under study, rather than at or beyond completion. For project FIS/2014/060 in Fiji this was in the last 2 years of the project and in FIS/2016/126 in years 3-4 of a five-year project in Tonga. In this sense, the findings represent immediate impacts or outcomes of the projects rather than longer term post-project impacts. Economic, social and cultural impacts were the main focus of analysis. Impacts were assessed against a specific set of pre-determined indicators identified in conjunction with the ACIAR project leader for FIS/2014/060 and FIS/2016/126, and the ACIAR Fisheries Program Manager. These indicators were selected to examine potential and expected areas of impact.

Three field visits were completed between July 2018 and August 2019. The final field visit scheduled for April 2020 was cancelled due to travel restrictions as a result Covid-19. This reduced the total number of interviews planned with women and youth in Fiji. These interviews would have provided more information on the distribution of income and household level benefits in community mabé production groups.

The study was primarily qualitative, using a brief survey, semi-structured interviews and focus groups. A total of 10 location sites across Fiji and Tonga were selected (7 in Fiji and 3 in Tonga). A total of 79 individuals engaged in mabé-based livelihoods participated in the IAS. A further 12 ACIAR project and Ministries of Fisheries personnel were consulted from both countries. In Fiji, a total of 55 individuals (38 women and 17 men) engaged in surveys, interviews or focus group discussions. In Tonga, a total of 24 mabé farmers and handicraft makers (11 women and 13 men) participated in surveys, interviews or focus group discussions.

Summary of socio-economic impacts of mabé-based livelihoods in Fiji and Tonga

Many of the findings of the IAS were similar for Fiji and Tonga and these are summarised below. Where differences were apparent these have been specified.

Economic Impacts

ACIAR aquaculture investments (FIS/2014/060 and FIS/2016/126) are continuing to make a significant contribution to the development of pearl-based livelihoods in Fiji and Tonga from which farmers and handicraft makers can earn a supplemental income.

Key finding 1: Pearl-based livelihoods are providing a substantial supplementary income for women, men and youth engaged in pearl-based enterprises.

While mabé based enterprises are now providing an income to community groups and family-based farms, they are still supplementing other sources of household income for most mabé farmers and handicraft makers. Pearl-based livelihoods also provide some opportunities for secondary employment opportunities in sales and management for women and diving, boat operation and pearl line maintenance for small numbers of young men.

The data collected through FIS/2018/129 with spat collectors, mabé farmers and handicraft makers confirms with the findings of economic modelling by Johnston, (2020a: 2020b) assessing the profitability of spat and mabé production in Fiji and Tonga, showing that pearl-based livelihoods have the potential to substantially boost incomes for family and village-based enterprises.

Determining the amount of income from spat, mabé and handicraft production as a proportion of total individual or household income is made difficult due to the small numbers of producers in the study and the variable practices of income distribution across groups of producers.

Key finding 2: Differences in the organisation of production influences income distribution.

The structure and operational arrangements of production differ between Fiji and Tonga and this has implications for the distribution of income to producers. Fiji is organised around village community and small group production while Tonga has fewer community operations and more family-based farming and small group handicraft production.

In Fiji, the distribution of income from sales flows primarily to handicraft groups and village community groups, rather than individual producers, except for women handicraft makers who maintain approximately 30 percent of the sale value of products. In village production groups, income flows to the community for infrastructure projects such as community buildings, equipment or to support families with school costs. For women who only engage in handicrafts, a third of the profits from sales flows to the producer. While such an arrangement is compatible with existing community structures it has implications for supporting individual women's access to income. In Fiji it was not possible to estimate individual or household incomes from spat collection and mabé production as income generated remains with the group and community. For handicraft makers in women's groups individual income from mabé handicrafts for a 6-month period in 2018 ranged from FJD 320-770. While this represents a very small proportion of reported household incomes (less than 10%), it should be noted that the income-earning potential of this activity has not yet been fully realised.

In Tonga most mabé enterprises are family-based with few community farms fully established. Most income is generated through the production and sales of handicrafts and income from sales of handicrafts flows directly to the individual producer. Handicraft production has been clustered around a regional location where a Pearl Farmer Association, workshop and sales centre have been established enabling leveraging of sales opportunities. Individual incomes were used primarily in the support of families, reinvestment into mabé farm infrastructure and the employment of labour.

Reported incomes from mabé handicrafts for individual producers varies markedly. Sales figures for the Pearl Information Centre for 2019 indicate that total sales incomes for

individual producers range from TOP 90 to TOP 8,110 for the period July-September (encompassing the whale-watching / tourist season), with two producers accounting for 61% of sales income. Information gathered *directly* from farmer / handicraft makers in Tonga about income gained specifically from mabé-based activities varied as some had not yet harvested shells (1F) or been trained in handicrafts (1M, 1 F) or sold products that had been made. Two individuals provided an estimate of the proportion of total income generated from mabé-based handicrafts as 5% (F) and another as 12-15% (M). Only three people interviewed (1M, 2F) reported that mabé handicrafts were their only source of income. The range of monthly incomes reported from the sales of MOP handicrafts at the time of interviews were TOP 200 -1,990 per month. Income from the sale of mabé generally remains with the individual farmer / farm family and flows to the households.

Key finding 3: Access to markets remains a constraint to profitability.

The largest constraint to profitability is limited markets for raw mabé and worked mabé handicrafts. Currently ACIAR projects and Ministries of Fisheries continue to subsidise the production costs and purchase of product in both Fiji and Tonga while enterprise linkages between farmers and handicraft makers and markets are being developed further. In addition, training and support to farmers and handicraft makers needs to continue to maximise culture practices, farm management and consistency of quantity and quality of products.

Socio-cultural impacts

Key finding 4: Pearl-based enterprises are inclusive and offer a wide range of social benefits.

In both countries, opportunities exist for a wide range of individuals across gender and age to participate in pearl-based industries. Men and women reported that group-based enterprises offered social support, reduced isolation and increasing productivity. Both Fijian and Tongan women farmers and handicraft makers reported enhanced social status and recognition from families and communities for their valued economic contributions. Work associated with spat and mabé production and handicrafts was identified as valuable, meaningful and satisfying.

Key finding 5: Pearl-based livelihoods are compatible with environmental, cultural and social values.

Pearl-based livelihood enterprises were highly compatible with cultural and environmental values in both Tonga and Fiji enabling individuals and communities to preserve and extend marine-based livelihoods and practice traditional crafts using mother-of-pearl as a new medium. In Tonga the practice of gift giving is an important part of family and community traditions and mabé handicrafts have become highly valued as uniquely Tongan gifts in giving and exchange practices.

Gender differentiated impacts

Key finding 6: Differences in engagement between women, men and youth in Fiji and Tonga.

Mabé aquaculture and handicraft production currently offers opportunities for men, women and youth to earn supplementary income from pearl-based enterprises and engage in a range of roles within production systems. In Fiji mabé-based livelihoods are predominantly undertaken by women, while in Tonga only a third of all mabé farmers and handicraft makers are women. While gender is not a barrier for women becoming primary producers in mabé pearl enterprises, family or individual wealth may be a factor in the establishment of mabé farms particularly for women in Tonga. Cooperation between women, men and youth is a common element of pearl-based enterprises in village production groups offering opportunities for women, men and youth to work together.

Key finding 7: Increased productive capabilities and agency are contributing to women's empowerment.

ACIAR pearl livelihood projects have supported women's empowerment through the provision of skills, knowledge and resources for production which has enabled women's groups and individuals to increase income and assets within households and communities. In Fiji women are actively negotiating within community hierarchies and structures about the use of income earned from women's enterprises. In Tonga a small number of entrepreneurial women are incorporating mabé farming and handicrafts into their business operations as a form of diversified income and as supplement to other tourist activities. While income was a motivating factor for all mabé farmers and handicraft makers it was not the only motivator or purpose. Pearl-based activities are enabling individual women and groups of women to take control and leadership of mabé-based production enterprises and make strategic decisions about the use of income. Learning new skills in handicrafts was personally rewarding and meaningful and many women began to think differently about themselves, their capabilities and their aspirations for the future, building confidence to make life choices to achieve their goals.

Impacts for youth

Key finding 8: Mabé-based enterprises offer youth opportunities for income and employment.

The analysis of youth (18-35 years) involvement in the IAS was limited due to the cancellation of the final field visit. Information gathered was based on a single field visit and focus group discussion with one village youth production group in Fiji. Further information and observations were collected across a range of study sites in Tonga and Fiji that were not specifically designated as youth enterprises but in which youth were involved. Spat and mabé production and handicraft enterprises offer a small number of community youth groups opportunities for village based economic activity in spat and mabé production and employment in supporting activities such as diving for pearl line maintenance, particularly for young men in Tonga and Fiji. Individual adult farmers identified mabé farming as an important form of enterprise for youth in the future. Women's village-based mabé production in Fiji encourages participation from young women because of their fine motor skills and good eyesight for oyster implanting however the practice of women leaving villages to marry can mean a regular loss of skills from groups. Opportunities to develop a range of skills (organisational, bookkeeping, leadership) could be actively fostered through future projects. Youth involvement in farming and handicrafts builds self-confidence and recognition from families and community for their economic contribution.

Monitoring and evaluation among partners and communities

Key finding 10: Greater integration of data collection could contribute to improved project monitoring and evaluation.

Interviews, observations and reviews of documents provided an understanding of the capacity and practices for monitoring and evaluation by various local stakeholders engaged in the mabé and handicraft industries in Tonga and Fiji. Ministries of Fisheries in Tonga and Fiji have established frameworks for annual monitoring and data collection for pearl-based enterprises however the release of reports have often been delayed or were unavailable due to limited resources. Strengthening the resources and capacity for monitoring within Ministries of Fisheries would provide more information on production outputs as well as challenges or constraints faced by farmers.

ACIAR project teams have developed data collection instruments to be maintained by community groups and individual farmers. Considerable variation exists across different site locations on the quality of information collected. This suggests farmers and groups may need further training and support in this area. Greater integration of data collection

between producers, project staff and Ministries of Fisheries could also contribute to improved project monitoring and evaluation leading to strengthened adaptive project management.

3 Introduction

Half pearl (mabé) culture is one of the Pacific region's high priority aquaculture activities for coastal communities through the collection of juvenile oysters ('spat'), growing of juvenile oysters, production of half-pearls and the production of mother-of-pearl (MOP) handicraft items. Prior research has demonstrated that pearl-based livelihoods have the potential to provide economic opportunities and benefits for men, women and youth in the western Pacific regions of Tonga and Fiji (Kishore et al., 2018; Simard et al., 2018; Southgate et al., 2019; Johnson, 2019, 2020). However, much of the research has previously focused upon pearl culture, marine biological conditions and economic benefits. As a result, the literature has tended to highlight scientific and economic benefits rather than socio-cultural impacts.

This document reports on a Small Research Assessment (SRA) FIS/2018/129 commissioned by the Australian Centre for International Agricultural Research (ACIAR): Monitoring and Evaluation of Socio-Economic Impacts of Mabé Pearl Livelihood Developments in Fiji and Tonga. The study was completed between June 2018 and June 2020. The purpose of the assessment was to extend an understanding of the socio-cultural, economic and gendered impacts resulting from two ACIAR funded projects below:

- FIS/2014/060 Developing pearl-based livelihoods in the western Pacific (2015-2020) (only the Fiji component was evaluated).
- FIS/2016/126 Half-pearl (mabé) industry development in Tonga and Vietnam (2016-2021) (only the Tonga component was evaluated).

FIS/2018/129 sought to gain an understanding of differentiated benefits and impacts for men, women and youth from engagement and participation in two specific types of aquaculture in Fiji and Tonga, specifically spat and mabé pearl production and mother-of-pearl (MOP) handicrafts.

4 Development of mabé pearl industries in Tonga and Fiji

4.1.1 ACIAR investments in pearl aquaculture

ACIAR investments in pearl aquaculture in Fiji and Tonga commenced in 2006 (Box 1). Subsequent ACIAR-funded research has addressed spat and mabé culture (Fiji), hatchery techniques (Tonga) and provided extensive training and capacity development to partners in Ministries of Fisheries, spat and mabé farmers and mother-of pearl handicraft makers on production techniques. Attention also focused on the development of markets for handicrafts. Professor Paul Southgate (USC) has led research in Tonga and Fiji associated with these studies. Mr Max Wingfield (USC), and Dr Pranesh Kishore (USP) have been the Senior Project Scientists in current projects.

ACIAR-funded research in Tonga first focused on activities to establish and improve the production capacity and efficiency of the Tongan pearl farming industry, addressing production from the hatchery phase, through nursery production, grow out, seeding, through to final harvesting. Later research focused on post-harvest aspects such as value-adding mabé pearls. This has involved supporting the development of a Pearl Farmer Association and handicraft workshop in Vava'u and providing training to pearl artisans and shell carvers most of whom also mabé farmers. This later phase focused on market development and promotion to maximise benefits such as income generation for Tongan mabé farmers and handicraft makers.

Box 1: ACIAR investments into pearl-based livelihoods in Tonga and Fiji

- FIS/2006/172 Winged pearl oyster industry development in Tonga
- FIS/2006/038 Mini Project Mabé Culture Fiji
- PC/2008/044 Pacific agribusiness research for development initiative (PARDI)
- FIS/2009/057 Pearl industry development in the western Pacific, Fiji, Tonga and PNG
- PARDI/PRA/2010.01 Cultured pearl production, capacity and improved quality, Fiji and Tonga
- PARDI/PRA/2013.01 Assessing Potential of Mother of Pearl handicraft sector in Fiji
- FIS/2014/103 Pearl livelihood development in Fiji
- FIS/2014/060 Developing pearl-based livelihoods in the western Pacific
- FIS/2016/126 Half-pearl (mabé) industry development in Tonga and Vietnam

In Fiji, ACIAR funded researchers have developed culture techniques for spat to improve reliable access to culture stock; expanded opportunities for prospective mabé farmers in coastal communities to enter the industry with appropriate training; supported and trained handicraft makers to have greater access to pearl shell for income generation and supported women's MOP handicraft production with appropriate training.

The characteristics and engagement of various groupings of actors in spat and mabé based enterprises in Tonga and Fiji are shown in Table 1.

A distinguishing feature of the enterprises in both nations includes the essential role of Ministry of Fisheries aquaculture programs and officers. They are critical actors supporting farmer production and supply and value chains for handicrafts. In Tonga spat is provided to farmers free of charge by Ministry of Fisheries from production in the hatchery. In Fiji spat is collected and farmed by village community producers from wild sources.

Table 1: Characteristics of spat and mabé based enterprises in Tonga and Fiji.

Fiji	Tonga
Community-based spat farmers involving men, women, and youth	Community based-mabé farming involving men, women, and youth
Community-based mabé farmers engaging primarily women with support from men and youth	Family-based mabé farming
Community-based spat and mabé farming engaging youth	Individual mabé farmers and handicraft producers
MOP handicraft producer groups (women only)	Pearl Farmers Association (men, women and youth)

4.1.2 Overview mabé pearl culture

Cultured round pearls are among the Pacific region's most valuable aquaculture commodities with considerable potential for market development, trade and export with production valued at USD 176 million (SPC, 2007). Pearl culture has been shown to be compatible with traditional lifestyles and provides an opportunity for income generation in remote and regional communities, for small farmers and for value adding of pearl shell through handicrafts. The industry is considered environmentally benign, contributes to food availability and can assist in preservation of marine environments (SPC, 2007; Chand et al., 2011).

The species farmed in Fiji include the black-lip pearl oyster (*Pinctada margaritifera*), farmed for round pearls and the winged pearl oyster (*Pteria penguin*), farmed for half pearls (commonly known as 'mabé') in Fiji and Tonga.

Oysters for cultured pearls are obtained by collecting juvenile oysters less than 2-3 years (called spat) from wild breeding populations from a reef or grown through hatchery production. It takes around 18 months for a juvenile oyster to reach adult size (10cm). Cultured round pearls are formed by inserting a nucleus (shell bead) into an oyster. The mollusc / oyster reacts to the irritant by coating it with nacre, a shiny iridescent material found on the inner surface of the shell. The oyster then secretes nacre around the nucleus and after 12 to 18 months the cultured pearls are harvested. (Haws et al., 2006).

Half-pearl farming requires less infrastructure and management and has lower production costs than round pearl farming. Mabé pearls are made by gluing one or more hemispherical plastic bead to the inside surface of winged pearl or black-lip pearl oyster shell. Over a period of 9 to 12 months the bead inside the oyster becomes covered with nacre (mother-of-pearl) and this forms the mabé. Mabé pearls vary in size from 12 to 20 mm in diameter. Unlike round pearl production, multiple mabé can be made from a single oyster and their collective value may be greater than that of a single round pearl. Handicrafts can be then crafted from the mother-of-pearl lining of the winged pearl and black-lip oyster shell, integrating the mabé into shell jewellery items (Haws, et al., 2006).

Risks to the industry include the sensitivity of oysters to changes in water quality conditions, vulnerable to disease, predation, adverse weather conditions such as cyclones, theft and the potential impacts of climate change on pearl culture in the Pacific region (Pickering et al., 2011; Beyer and Pickering, 2017).

4.1.3 Overview mother-of-pearl handicrafts

In many Pacific countries, handicrafts are significant cultural products utilised in traditional ceremonies, community and family events such as weddings, births and funerals and contribute to the economy through tourism activities in many Pacific countries (Pacific Community, 2020; ITC, 2010). The maintenance and promotion of arts and culture of traditional crafts also remain important to Pacific nations. Handicrafts also play role in

representing the culture and traditions of a country or region. They are a substantial medium to preserve traditional practices, heritage and skills which are associated with people's lifestyle, history and culture (Giuffre, 2016).

Traditional handicrafts common to Fiji and Tonga include carving wood, mat and basket weaving, and Tapa - a decorative bark cloth painted with traditional symbols and designs. Tonga is also known for carving bone and Fiji for pottery. Traditionally, women's crafts and men's crafts are separate, the women predominantly in charge of Tapa, weaving and pottery and the men in charge of bone and woodcarving. Shell handicrafts are also produced and traded and commonly used for adornment, ceremonies, gifts, and selling within the tourism sector. Shell products commonly used in creative and cultural products include trochus - cowrie black lip and winged pearl oyster shell. In some regions shell handicrafts have become a major income-generating activity particularly for the women (Pacific Community, 2020).

The introduction of mabé to Tonga and Fiji has allowed for a range of value-adding activities that includes the production of mother-of-pearl shell handicrafts. Handicrafts manufactured from the lining of the winged pearl and black-lip oyster shell are made into necklaces, pendants, broaches, hair ties, shell bowls and framed mother-of-pearl pictures. Oyster shells containing one to three mabé need to be purchased from mabé farmers. The production of jewellery and handicrafts requires access to equipment ranging from basic hand-tools to machinery such as bandsaw, grinders and polishers requiring power. Handicraft makers may also need to buy silver wire, clasps, necklace materials and other consumables for the production of jewellery.

In 2013, the ACIAR Pacific Agribusiness Research Development (PARDI) (PARDI, 2014) recognised the economic potential for the development of mother-of-pearl handicrafts. Historically the Pacific tourist trade in mother-of-pearl handicrafts and jewellery has been dominated by imported items from Southeast Asia. Subsequent ACIAR-funded research sought to further develop the industry by providing opportunities for communities and women in Fiji and Tonga to develop and produce unique mabé and mother-of pearl handicrafts as an economic activity. This involved providing extensive and ongoing specialised skills training for handicraft makers as well as business and marketing training. Workshops were established in various locations in Fiji and Tonga to support communities in the production, marketing and sale of unique locally made mabé jewellery and fashionwear.

5 Country Overviews

5.1 Fiji Country Overview

Fiji's population of 885,000¹ consists of 330 islands scattered over 1.3 million square kilometres of the South Pacific Ocean. The two main Islands, Viti Levu and Vanua Levu, remain the most populous islands of Fiji with 96 per cent of the population¹ (Figure 1). Fiji's major languages are English, Fijian and Hindi, and its major religions are Christianity, Hinduism and Islam. There are two main ethnic groups: i-Taukei (indigenous Fijians) who make up about 57% of the total population and Fijians of Indian descent who account for 37% (ADB, 2015). Fiji is classified as an upper middle-income country, with per capita gross domestic product FJD 13,584.00 (USD 6,208.257) in 2018 (IMF, 2019). Fiji has one of the most developed economies in the Pacific, with tourism as its main driver of economic activity and foreign direct investment. Despite recent growth, Fiji faces a number of challenges that constrain economic development, including its geographic isolation, a relatively small population, the complexity of land tenure systems and vulnerability stemming from cyclones (The World Bank, 2017).

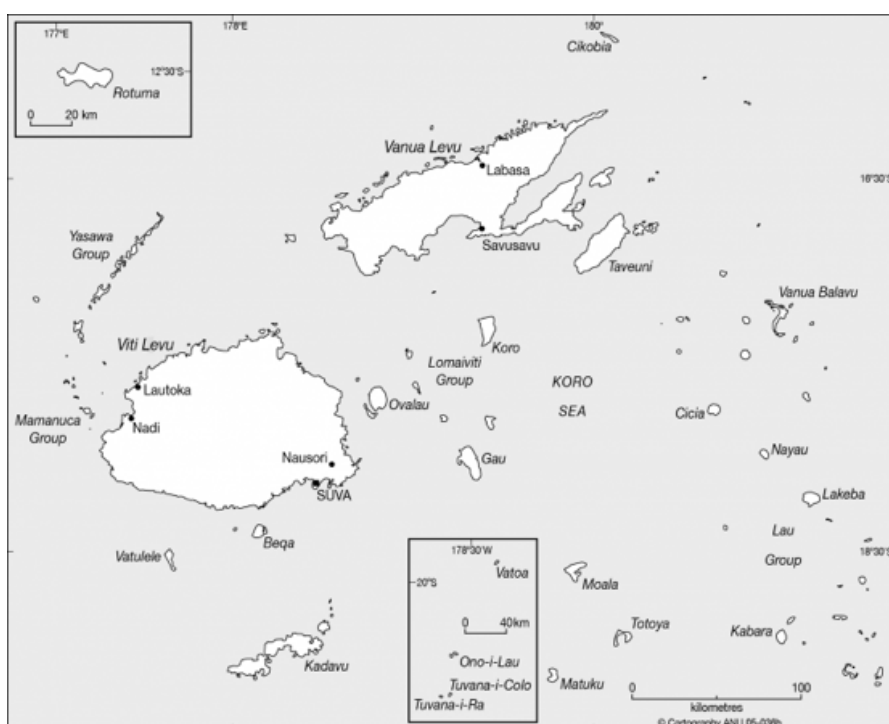


Figure 1: Map of Fiji Islands. ANU College of Asia and the Pacific

5.1.1 Youth in Fiji

The Fiji Government remains committed to working towards the development of young Fijians. The National Youth Policy of Fiji (2011) defines youth as those between the ages of 15 and 35 years which constitute about 32 percent (285,000) of the total population based on the 2017 population census. With a median age of 27.5 years, over half of the

¹ Fiji Census 2017: FBOS- <https://www.statsfiji.gov.fj/>

country's population are below 28 years. Rural populations have a higher proportion of youth below 14 years compared to urban dwellers. In 2019, the estimated youth unemployment rate in Fiji was at 14.5 percent. The female youth unemployment rate is higher than male youth: a quarter of young women in the labour force are actively looking for work compared to about one-in-six young men (Fiji National Employment Policy (NEP) 2018). The NEP recognises youth as its first priority area to develop clear pathways from education to productive employment. Other priorities include the creation of income generating opportunities for those reliant on subsistence activities to earn income.

Youth in Fijian coastal communities are likely to be at the forefront of balancing customary fishing practices and managing ecological problems associated with dwindling resources – both now and in the future. ACIAR funded projects have established and supported a number of youth groups in coastal village communities in Fiji to collect spat and farm mabé as a marine economic enterprise.

5.1.2 Gender relations in Fiji

Fiji has made a number of specific international and national commitments to gender equality, including the Convention on the Elimination of All Forms of Discrimination against Women, and the Fiji National Gender Policy (2017). Gender relations in Fiji vary by ethnicity, socio-economic status, and rural–urban contexts. These include patriarchal cultures and gender-differentiated access to economic and political resources. Fiji's labour force participation rate for men is at 80 per cent, with women at 46 per cent. Women constitute more than 70 per cent of market vendors in Fiji and actively participate in almost all aspects of agricultural production. In 2018 a large proportion of women were in unpaid work and unemployment rates for females were 5.3% and for males 3.6% (World Bank, 2020).

Land is a key economic resource in Fiji and the land tenure system has historically favoured indigenous Fijians through recognition of their traditional claims. Despite this, iTaukei women may still be excluded from formal inheritance rights to customary land, often having no rights to land other than those permitted by their fathers or husbands, and do not customarily receive land rents (UN Women nd). Rural communities in general maintain more traditional gender norms than urban communities. In relation to fishing, Vunisea (2014) notes that the cultural roles of women continue to define and determine their spheres of influence at the community-level and dictate their roles and participation in the various fisheries sectors. Gender continues to play a role in determining where women and men work, and separates traditional knowledge, roles and responsibilities, while customary ownership of rights to fishing grounds (i-qoliqoli), determines how community groups, including women, participate in fishing and aquaculture.

5.2 Tonga Country Overview

The Kingdom of Tonga is a Polynesian country comprising of 176 islands of which 36 are inhabited. There are four main islands groups: Tongatapu and 'Eua, Vava'u, Ha'apai and the remote Niua (Figure 2). Tonga has a population of 106,000 and is a Constitutional Monarchy with an established Constitution since 1875. Tonga's economic structure revolves around five main sectors – agriculture/ fisheries, trade, public administration, tourism and finance. Tonga ranks 101 out of 188 countries included in the Human Development Index. The economy is heavily reliant on foreign aid and remittances from Tongans working overseas. Tourism is currently modest but with a large potential for expansion. Tonga's main trading partners are New Zealand, Australia, Fiji, the United States and Japan. Most Tongan exports are agricultural produce while imports cover the full range of consumer and industrial goods. <https://dfat.gov.au/geo/tonga/Pages/tonga-country-brief.aspx>

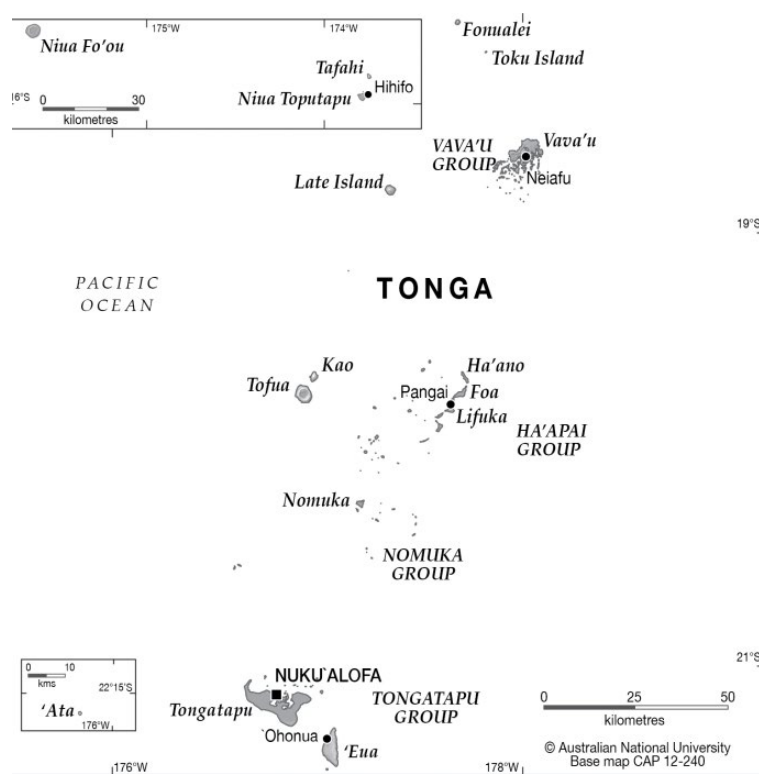


Figure 2: Map of Tonga. ANU College of Asia and the Pacific

5.2.1 Youth in Tonga

The Tonga National Youth Strategy describes 'youth' as young men and women between 15 and 34 years of age. Tonga has a relatively young population, with a median age of 22 years, and almost four-in-ten people (39 per cent) are aged 15 years and younger. Young people may not be considered adults until they are married or have left home. Many young people in Tonga are bound by family ties, faith, and tradition (UNDP, 2011). Boys are leaving school earlier than girls with the gender gap being largest at age 16 by when almost 22% of boys have left the education system compared to 12% of girls. A relatively high proportion of women and men aged 15-34 are not in employment, or currently undergoing education or training – 44.5% of young women and 34.5% of men (Kingdom of Tonga, 2019). Limited employment and meaningful activities can restrict opportunities for young people to positively contribute to their communities. Tonga's Strategic Development Framework 2015-2025 aims for a more progressive Tonga, supporting a higher quality of life for all.

5.2.2 Gender relations in Tonga

Culture plays a significant part in shaping gender relations and roles in Tonga as do Christian values and beliefs. The Constitution of Tonga and its subsequent revisions do not specifically guarantee women equal rights to those of men. Although the legal framework is progressive with regard to the promotion of gender equality, some laws still discriminate against women, notably those related to land ownership and the distribution of property and wealth after divorce. The Gender Inequality Index positions Tonga at 96 out of 189 countries in 2017. The total labour force participation rate in 2016 was 63.7 percent with a participation rate of 71.2 percent for men and 56.7 for women. (FAO and SPC, 2019). Tonga is one of six countries globally that has not ratified the Convention on the Elimination of All Forms of Discrimination Against Women however Tonga has developed a national Gender and Development (GAD) Policy in support of women's empowerment. (SPC, 2019).

6 Objectives

6.1 Objectives, deliverables and activities

A summary of SRA objectives, deliverables, a report against deliverables and key points captured against each objective is as follows:

<p>Objective 1: Assess the socio-economic impacts of mabé pearl-based livelihood developments in Fiji and Tonga.</p>
<p>Activities:</p> <ul style="list-style-type: none"> • Demographic analysis of spat and mabé farmers and MOP handicrafts makers in Fiji and Tonga • Analysis of social and economic benefits to communities, individuals and families engaged in mabé aquaculture and handicrafts. • Analysis of gender and age differentiated benefits • Mapping of pear-based livelihoods in Tonga and Fiji.
<p>Report against deliverables:</p> <p>The study team completed three field visits between 2018 and 2019 to collect data in the form of interviews, survey and focus groups. The fourth visit was cancelled due to COVID-19 restrictions. Document analysis, key informant interviews and integration of economic modelling data supplemented the impact assessment analysis. The analysis identified a range of socio-economic impacts for men, women and youth as shown below.</p> <ul style="list-style-type: none"> ➤ ACIAR aquaculture investments are making a significant contribution to the development of mabé aquaculture and handicraft industries in Fiji and Tonga although full potential yet to be realized as a result of insufficient markets. ➤ Mabé aquaculture and handicraft production currently offers opportunities for men, women and youth to earn income from mabé enterprises which significantly supplement other household or community livelihoods. ➤ Additional market research and development are required to achieve full impact potentials. ➤ Mabé enterprises are highly compatible with pacific cultural and environmental values enabling individuals and communities to preserve and extend cultural practices. ➤ Women have been successfully engaged in mabé enterprises gaining benefits including additional income, access to assets and resources, specialized skills and knowledge and increased status and recognition in their families and communities and improved self-confidence and wellbeing.
<ul style="list-style-type: none"> ➤ Mabé aquaculture and handicraft production currently offers opportunities for men, women and youth to earn income from mabé enterprises which significantly supplement other household or community livelihoods. ➤ Additional market research and development are required to achieve full impact potentials.

<ul style="list-style-type: none"> ➤ Skills, knowledge and proficiency in spat and mabé husbandry and handicraft production take considerable time and support to develop. Whilst basic skills can be acquired within 12 – 18 months, quality products and high-level crafts/ artistry can take up to five years. ➤ Gender is not a barrier for women to become the primary producer or income earner in mabé pearl enterprises. ➤ Benefits of working in groups- reduces social isolation, builds friendships and increased productivity.
<p>Objective 2. Examine the involvement of youth in pearl-related livelihood activities in Tonga and Fiji.</p>
<p>Activities:</p> <ul style="list-style-type: none"> • Analysis of the participation of youth in mabé aquaculture in one specific community in Fiji. • Analysis of benefits to youth in in aquaculture and handicraft enterprises in Fiji and Tonga. • Identification of barriers and enablers to youth involvement in mabé aquaculture enterprises.
<p>Report against deliverables:</p> <p>The project team was only able to complete the analysis of youth involvement in one community of spat and mabé farmers in Fiji due to COVID-19 restrictions on travel. Further information and observations were collected across a range of study sites that were not specifically designated as youth enterprises but where youth were participating. Further work on the enablers and barriers to youth participation would enhance understanding of youth participation. The analysis identified a range of impacts and factors effecting youth as shown below.</p> <ul style="list-style-type: none"> • Mabé production and handicraft enterprises offer youth group enterprises a viable opportunity for village based economic activity. • A small number of young men and women gain employment in • Families engaged in mabé enterprises often see mabé farming as an opportunity for youth employment particularly young males in Tonga. • Women’s village based mabé production in Fiji encourages participation from young women because of their fine motor skills, good eyesight for oyster implanting however the practice of women leaving the village to marry can mean a loss of skills from groups. • Mabé farming offers young women and men an opportunity to engage in economic activity together where may have previously operated in a segregated manner. • Opportunities to develop range of skills (organizational, bookkeeping, leadership)- these need to be actively fostered through project. • Increased confidence and valued contribution to community. • Involvement and interest from youth in pearl-based enterprises is increasing however the limits of the current research on youth involvement warrants further investigation to gain a more detailed understanding of socio-economic impacts.

Objective 3. Identifying capacity for monitoring and evaluation among partners and communities.

Activities:

- Interviews with project staff and Ministry of Fisheries aquaculture officers and senior aquaculture staff were conducted to understand the current methods of monitoring and evaluation.
- Review of monitoring and evaluation documents.
- Analysis of community capacity for monitoring production and planning future activity.

Report against deliverables:

Following interviews, observations and review of documents a reasonable understanding of the capacity and practices for monitoring and evaluation of various actor groups engaged in the mabé and handicraft industries in Tonga and Fiji was identified. A range of recommendations were made enhancing monitoring and evaluation. These include:

- The development of consistent data collection templates for monitoring production and sales data across and between partner agencies and producers.
- Ministry of Fisheries personnel provide essential and valued information about the development of pearl industries in both Tonga and Fiji however staff are limited by time and resources in relation to monitoring and evaluation.
- Technical scientific researchers do not always have time to engage monitoring and evaluation activities. Other project personnel could be tasked with activities in this area.
- Farmer and handicraft groups could benefit from further training in monitoring and evaluation.

7 Methodology

7.1 Impact assessment approach

ACIAR has developed impact assessment guidelines for tracing the way in which research or development initiatives lead to changes in the lives of people, the environment or policies. (Guidelines for assessing the impacts of ACIAR's research activities, 2008). Impacts are often considered to be immediate (those that are apparent at the end of a project), intermediate (1-2 years) and those that are sustained over a longer period, after a number of years (3-5 years).

The impact assessments made in this study were identified during the last 2 years of project FIS/2014/060 in Fiji and within years 3-4 of project FIS/2016/126, a five-year project in Tonga. Therefore, the findings represent immediate impacts or outcomes of the projects rather than longer term post project impacts. Economic, social and cultural impacts were the main focus of analysis. For this research, impacts were assessed against a specific set of pre-determined indicators identified in conjunction with the ACIAR project leader for FIS/2014/060 and FIS/2016/126. These indicators were selected to examine potential and expected areas of impact.

The focus of the economic analysis was on impacts for individuals, families and communities. Broader economic modelling has been completed by the ACIAR projects team and has informed this impact assessment. Social impacts not derived directly from income include access to, and control of, assets and resources, skills and knowledge, changed status and relationships, increased networks and improved wellbeing. Cultural impacts included opportunities to share cultural knowledge, values, customs or artistic products.

7.1.1 Methods

The study was an exploratory qualitative study with survey, semi-structured interviews and focus groups as the main methods of data collection. A brief administered survey was integrated into the interviews to collect socio-economic information from participants. Key informant interviews were conducted with project staff and Ministries of Fisheries staff in Tonga and Fiji. This approach relied on the knowledge and networks of local partners, in particular Ministry of Fisheries personnel to contextualise findings. In addition, selected participatory impact assessment methods were trialled to explore alternative evaluation processes to gather participant experiences. Table 2 summarises the focal areas investigated within each method.

Purposive sampling informed participant selection. Three field visits were completed between July 2018 and August 2019. The final field visit scheduled for April 2020 was cancelled due to travel restrictions as a result Covid-19. Further interviews were to be conducted with women and youth participating in village mabé production. Each field visit was two to three weeks in duration. Locations were selected in consultation with the ACIAR project team leader (7 in Fiji and 3 in Tonga (Table 3)). The data was analysed manually using basic descriptive statistics and thematic analysis of predetermined socio-economic indicators of change.

Table 2: Study methods and focal areas for investigation with spat and mabé farmers and mother-of-pearl handicraft makers.

Survey Age Gender Education level Ethnicity Marital status Household size Number of children Membership of groups Individual and household income Income from pearl-based activities	Interview Income, income use, livelihood diversity Financial support from and to others Involvement in mabé or handicrafts Motivations Individual, family, community benefits Self-concept, relationships with others Time and fit with other work Production supply and costs Sales quantity and price and market Decision making on income use Future aspirations Barriers and challenges
Focus group Type of involvement Roles and responsibilities Place and group characteristics Production, income and sales Benefits challenges Aspirations and goals	Document Analysis Project documents and annual reports National and International reports Ministry of Fisheries Aquaculture reports Published papers

Table 3: Study locations, participant groups and type of mabé pearl-based livelihood activity.

Location	Participant group	Activity / Production
Fiji		
Ba, Viti Levu	Marama Shellcraft Centre	Shell craft and jewellery
Viani, Vanua Levu	Community Youth group	Spat collection and mabé production
Raviravi Village, Viti Levu	Navatudua Women's Group	Mabé production and MOP handicrafts
Somosomo, Taveuni, Vanua Levu	Nasomso Ra Marama Handicraft Centre	MOP handicrafts
Qamea, Taveuni, Vanua Levu	Dreketi Women's Group	Mabé producers
Natuvu Ravita Village, Vanua Levu	Drodromalua Women's Group	Mabé producers
Suva, Viti Levu	Ministry of Fisheries aquaculture officers	Spat and mabé aquaculture
Tonga		
Ha'apai	Family mabé farmers	Mabé producers
Vava'u	Tonga Pearl Farmers Association and individual farmers and carvers	Mabé farmers and artisan carvers
Tongatapu	Ministry of Fisheries aquaculture officers	Spat and mabé aquaculture

Assessing women's socio-economic empowerment

Research on gendered social relations is key objective of ACIAR commissioned agricultural research (ACIAR, 2018). In addition to the three key objectives of this SRA the assessment team was asked to consider how the ACIAR-funded projects may have contributed to women's empowerment.

For this study gender was understood as the socially constructed differences between women and men, that are central to social identity and intersect with other identities such

as age, class, ethnicity, sexuality and religion. While women are generally recognised to have fewer privileges, rights, more domestic responsibilities and less of a voice in socio-economic and political decision-making than their male counterparts, over time the power and structures associated with gender inequality can be changed (FAO, 2017).

While many development projects aim at empowering women, the measurement of empowerment can be a challenge (Masset, 2015). Numerous assessment tools have emerged over time, including an increasing number of gender indexes (Gupta 2016; Malhotra et al. 2002; World Bank 2012; IFPRI, 2020). These typically provide definitions of empowerment, frameworks for measuring impact, and indicators against which to measure women's empowerment. Golla et al., (2018) define women's economic empowerment as the ability to succeed and advance economically, and the power to make and act on economic decisions. This draws on Kabeer's foundational understanding of empowerment as an expansion in people's ability to make life choices (1999, 437). This ability to exercise choice encompasses three dimensions: resources (including material, human, and social resources), agency (processes of decision-making and negotiation), and achievements (well-being outcomes).

For this impact assessment the design of the study was influenced by Kabeer's (1999) definition of empowerment and the [Project-Level Women's Empowerment in Agriculture Index \(pro-WEAI\)](#) developed by the [International Food Policy Research Institute \(IFPRI\)](#) (Malpit et al., 2018). The Pro-WEAI measures women's empowerment in various types of agricultural development projects. It is primarily a quantitative tool that captures aspects of women's empowerment but also draws on qualitative methods. It was specifically developed to meet the needs for monitoring and assessing the impact of projects (Malpit, Quisumbin, et al., 2019). As the Index is still being tested and remains time intensive and costly to implement in full, for this study the Pro-WEAI was used as a guide for the design of qualitative indicators of women's empowerment as shown in Table 4. Unlike the Pro-WEAI these indicators were not measured through a quantitative metric rather through qualitative surveys, interviews and focus groups. The table below shows indicators used in the Pro-WEAI and those selected for the evaluation study.

Table 4: Comparison of Pro-WEAI indicators and seven used in this study.

Pro-WEAI	Impact Assessment Study
Intrinsic agency <ul style="list-style-type: none"> • Autonomy in income • Self-efficacy • Attitudes about intimate partner violence • Respect among household members 	Intrinsic agency <ul style="list-style-type: none"> • Self-efficacy and sense of wellbeing • Community perception
Instrumental agency <ul style="list-style-type: none"> • Input in productive decisions • Ownership of land and other assets • Access to and decisions on financial services • Control over use of income • Work balance • Visiting important locations 	Instrumental agency <ul style="list-style-type: none"> • Access and control over resources and income • Decision making about productive assets and use of income • Workload and time • Leadership
Collective agency <ul style="list-style-type: none"> • Group membership 	Collective agency <ul style="list-style-type: none"> • Membership of groups

7.2 Study Participants

A total of 79 individuals engaged in mabé pearl-based livelihoods participated in the IAS across Fiji and Tonga (Table 5). A further 12 ACIAR project and Ministries of Fisheries

personnel were consulted from both countries. In Fiji, a total of 55 individuals (38 F and 17 M) engaged in interviews or focus group discussions. A further three Ministry of Fisheries personnel (2 M and 1 F) and a project scientist (1M) participated in key informant interviews.

In Tonga, a total of 24 mabé farmers and handicraft makers (11 F and 13 M) participated in interviews or focus group discussions. A total of 8 key informant interviews were conducted with Ministry of Fisheries personnel (2M and 2F), project scientist (1M) and project volunteers (2F).

Table 5: Number of individual participants in the FIS/2018/129 study.

	Fiji		Tonga		Total
	Females	Males	Females	Males	
Farmers and handicraft makers	38	17	11	13	79
Ministry of Fisheries key informants	1	2	2	2	7
Project scientists and volunteers	0	1	2	1	4

7.2.1 Fiji study participant demographics

A total of 55 individuals (38 F and 17 M) participated in focus group discussions and 12 women handicraft makers were involved in individual interviews (Table 6). Seventeen women were both mabé farmers and handicraft makers. Additional interviews were to be conducted with women and youth spat and mabé producers in April 2020 however this was not possible due to COVID-19. Four key informant interviews were also conducted with ACIAR project scientist (1 M) and Ministry of Fisheries aquaculture personnel (1 F and 2 M). Interviews explored contextual information about mabé and spat collecting activities in Fiji, collaboration and partnership arrangements between the project team and Ministry of Fisheries Fiji, the role of Fisheries aquaculture staff with community farming groups, information regarding production, sales and supply chains as well as observed community benefits.

Table 6: Number of participants by gender and data collection methods, Fiji (2018-2020)

Location	Group of respondents	Interviews		Focus Groups	
		F	M	F	M
Dreketi village Qaemea,	Mabé farming women's group	0	0	4	0
Ravita village, Vanua Levu,	Mabé farming and MOP handicrafts women's group	0	0	10	1
Raviravi, Vanua Levu,	Mabé farming and MOP handicrafts women's group	0	0	7	8
Viani, Vanua Levu,	Mabé farming and spat collecting youth group	0	0	5	8
Ba, Viti Levu,	MOP Handicrafts women's group	6*	0	6*	0
Somosomo Taveuni,	MOP Handicrafts women's group	6*	0	6*	0
Total all		12	0	38	17

Those who participated in both interview and focus group were only counted once as indicated by an Asterix*.

7.2.2 Gender, Ethnicity, Age, Marital Status, Education and Household size

In all but one of the five study locations in Fiji, women's groups were identified as the primary producers of spat and mabé farming in village enterprises and handicraft groups within the study communities. This was a strategic decision made by FIS/2014/060 project team as a strategy to increase engagement of women in pearl-based livelihoods. Men who participated in focus groups identified as having some involvement in mabé farming activities within their community but primarily in supporting roles to the women's groups. Community spat collectors and youth groups are the exception where both young men and women are both involved in farming.

All mabé pearl farmers were living in coastal villages and identified as indigenous Fijian's (iTaukei, n=43). Handicraft makers identified themselves as Fijian Indian (n=3), iTaukei (n=25) or Pacific Islander (n= 3). A broad range of ages were engaged in spat and mabé farming and handicraft making. Age data was available from handicraft producers and mabé farmers in 4 locations with ages ranging from 17 to 77 years with an overall mean age of 42 years (n=37). The youngest group of mabé farmers were in the village of Viani with a mean of 27 years and the oldest in the village of Ravita (mean 54 years). Fewer younger women were engaged in handicraft only groups where the mean age was 47 years (n=12).

Information about marital status of mabé farmers was collected from four locations (Viani, Ravita, Raviravi and Qaemea). Fifty four percent were married, 44% single and 2% widowed (N=32). Most single people were from the youth village. Among handicraft only groups 58% were married, 25% widowed and 16% divorced. The majority of handicraft makers from Somosomo and Ba (77%) had completed senior secondary school education.

Of the 12 handicraft makers were interviewed in Fiji, eight women had between 1-4 persons living in their household, two had 5-7 persons and two had more than 8 persons. Five women had no children living at home. The remaining 7 households supported a total of 23 children of school age or younger.

7.3 Tonga study participant demographics

The study was conducted between 2018-2020 in Vava'u and Ha'apai with a total number of 24 mabé farmers and handicraft makers participating in focus groups and/ or interviews (11 F and 13 M) (Table 7). A further 4 informal discussions were conducted with MOP

handicraft makers in Tongatapu (1 M, 1F), Vava'u (1M), Ha'apai (1F). These are not explicitly discussed in this report but provided useful contextual information for the research team.

An attempt was made to meet with a community of mabé farmers on the island of Felemea in Ha'apai, however this was not possible due to travel disruptions. Subsequently a Ministry of Fisheries Aquaculture officer travelled to the community and administered a short group interview on behalf of the research team. Four women and 3 men participated results are incorporated into this report. The majority of participants in Tonga were both mabé farmers and mother-of-pearl handicraft makers.

A total of 8 key informant interviews were conducted with Ministry of Fisheries aquaculture personnel, as well as ACIAR project personnel/volunteers (5 F and 3 M).

Table 7: Participants by gender and data collection methods, Tonga (2018-2019).

Location	Producer group	Interview		Focus Group		Total
		F	M	F	M	
Vava'u	Mabé farmer + handicraft maker	4*	4*	2*	6*	12
Vava'u	Handicraft maker only	1	1	0	0	2
Ha'apai	Mabé farmer only	2	1	4	3	10
Total		7	6	4	7	24

*Two males and two females completed both interviews and attended the focus group in Vava'u and have been included in the total only once

7.3.1 Gender, Ethnicity, Age, Marital Status, Education and Household size

In Tonga women are increasingly becoming involved in mabé farming. All but one of the farmers interviewed identified as Tongan. Of the 24 individuals participating in the IAS in Tonga 11 were women (45%). Most individuals were married (80%) and ranged in age from 28 years to 76 years with a mean age of 50 years. Women farmers were younger than men with a mean age of 41 years. The majority of those interviewed had attended senior secondary school or above.

Most families (73%) had between 5-7 persons living in their household and only two had no children living at home. A total of 21 children of school age or younger were supported by those interviewed.

8 Socio-economic impacts of mabé-based livelihoods in Fiji

8.1.1 Structure and operations of pearl-based livelihoods in Fiji

The Division of Aquaculture in the Ministry of Fisheries (MF) is responsible for aquaculture priorities including round pearl and mabé. Due to increasing population and pressure on fish stock, the MF continues to invest in aquaculture for food security, improved livelihoods and increasing import substitutions. The Fisheries Sector Investment Guide outlines tax and other incentives available to small and micro aquaculture, tourism and community handicraft enterprises.

The Division is also engaged in pearl research in partnerships with ACIAR projects including FIS/2014/060 Developing pearl-based industry-based livelihoods in the western Pacific (2015-2021). Pearl oyster research and training supports the development of Fiji's pearl farming industry by conducting feasibility surveys of potential spat collection sites, procuring spat materials, conducting training on spat collector farming and business planning, harvesting of spat from community based farms, the development of the spat / pearl database and the review of the pearl management plans.

The key actors in the mother-of-pearl value chain in Fiji are spat collectors, mabé pearl farmers, MOP shell handicraft makers, people employed by farmers to work on mabé pearl farms (boat operators, divers), input suppliers such as the ACIAR project team, Ministry of Fisheries, round pearl farmers and tourism operators (i.e. resorts). ACIAR FIS/2014/060 and Ministry of Fisheries provided the initial infrastructure equipment, materials and training to start up spat, mabé and MOP handicraft production but the intention is to shift towards greater independence and sustainability among participating community members, farmers and Ministry of Fisheries.

The MF indicated that about 30 communities had been involved in the sale of spat and that the average participating community sells an average of FJD 3,000 worth of spat per year (1,500 individual spat) to round pearl farmers, representing a gross annual value across the 30 communities of about FJD 90,000 (45,000 spat) (Gillett, 2016). Twenty-two of these communities are engaged in selling Black-lip oyster (*Pinctada margaritifera*) spat to round pearl farmers. Seven spat collecting communities have received training for half-pearl seeding and oyster husbandry using spat from winged pearl oyster (*Pteria penguin*). Four of these communities have harvested crops of mabé pearls (Raviravi, Ravita, Qamea and Viani). Three of these communities are managed by village women's groups of 10-20 women in each group. The fourth group is managed by a village youth group involving both young women and men. Activities in these communities are carried out in collaboration with the Ministry of Fisheries who oversee deployment and monitoring of spat collectors assisted by ACIAR project staff. Extensive training has been provided by ACIAR project staff in spat collector deployment and oyster husbandry.

Enterprise links have also been established between a number of spat collecting / mabé pearl producing communities and handicraft producers. Four MOP / shell craft handicraft producer groups have been established in various locations. Two facilities operate in workshops in small urban settings using power tools and machines (Ba and Somosomo) and two in coastal village settings (Raviravi and Ravita) using hand tools. Regular training has been provided to communities focused on spat collector deployment and maintenance, harvest and husbandry of pearl oysters and mabé pearl seeding and harvest by ACIAR project FIS/2014/060 and Fiji Ministry of Fisheries.

The main requirements for spat and mabé pearl farmers in Fiji include access to training in spat culture methods and oyster management over a period of at 12- 18 months, equipment and supplies, training manuals and resources, access to water crafts / boats,

capability to swim or dive, capital to employ labour if needed, access to markets and transport of spat and MOP shell.

The main requirements for MOP shell handicraft makers include access to specialist training over a period of at 12-18 months, equipment and materials for shell handicrafts, workshop space / storage, markets and transport for sale of products. Currently trainers from New Zealand provide skills and design training. Current markets include local handicraft markets, resort tourist operators, retail outlets such as department stores and tourist outlets.

The ACIAR project team and Fisheries extension officers currently fulfil the roles of providing equipment, supplies and transporting spat to round and round pearl farmers and mabé shell to handicraft producers. Figure 3 below summaries the structure of pearl-based enterprises in Fiji.

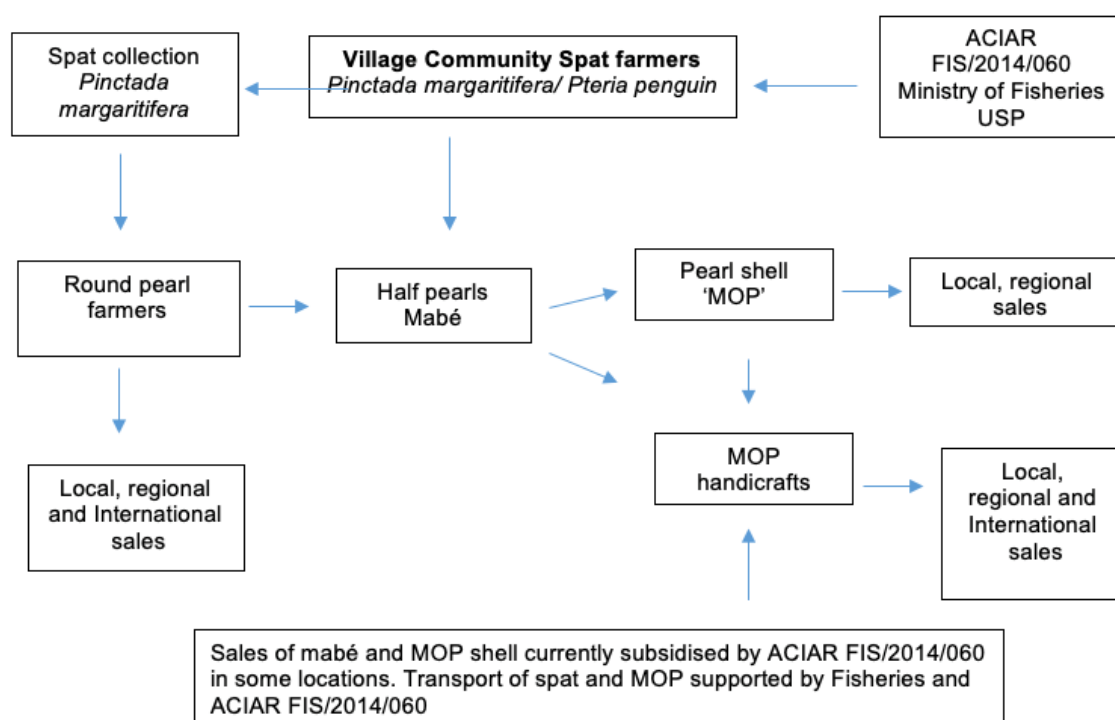


Figure 3: Pearl based livelihood operations in Fiji

8.2 Economic benefits of mabé-based livelihoods in Fiji

8.2.1 Household Incomes in Fiji

The most recent published Household Income and Expenditure Survey (HIES) report for Fiji is for the period 2008-2009 and provides national and regional statistics on household income and expenditure (Narsey, 2010). This information presents a context for incomes from pearl-based livelihoods in various regions of Fiji.

National average annual household (HH) income is FJD 17,394 and ranges from FJD 11,608 per HH per year in rural areas to FJD 23,036 in urban areas. The national median HH income is FJD 12,200 and ranges from FJD 9,573 per HH per year in rural areas to FJD 17,037 in urban areas. The average HH income **per capita** is FJD 3,738 and ranges

from FJD 2,346 in rural areas to FJD 5,071 in urban areas. These HIES income figures are shown in Table 8 below.

Table 8: Total average and median annual HH and per capita income (FJD), 2008-2009 (Fiji Bureau of Statistics 2011).

Location	Household Income		Per capita Income
	Average	Median	Average
Rural	11,608	9,573	2,346
Urban	23,036	17,037	5,071
Total	17,394	12,200	3,738

8.2.2 Modelling the economic benefits of spat and mabé production

Economic modelling of the benefits of spat collection and mabé production was undertaken by Johnston et al. (2020a) ² as a component of research within FIS/2016/060, to better understand production costs and the profitability of mabé farming and spat collection, including viable farm size. The results of this modelling have been incorporated into the economic analysis of FIS/2018/129. The economic model was based on production and sales data collected from mabé farmers and for **spat collection** assumed a farm size of four 100m long lines. Key features of the model for spat collection are summarised in Table 9 below. The economic model used USD and these figures have been reported in both USD (\$) and FJD for the purposes of this study.

Table 9: Economic model for spat collection infrastructure, production costs and revenue in Fiji (Johnston et al., 2020).

Indicator	Result
Farm Size	
No. of longlines (100m)	4
No. of collectors	1,240
Expected number of spat per collector	2
Time from deployment to harvest	12 months
No. of saleable spat produced	2,332
Gross revenue	\$2,648 (5,652 FJD)
Average price per spat	\$1.14 (2.43 FJD)
Annual production costs	\$1,737 (3,707 FJD)
Labour costs (292 hrs @ \$1.26 per hour) (2.69 FJD per hour)	\$368 (785 FJD)
Fuel and energy	\$395 (843 FJD)
Operating costs	\$670 (1,429 FJD)

² Johnston, W.L., Kishore, P., Vuibeqa, G.B., Hine, D. and Southgate, P.C. 2020. Economic assessment of community-based pearl oyster spat collection and mabé pearl production in the western Pacific. Aquaculture 514, 734505.

Indicator	Result
Capital equipment purchase and replacement	\$30 (651 FJD)
Annual return	\$911 (1,944 FJD)
Capital investment	\$1,245 (2652 FJD)
Years to recover initial capital investment	4 years

Labour is not a large component of production costs at \$368 (21%), which amounts to 5.5 hours per week.

The model indicates that a spat collection operation of this size is profitable (after all production costs including owner / operator wages), with an annual profit of over \$911. Given that the median per capita income in rural Fiji is around FJD 2,350 (USD 1,030), the modelling shows that spat collecting offers the opportunity for a substantial boost in incomes with minimal capital investment. In addition, the small labour inputs can be managed in the context of other income-generating activities, including increasing the size and scale of the spat collection operation (where labour and infrastructure is available). Further, spat collection can be leveraged for vertically integrated mabé production where farmers can collect spat at a lower cost than the price for purchased spat, as well as value-adding through pearl handicraft activities.

For **mabé production**, the model assumed a farm size of two 100m long lines. The key features of the model for mabé production are shown in the Table 10 below. The economic model used USD and these figures have been reported in both USD (\$) and FJD for the purposes of this study.

Table 10: Economic model for mabé production infrastructure, production costs and revenue in Fiji (Johnston et al., 2020).

Indicator	Result
Farm Size	
No. of longlines (100m)	2
Total no. of oysters	3,060
Total no. of harvested oysters	2,000
No. of saleable pearls produced	5,400
Time from implant to harvest	12 months
Gross revenue	\$49,754 (106,190 FJD)
Average price per pearl	\$9.21 (19.66 FJD)
Annual production costs	\$6,870 (14,663 FJD)
Spat purchase (2,217 units @ \$0.48 (1.02 FJD))	\$2,616 (2,261 FJD)
Nuclei purchase (6,002 units @ \$0.16 (0.34 FJD))	\$860 (2,040 FJD)
Labour costs (292 hrs @ \$1.26 per hour) (2.69 FJD)	\$1,308 (3,518 FJD)
Fuel and energy	\$447 (954 FJD)
Operating costs	\$462 (962 FJD)
Repairs and maintenance	\$366 (781 FJD)
Capital equipment purchase and replacement	\$811 (1,730 FJD)
Annual return	\$42,884 (91,527 FJD)

Indicator	Result
Capital investment	\$7,319 (15,621 FJD)
Years to recover initial capital investment	3 years

Labour is the largest component of production cost at FJD 3,518 (25%), which amounts to 20 hours per week, followed by purchase of spat at FJD 2,261 (20%).

The model indicates that a mabé farm of this size is profitable (after all production costs including owner / operator wages), with an annual profit of over \$42,000 (91,500 FJD). Given that the median per capita income in rural Fiji is around FJD 2,350 (USD 1,030), the modelling shows that mabé farming offers the opportunity for a substantial boost in incomes with minimal capital investment. In addition, the small labour inputs can be managed in the context of other income-generating activities, including increasing the size and scale of mabé farms (where labour and infrastructure is available).

8.2.3 Livelihoods diversification and income generation

Participants in the FIS/2018/129 IAS were asked about the range of income-earning activities that members of their household engaged in and this revealed both a diversity of income sources as well as a reliance on multiple income streams. Discussions with indigenous community groups identified a range of income sources including fishing, vegetables, kava, cassava, pigs and weaving, in addition to spat and mabé-related activities.

Members of the MOP handicraft groups were also interviewed about their sources of household incomes and Table 10 below shows the range of income generating activities. Of the 12 women participants in the MOP handicrafts groups who were interviewed, only one indicated that this was their primary source of income – the remainder identified a variety of income earning activities as their primary source of income including farming (4) and part-time or casual wage jobs (4). In relation to farming, this included a variety of crops including taro, yams, cassava and kava. Paid jobs and small family businesses were mostly held by husbands and included carpentry, plumbing, and fishing while women sold food, ran small canteens, produced coconut oil, woven mats and tapa. Table 11 below shows the range of income generating activities.

Table 11: Income generating activities in households Fiji.

Income generating activities	Number
Farming	12
Fishing	5
MOP handicrafts	6
Other handicrafts (wood, mat weaving, jewellery)	4
Self-employed (carpentry)	1
Family business (food van / canteen)	1
Food (cakes, snacks and other prepared foods)	6
Wage job (health worker, plumber)	8

Of the 12 female handicraft makers interviewed, 9 provided information on monthly income and annual incomes (Table 12). Individuals provided best guestimates of their monthly income from various sources and on the household's annual income from all sources.

Table 12: Income range from all sources of income Fiji.

MOP handicraft makers	Monthly income range - all sources N=9	Annual income range - all sources N=9
TOP	450 – 1,400	4,000 - 10,000

The estimated monthly income ranged from FJD 450 to 1,400 and averaged FJD 750 across the group. It should be noted that this data was collected in April 2019 and will reflect seasonal or other factors at this time.

Respondents also provided estimates of annual household incomes from all sources from all members of the household and this ranged from FJD 4,000 to 10,000 with an average across the group of FJD 8,100. This average is less than the average for rural households of FJD 9,573 reported in the 2008-2009 HIES.

Individual interviews were not able to be conducted with community groups due to COVID-19. While discussions in focus groups with community spat and mabé producer groups did not ask participants to estimate household incomes, information was provided on potential incomes from various sources. Typically, households can earn up to FJD 200 per day from fishing and FJD 150 per week from vegetables, with a potential annual household income of up to FJD 10,000 from these two sources, if they caught / harvested and sold regularly (depending on seasons). Households will also have income from sources such as kava and weaving. Incomes from pearl-related activities are discussed further in the section below.

While it is not possible to estimate incomes from spat collection and mabé production on an individual or household basis, individual income from mabé handicrafts for a 6-month period in 2018 ranged from FJD 320-770. While this represents a very small proportion of reported household incomes (less than 10%), it should be noted that the income-earning potential of this activity has not yet been fully realised.

In addition to household and individual incomes from these activities, communities also raised collective incomes through groups (men's, women's and youth groups). For example, the Women's Club in Dreketi village at Qamea grow and sell vegetables and kava as a group. Kava sales alone brings FJD 200 a month for the group. They are planning to establish a village store and aim to raise funds from vegetables, kava and mabé-related activities to achieve this. Similarly, the youth group in Viani grow and sell vegetables and kava to raise funds for community projects.

8.3 Income from pearl-based activities in Fiji

Spat and mabé farming and MOP handicraft production is now providing a substantial supplementary income for women, youth and communities engaged in pearl-based enterprises. While the supplemental incomes received from pearl-based activities may be small, given the average Fijian rural household income is FJD 5,800, they remain a significant contribution towards household incomes.

8.3.1 Income from spat

Spat production by community-based farmers provides a supplemental income to village community producer groups. FIS/2014/060 monitoring data shows that sales incomes from project sites ranged from FJD 500 to FJD 4,000. Generally, harvests occur once a year. While this data does not include production costs, economic modelling (Johnston et al., 2020a) of a similar-sized operation shows that non-labour production costs (such as fuel) represents about 50% of sales. Thus, a spat collection site with sales of FJD 2,400

will net FJD 1,200 before labour costs. Capital costs, which were subsidised by the project, are also significant – the economic model shows that capital cost represent 50% of annual sales revenue. Sales data for spat collected at various sites in Fiji for the period is shown in Table 13 below.

This information shows sales data only and does not include information on capital and annual production costs (subsidised by the project), or the number of farms and workers involved in production, and it is not possible to indicate, on the basis of this data, the income paid to individual workers or their families.

Table 13: Spat Sales, Fiji (2013-2018).

Site	Year	No. Harvested	Total Sales	Average price
Tavulomo	2013	2,000	\$4,000	\$2.00
Natuvu	2016	650	\$1,300	\$2.00
Natuvu	2018	900	\$2,250	\$2.50
Namarai	2017	260	\$520	\$2.00
Nacoubau	2017	444	\$888	\$2.00
Raviravi	2017	1,200	\$2,640	\$2.20
Ravita	2018	2,000	\$1,975	\$0.99

8.3.2 Income from mabé

Mabé production by community-based farmers also provides a small supplemental income. The market for raw mabé is primarily to handicraft makers. Currently community village mabé producers sell MOP shell and raw unworked mabé to women's handicraft producer groups. Some of the purchase of this mabé has also been subsidised by FIS/2016/060 who monitor the supply and demand between farmer producers and handicraft makers.

Income data provided by FIS/2016/060 shows that sale incomes ranged from FJD 800 to FJD 2,200. This data also does not include production costs. However, as the scale of production is much smaller than that used in the economic modelling by Johnston et al. (2020), it is not possible to estimate the non-labour production costs for these farmers. Johnston's (2020a) economic model suggests that for a mabé farm with annual sales revenue of FJD 50,000, the non-labour production costs represent just over 10% of mabé annual sales revenue and capital costs of 15%.

Sales data for mabé produced at various sites in Fiji for the period 2017-2019 is shown in Table 14 below.

Table 14: Mabé Sales (FJD), Fiji (2017-2019).

Site	Year	Pt. penguin	Total Sales	Av. Price	Pt. marg.	Total Sales	Av. price
Natuvu	2017	30	\$800	\$26.66			
Raviravi	2017	60	\$2,200	\$36.66	22	\$1,600	\$72.72
Raviravi	2017	24	\$735	\$30.62			
Ravita	2019		\$1,830				
Qamea	2019					\$1,795	

This information shows sales data only, and does not include information on production costs, or the number of farms and workers involved in production, and it is not possible to indicate, on the basis of this data, the income paid to individual workers or their families.

8.3.3 Income from MOP handicrafts

In Fiji, two women's handicraft workshops using machinery produce most of the MOP handicrafts for sale. These are Marama Shell craft Fiji located in the town of Ba, Viti Levu and Nasomo Ra Marama Handicrafts (NRMH) in Somosomo, Taveuni. A further four community groups have received training in handicraft production using hand tools in the villages of Raviravi, Ravita, Viani in Vanua Levu and Dreketi in Qamea. These groups have a smaller base of production and sales.

Income from sales of handicrafts at MSF is paid to individuals as an amount based on their participation and production – bi-annual payments to participants ranged from FJD 320-770.

Annual sales figures from the time of establishment for the years 2016-2019 provided by FIS/2014/060 are shown in Table 15 below. The sales for 2019 show an increase of 46% over 2018, and this corresponds with the commencement of sales to Jacks of Fiji P/L., a large retail chain in Fiji selling jewellery, handicrafts and apparel.

Table 15: MOP handicraft sales (FJD), MSF (2016-2019).

	2019	2018	2017	2016
Sales	14,703	10,027	na	na
Distribution to members		3,062		

Although the project has subsidised the set up and operational costs for this group, and they are not yet fully self-sufficient in terms operating costs, the income distribution model seeks to reflect this by returning one third of sales income to participants, with two thirds retained by the group to cover operating and capital costs. While this significantly reduces the payments to individuals, it is appropriate given the real costs of the operation.

The Nasomo Ra Marama Handicrafts (NRMH) at Somosomo, which is still receiving training, have commenced product sales and as at February 2020 recorded FJD 3,000 in sales. Information on income payments to individual participants is not available.

Like the MSF group, the set up and operational costs of the NRMH group have been subsidised by the project and the group intends to distribute income to individuals using the MSF model, to provide for future operating and capital costs.

Handicraft Market Constraints

Access to markets remains a constraint to the sale of handicrafts in Fiji. This is consistent across women's handicraft groups within village communities and within workshop-based groups in peri-urban areas. Project FIS/2014/060 final report indicated that efforts had been made to assess potential overseas markets for pearl shell products however none were successfully established. Market analysis concluded that the design and quality of products was not yet commercially viable for export markets and that the focus should remain on the domestic tourist market in Fiji, despite competition from cheap imports. Future emphasis will be placed on developing the potential for web-based sales and investigation of private sector engagement. Recent negotiations with Jack's Handicrafts of Fiji (a major handicraft and souvenir retailer) have led to a substantial order and planned launch of shell handicraft from MSC products at Jack's stores

The training centre at Somosomo (Taveuni) is closely associated with Civa Pearls (round pearl producer) which has a pearl boutique, farm sales and internet sales of its round pearl products. Civa Pearls will have input to product design and there are obvious advantages relating to access to markets for these products.

Despite access to markets being a current major constraint on the income generation from MOP handicrafts there are potential opportunities yet to be explored such as web-based marketing sales of Fiji-made products and cruise ship sales.

Income Distribution

Income distribution structures were varied across the research sites in Fiji, depending on the type of pearl-based activity participants engage in, whether they employ other community members to assist, and village cultural norms, customs and priorities.

Handicraft groups

The income earned by MSF members is regarded as individual income, although it is paid from net income (one third of total revenue) after expenses (one third) and reinvestment (one third). Nasomo Ra Marama members indicated that they would apply the same approach to income distribution.

Spat and mabé community groups

The organisation and structure of Indigenous community spat and mabé farmers is influenced by village cultural norms and customs. These determine the level of community support for the activities and the ways in which income will be used.

Income from the sale of spat and mabé generally remains with the group and community and used for community projects. Women in community mabé farming groups maintain income from sales within the group for community determined priorities. For example, in 2019 the Vuanisinu Women's Club (Qamea) sold mabé for FJD 1,795 (before costs) which will contribute to its funds for the planned village store. Some money is used to support families in need within communities and for community assets. The women's group at Raviravi have used the income from the group's mabé sales to extend the community hall and buy a new generator. In addition, the group provides families with an annual subsidy of FJD 50 per child for school fees. Sales income is also used to reinvest in infrastructure such as craft workshops, with this work typically undertaken by workers within the community or group, which retains the indirect flow-on income.

For women who only engage in handicrafts, income flows primarily to households (husbands and children) after funds for operations are withheld from sales.

In community groups where women farm mabé as well as produce handicrafts, sales from raw mabé flow to the group but income from the sale of the handicraft item a woman makes is divided 20% to the group and 80% to the handicraft maker.

Women's groups also employ people from the village to assist with mabé farming – men are paid FJD 20 per day for diving as well as FJD per kg for collection of wild spat, while men and women are paid FJD 10 per day for other tasks. While this is a helpful supplemental income, it usually only involves 2 days per month.

8.3.4 Other economic benefits

Employment opportunities

Employment in pearl-related activities for men, women and youth

While the project activities provide a range of direct employment opportunities, such as farm labour (checking and cleaning lines, harvesting, boat skipper etc.) or handicraft making, the project sites also created employment opportunities in related areas. For example, MSF has employed one of the women in the group as a workshop supervisor, and community groups have employed local workers to construct workshop facilities.

Development of diversified income streams

A positive by-product of increasing community incomes has been the development of the capacity to initiate community projects that will diversify the community's income, such as

purchasing a boat that can also be used for fishing or developing a village store. The women's group at Ravita hire out their boat for FJD 10 a day, which provided an annual income in 2018 of FJD 190.

Savings

Mabé farming groups all have bank accounts for income earned from production. These funds will be used for specific community priorities such as building a community hall, equipment such as a generator, providing educational support to families for children's schooling, building paths within the village or a village shop.

The MSF handicraft group has its own bank account and intends to keep one third of its revenue for reinvestment. In addition, a number of MSF members indicated that they intend to save between 10% and 30% of their income from their handicraft work.

Assets

Assets for mabé production

Infrastructure for mabé and handicraft groups is provided by the project, Ministry of Fisheries or through a commercial round pearl farmer. Some groups reported re-investing in equipment but were still reliant on Fisheries and project staff for replacing specific items such as repair of grinders or saw blades or supply of new lines.

As the income distribution model for handicraft groups is based on reserving one-third of sales income to contribute to maintenance and repairs and one-third for future investments, then as these groups develop, their capacity to increase assets will improve.

Assets for personal and community use

For community-based groups, where income from the project's pearl-related activities is treated as a collective income, the groups have reinvested, or plan to reinvest, the income in community assets, either in repairing existing assets or developing or acquiring new assets.

For groups where the income is regarded as individual income, there is not a focus on using the additional income for personal assets, rather on saving, school expenses, family or special events (weddings) and donations to the church (tithing).

Grants

Three groups (mabé and handicrafts) were actively engaged in applying for funding to other agencies to support the expansion or ongoing development of their enterprise.

8.4 Socio-cultural impacts of mabé livelihoods in Fiji

Five key socio-cultural impact areas were examined in Fiji (Appendix 1): opportunities for participation and inclusion; skills and knowledge; relationships and networks; self-confidence and wellbeing; and cultural compatibility. Findings from each of these indicator areas are presented below. Gender and age differentiated impacts are integrated into the discussion following the table. Given that the majority of mabé and handicraft producers in Fiji are female, information regarding males is limited and derived from contributions made through focus groups and from interviews.

8.4.1 Participation and inclusion

Mabé-based livelihoods in Fiji involve a broad range of individuals including men, women, youth and individuals from different cultural groupings. While some roles in production require certain characteristics, a range of roles can be performed by younger and older people, by men or women. While women had taken a lead role in oyster farming and handicrafts, men have participated in community-based enterprises in a range of tasks

(diving, harvesting, cleaning, lifting oyster lines), making this an ideal community enterprise. Youth with good eyesight and manual dexterity are better suited to implanting oysters suggesting some specialised roles require specific training and practice. One spat and mabé farming group explained that although only women worked on spat and mabé, everyone helps out, men and women together as needed.

Marama Shellcraft Fiji (MSF) handicraft group in Ba demonstrated that women from both iTaukei and Fijian Indian ethnic backgrounds were engaged in pearl handicrafts as an income earning activity. This was the only group in Fiji with women from diverse ethnic groups.

8.4.2 Skills and knowledge

Skills and knowledge form the basis for human capital and are pre-requisites for engagement in economic activity. The extensive technical training program developed by the ACIAR project team has been highly effective in delivering the skills and knowledge required for successful spat and mabé production and the development of handicraft skills in Fiji.

Four spat and mabé producing community groups included in the study demonstrated the capability successful culture and harvest spat and mabé. However, all four groups visited indicated they needed ongoing support by the project team or Ministry of Fisheries officers in areas such as oyster implanting, oyster husbandry, disease management or practical assistance with boats. Pearl farmers and shell-craft makers who operate in a group or community context might also benefit from additional training in organisational management and business development, understanding models of governance and group dynamics and how to optimise identification and engagement with potential markets.

Handicraft training enabled women from four women's groups to produce MOP / mabé products suitable for sale within a period of 12 to 18 months, however intensive ongoing training is needed to improve quality of products and design values. Two groups have been provided with training to use machines for production and two village groups to use hand-tools. For example, between 2017 and 2018 the MSF group received a total of 97 days of training, 84 days in handicraft skills and 13 days in enterprise development and sales. To date external trainers from New Zealand and Australia have provided specialised handicraft training. Consideration could be given to developing capacity for handicraft trainers and training organisations within Fiji in future projects.

Machine-based vs hand tool production of handicrafts have differing advantages and disadvantages. Machine-based crafts require access to a secure workshop with access to power and ongoing maintenance of machinery with a limit of 10-12 trainees per workshop and makes working with MOP shell physically easier and more time efficient. Hand tools are more portable and suitable for rural remote areas and can be used by more people within a community however are more time intensive. In both cases access the replacement of equipment can be difficult without project or Ministry of Fisheries support.

As with any craft, mastery at a higher level requires practice and ongoing skill development training. Some women are more adept at handicrafts, particularly those who have previously been involved in traditional crafts such as weaving or making tapa, however all women were able to produce items suitable for sale. Within the group that has been operating for the longest period of time (MSF: 5 years) women have begun to specialise in producing specific items which enables higher volume of products and improved quality. In one community, men were also involved in the design of handicraft items drawing on knowledge of traditional carving designs and were interested in having opportunities to be more involved.

As handicraft groups gained proficiency in handicraft skills the need for training and capacity development in other areas emerged such as record and book-keeping, workshop management and maintenance, marketing and sales, quality control and supply and governance and small business training. The project has begun to introduce a range

of training opportunities within groups as they become relevant to the group. Further opportunities to forge connections with existing training organisations in Fiji may be helpful in relation to such training over time.

8.4.3 Relationships and networks

Spat and mabé farming offered opportunities for men, women and youth to work together in a collaborative manner. While men and women often have differing roles and responsibilities spat and mabé farming offered opportunities to work and spend time together. Although the spat and mabé farming production was allocated to a specific group within a village (women or youth), the activities enabled a broad range of people, male, female and youth to participate in production activities at various times. In spat and mabé farming communities the women's groups were actively supported by males in the village. All women's spat and mabé farming groups indicated a reliance on men in the community, male Ministry of Fisheries officers or a local round pearl farmer to assist with some of the heavier sea-based activities. In some cases, women's groups were able to employ men including youth, in roles as boat skippers or divers. These relationships were mutually valued arrangements within the community. Some men in villages indicated they would like to have men's groups engaged in spat and mabé production. In the youth community both young women and men had designated roles within the group and worked together to learn the skills for production.

The ACIAR project has facilitated local partnerships to develop enterprise links within regions and between groups. A local round pearl farmer (CIVA Pearls) who has established relationships with local indigenous village communities has assisted a village women's spat and mabé group with the provision of oysters as well as support with the maintenance of oyster lines and implanting. He also liaises with the nearby women's community handicraft group in a range of support roles such as handicraft workshop development and maintenance, marketing and sales of products. Mutually beneficial relationships within regions or between communities are essential for ensuring not only a functional supply chain but amenable and beneficial working relationships between actors in the supply chain.

The project has enabled village communities to develop ongoing relationships with Ministry of Fisheries officers who regularly visit communities to monitor aquaculture activities and assist the project team with training as well as to begin to form networks between women's farmer groups and handicraft groups. Some groups are participating in regional craft shows increasing their networks and community profile. Project staff have facilitated and supported women's groups to identify and access grant funding through agencies such as the Ministry of Fisheries or Ministry of Women.

However not all partnership arrangements worked constructively. Issues around governance, ownership and control of resources and income became issues of considerable intractable dispute between one urban handicraft group and the women's association under which they were auspice. Despite efforts to resolve these issues between local parties a number of issues continue to hamper production and sales from this group. The women in this group expressed a strong desire to become an independent small business enterprise and continue to work towards this outcome in time. Such situations highlight the need for the development skills and procedures for dispute resolution between groups or potentially within village groups.

8.4.4 Self-confidence and wellbeing

In research literature, wellbeing can be expressed in terms of the experience of health, self-esteem, happiness, prosperity, life satisfaction and sense of meaning or purpose. The idea of well-being is frequently conflated with concepts of happiness, quality of life and life satisfaction. Well-being is a complex, multi-faceted construct that is challenging to measure (Medvedev and Landhuis, 2018). A multitude of quantitative instruments are available for researchers to measure each of these concepts. For this impact assessment

it was not feasible to explore well-being in a wholistic or comprehensive manner through quantitative measures. Non-the-less we were interested in understanding if and how participation in mabé pearl farming and handicrafts had contributed to individual's subjective sense of wellbeing. A number of questions were integrated into semi-structured interviews and focus groups seeking to understand individual experiences and perceptions of benefits gained from participation (psycho-social, economic or material).

Women farmers and handicraft makers alike expressed high levels of satisfaction and enjoyment in learning a wide range of new skills. Some women spoke of gaining confidence through learning and though successfully producing and selling handicrafts. As one woman explained:

"Before when we were at home we used to come into town for shopping and then go home, now I have no fear, I can go anywhere, to meet people, to sell our products, to engage people - with women's empowerment, us ladies, I know I can manage myself, I can manage my life, I can do any job, I can make it, I can sell."

Others gained satisfaction from making beautiful objects. They enjoyed the mastery of machine and hand tools which they associated with men's work and extending their existing handicraft skills. Although a primary motivator for most women handicraft makers was earning money, all enjoyed the opportunity to extend their creativity to a new medium (mother of pearl shell). Women farmers in a community context also expressed a strong desire to become proficient and independent in their pearl farm management over time.

For some handicraft makers the opportunity to attend handicraft groups alleviated isolation and the boredom associated with domestic life and they formed friendships from the social interaction and supports within the group.

In one handicraft group (MSF) the women had been working together to improve their physical health.

"When I started here, I have changed my life. When I sat at home, I have high blood pressure. When I'm here I have a purpose...We have been going to 'Friend' [community centre] and doing workshops on NCS [non-communicable diseases] - that's the biggest health problem in Fiji. This was part of the program to do this, but it has not happened until now, but the ladies do exercise together, always after prayer - we do moving, drinking more water, less sugar, everything - awareness about health - diabetes. Number one priority health."

8.4.5 Cultural compatibility

Spat and mabé farming enables community members to maintain current livelihood activities in areas such as agriculture and fishing. Pearl-based aquaculture enterprises by women or youth do not present a challenge to customary land tenure systems, disrupt usufructuary fishing rights or women's active role in fishing especially in reef gleaning and inshore fishing as spat and mabé production fits well with the pre-existing structures of coastal village life. Villages included in this study had established community development plans supported by district development committees and village councils. This structure for rural development in Fiji means that villages already have pre-existing working groups and governance structures within which the ACIAR mabé pearl project could easily integrate. These groups engage in projects and fundraising for initiatives such as sea wall building, forestry, building infrastructure (community centres) etc. This means traditional decision-making structures and hierarchies within the village are already established unlike in externally formed heterogenous groups such as Marama Shellcraft Fiji that needed to develop operational protocols and group norms. Bringing together individuals from different cultural groups can increase the time taken by the group to develop ways of working together. A handicraft group participant explained that:

"Even though we have different races the ladies have commitment and determination. It is not easy. It's been 4 years and they are still together. Difficulty with different cultures,

belief systems and background is difficult but [we] still have a commitment. Despite differences between ladies the commitment is still there. (Female handicraft maker)

In all the women's groups some members were already engaged in the informal economy producing handicrafts for home and sale (Tapa and woven mats), commonly working in small groups with other women. Although the majority of handicraft makers in Fiji are women, some men in village communities indicated they had been involved in design of MOP handicrafts based on traditional designs used in wood carving. Women at MSF were beginning to incorporate traditional Polynesian weaving techniques into handicrafts as shown below (see Fig 3). The item on the left was produced by Ana Baravi Ranitu from MSF. The item on right is a reproduction from the Museum of New Zealand Te Papa Tongawera online collection of Tā'iri (fan) from the Cook Islands.



Figure 4: Mother of pearl woven fan produced at Marama Shell craft (left) and Tā'iri (fan) from the Cook Islands from Museum of New Zealand Te Papa Tongawera online collection.

<https://collections.tepapa.govt.nz/object/468714>

8.5 Women's empowerment through mabé-based livelihoods Fiji

Women were identified as specific populations of interest for this study. ACIAR project FIS/2014/060 objectives sought to expand pearl and mother-of-pearl (MOP) handicraft production by community and women's groups and examine socio-economic aspects of half pearl culture in Fiji. A number of empowerment indicators were developed to consider benefits of mabé-based livelihoods for women (Appendix 1). These included women's access and control over resources and income, decision making about productive assets, time and workloads, changes in community perception and leadership opportunities.

8.5.1 Access and control over resources and income

Infrastructure and equipment provided to women's groups by the FIS/2014/060 are considered resources of both the production group and broader community. This is likely to be associated with resource management practices associated with traditional ownership of fishing grounds (l qoliqoli) by coastal community units. Land and fishing areas are defined and owned by a clan that regulates the use and management in the area (Mathews, Veitayaki, Bidesi, 1998) While production resources (pearl lines, chaplets handicraft tools), belong to the farming or handicraft group they have been jointly maintained with assistance from the project team and Fisheries officers. Gradually as groups become more productive and gain income there are greater expectations that they will purchase replacement equipment or materials. There is some reluctance from some groups to do this and for those who are prepared to re-invest some difficulties have been encountered in accessing specific equipment such as saw blades, machinery or beads for implanting. Mostly, groups have a strong desire to move towards independence and self-

sufficiency in their pearl-based enterprises. At the time of this study some groups were still being subsidised by the ACIAR project though the purchase of subsidised MOP shell or raw mabé. This is being addressed by linkages between farmer groups and handicraft makers however this is unlikely to be resolved until fully until markets for products are firmly established.

A key issue for village farmer groups was the distribution of income from sales of spat and mabé. As is customary the money is channelled into the community economy for village projects rather than to individual women or households. This offers some protection to the women's enterprise from husbands or others seeking access to income. While women in the community groups indicated they contribute to decisions about how income would be used, (e.g. purchase of generators, saving for community hall, school fees support) the community priorities remained primary. In this sense women's labour contributes to the community economy rather than to their own or household's income. When the women's village group also made MOP handicrafts, some groups had determined that 20-30% of income from the sale of MOP handicrafts would go to individual makers and the remainder to the group to cover supplies. This was a welcome arrangement for women in these groups.

8.5.2 Decision-making

Each group has their own processes for making day-to-day operational decisions about production. These are often made in collaboration with the project team, Fisheries officers and community leaders. Once groups have become confident in production, they are increasingly independent in decision making.

"We are looking forward to being independent. We want to change this into a real business [Handicraft maker, MSFC]."

At the household level, handicraft makers who derived some income from handicrafts reported different practices for making household decisions about household income. Most decisions made were made by husbands and wives together or in a small number of cases by husbands only. A small number of widows made decisions alone or with other family members. Those whose husbands made most decisions about the use of money were less able to report on monthly and annual household income.

In spat and mabé farming groups decisions about the use of income were tied to community priorities determined at a community level

8.5.3 Workload and Time

Women in coastal communities work long hours to care for their families and engage in subsistence farming, fishing or handicrafts activities. While time-use studies were not included in all field site studies, a mapping activity of time use for women was explored in one village group. This indicated women worked long hours within households in addition to farming or fishing activities. Despite this, women indicated that the additional work from spat or mabé farming and handicrafts was manageable. Some women simply continued to undertake all their usual responsibilities and a few were successful in changing the allocation of work responsibilities within households. For example, one handicraft maker indicated she had renegotiated household responsibilities with her husband as a result of the confidence she had gained and the income her work was providing to the family. She said:

"My husband used to say this girl is hopeless, doesn't know anything. Now my mother in law says she is my daughter she is the best. She can do anything [Handicraft maker MSC]."

However, another woman in the same group had not experienced such support from family as she explained that she needed to interrupt her handicraft work to bring her husband food for lunch each day and then return to the workshop.

8.5.4 Community Perception

The capacity to generate income and engage in work outside of the home contributed to women's perception of themselves as well as to their standing/ status in their own community and in some cases own families.

When I started working here [handicraft centre] I now feel more confident and more independent. When I was married, I was just a housewife in my village so when I came here now they know me as a working woman. In my family we didn't get the value that we get now. Before the husband and the children they will know the mother is at home and she will do all the work but now we have some value at home, my husband always helps me to finish the work so I can come here [handicraft workshop] and my children are helping me when they come home. Now my husband and my children know I am busy working outside the home. [Handicraft maker MSC]

Statements from men in mabé producer villages indicated high value was placed on pearl farming and handicraft ventures within their community. Individual women spoke of improvements in familial relationships as a result of participation in spat and mabé production. They felt they were making a contribution to their household and some gained respect from husbands.

Sometimes at home we don't have money and the husband is not working - we can help them. We learn some skills here to produce something to sell and help them at home. Something for our-self and family.

Local and regional recognition of women's group achievements has attracted grant funding to support workshop facilities in village communities from the Ministry of Fisheries, raised the profile of women's enterprise activities locally and created opportunities for linking with local and regional tourism hubs.

8.5.5 Leadership of pearl-related enterprises

Handicraft and women's farmer groups offer some opportunities for women to take on specific leadership roles within the groups and as well as representing the group within the community village structures. These can be formal governance roles such as president or secretary or taking on specific roles within the group such as responsibility for marketing or liaising with suppliers. For many women who have primarily engaged in the informal economic activities, leadership opportunities have been limited to family or village community contexts.

A precursor to leadership for women may be gaining confidence in their own lives. Women spoke of developing confidence to speak up or talk in their handicraft or farming groups, and then in their hierarchical community structures. A few women were able to be more assertive in their home. A few women had been able to reduce the burden of housework within their family by re-negotiating household roles.

As the number of farming groups expands and women develop enterprise linkages between groups and across markets, opportunities for women's leadership could be expanded through the development of linkages to external organisations, networks, training organisations, or supporting the development of an entrepreneurial hub or women's mabé farmers association.

9 Socio-economic impacts of mabé-based livelihoods in Tonga

9.1.1 Mapping pearl-based livelihoods in Tonga

Aquaculture is one of the top development priorities of the Tongan Government and comes under the Ministry of Fisheries (MF). Aquaculture operations in the Kingdom have mostly been undertaken as part of research and development (R&D) activities. Current priority areas include giant clams and mabé production. Mabé farming is a well-established sector with second-generation farmers. Farms have been established in Vava'u, where the activity started, and more recently around Tongatapu and Ha'apai. The mabé sector is well structured, with an ongoing research program. Development objectives for mabé production include upgrading hatchery for use for mabé production, developing a scheme for providing equipment to farmers at a lower cost and developing and improving methods for spat collection. The Ministry of Fisheries is choosing to continue long term research and development, within and beyond the timeframe of the current development plan (2018-2022), to improve the feasibility of high benefit commodities such as mabé (Kingdom of Tonga, National Aquaculture Management and Development Plan 2018–2022)

The key players in the mother-of-pearl supply chain in Tonga include mabé pearl farmers, MOP shell handicraft makers, people employed by farmers to work on pearl farms or produce handicrafts, input suppliers such as the ACIAR project team, Ministry of Fisheries, other NGOs or donors, resort operators and intermediary distributors (people who sell MOP shell and / or handicraft products for farmers and craft makers). Currently the ACIAR pearl project and Ministry of Fisheries provide input equipment, materials, training and support for farmers and handicraft makers. The costs associated with these inputs should be progressively taken up by famers and handicraft makers and Ministry of Fisheries prior to the completion of ACIAR-funded research project activities.

Mabé farming in Tonga occurs across three island groups. In 2019 there were 17 pearl farms in Tonga (11 Vava'u, 3 Tongatapu, 3 Ha'apai). Spat is provided to farmers by Ministry of Fisheries from the hatchery in Tongatapu developed and supported through research partnerships with ACIAR projects. In Tonga the majority of farmers are also handicraft producers. There are approximately 20 MOP handicraft makers selling products in Tonga. ACIAR projects have provided training to mabé farmers and handicraft makers through workshops and on-farm extension activities.

The main requirements for mabé pearl farmers include access to spa, timely training in mabé pearl grow out and husbandry, access to training manuals and equipment for implanting, access to boats, capacity to swim or dive or capital to employ labour, costs associated with farmer registration and licences and access to markets for shell (if not producing handicrafts themselves). Proficiency is developed over 12-18 months however this may take longer dependent upon access to training and farmer knowledge. In Tonga farmers rely heavily on Ministry of Fisheries aquaculture officers and ACIAR project support for access to spat as well as assistance with maintenance and grow out of oysters as they are learning. Some farmers are beginning to harvest wild spat.

The main requirements for MOP shell handicraft include access to skills training over time 12 to 18 months, equipment for shell handicraft production (hand tools and power tools), workshop space / storage and markets for sale of products. A Pearl Information Centre and Workshop (PICW) was established in Vava'u in 2017, as a joint initiative of the Ministry of Fisheries and Ministry of Commerce, Consumer, Trade, Innovation and Labour (MCCTIL). This development was facilitated by the ACIAR project. Power tools and other equipment for the PICW have been provided by DFAT and the project. A total of four MOP

handicraft workshops have been conducted. The MAFFF has recently appointed a Fisheries Marketing Officer who will work with project staff to identify and establish market options for Tongan pearl products.

Pearl farmers and shell-craft makers who operate in a group context could also benefit from training in organisational management and small business development; understanding models of governance and group dynamics as the operations of the pearl centre are increasingly administered and by the Pearl Farmer Association.

Individual or small family pearl farmers face challenges including ongoing support from Fisheries extension services that are in high demand, inconsistent supply spat, availability of equipment and materials, maintenance and replacement of equipment, changing regulatory arrangements such as introduction of Special Management Areas, increasing costs of licences and theft of oysters.

Limited markets are the main constraint to both individual, family or group handicraft makers. Vava'u has the most consistent market for handicrafts as a result of the establishment of the retail outlet within the Pearl Information Centre and workshop in Vava'u and the volume of tourists from cruise ships. Current markets include wholesale and retail domestic markets. Individual farmers and handicraft makers are exporting raw MOP shell and handicrafts for sale through internet sales and directly through international travel to NZ, Australia and the USA. These are primarily as gifts but also for sale through family members. It is difficult to establish the volume of handicraft product sales outside of the Pearl Information Centre.

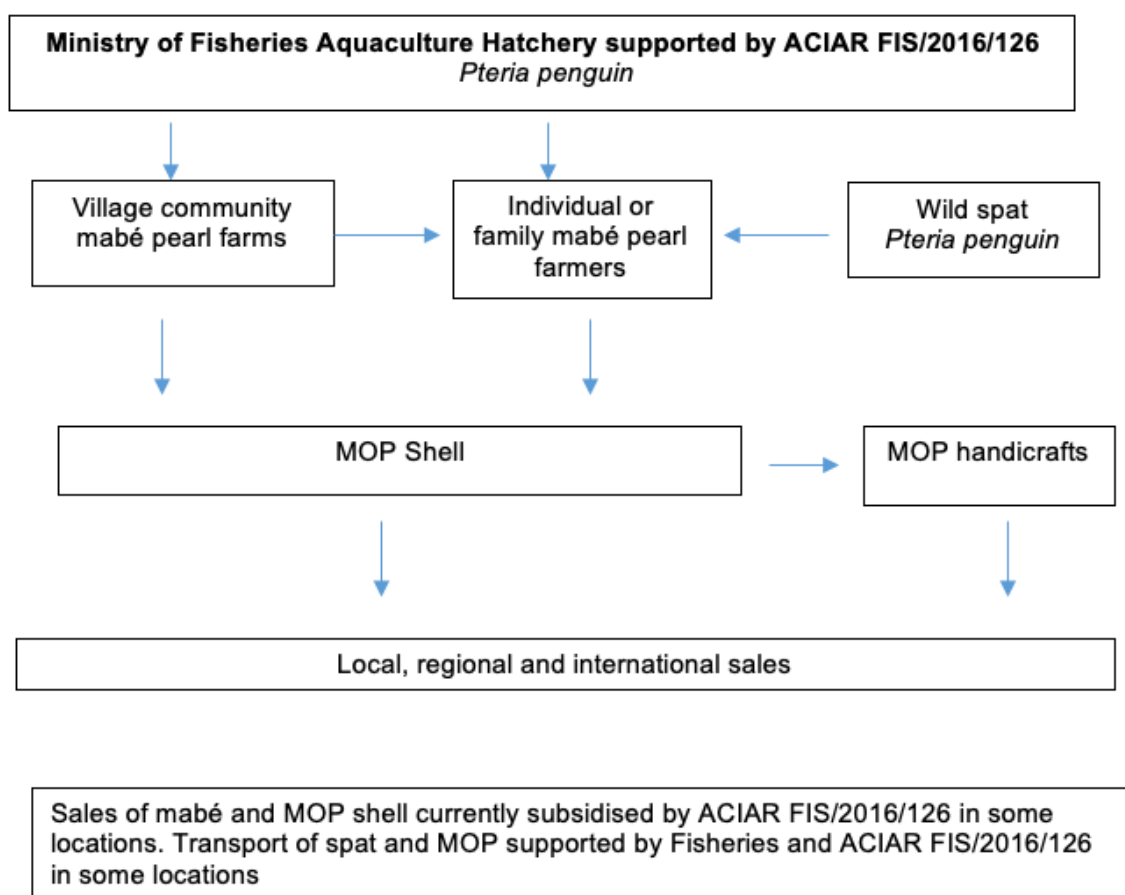


Figure 5: Pearl based livelihood operations in Tonga.

9.2 Economic benefits of mabé-based livelihoods in Tonga

9.2.1 Household incomes in Tonga

The most recent Household Income and Expenditure Survey (HIES) report for Tonga was produced for the period 2015/2016 and provides national and regional statistics on household income and expenditure (Secretariat of the Pacific Community and Tonga Statistics Department, 2017). This information presents a context for household incomes in various regions of Tonga. National average annual HH income amounts to around TOP 32,530. This ranges from a low of around TOP 17,730 per HH per year in more remote areas, up to 37,240 in Tongatapu (urban). The annual national median HH income is TOP 25,000, with a range of TOP 15,300 in remote to TOP 29,800 in Tongatapu (urban). Incomes for Vava'u and Ha'apai where information for this study were collected are reported below in Table 16.

Table 16: Total average and median annual HH and per capita income, by strata (TOP) (HIES - SPC and TSD, 2017).

	HH's		Per capita	
Location	Average	Median	Average	Median
Vava'u	27,190	21,140	5,420	4,080
Ha'apai	23,010	19,420	4,440	3,950

Per capita annual income averages around TOP 5,890 with a national median of TOP 4,370.

9.2.2 Modelling the economic benefits of mabé production

As part of the mabé pearl livelihoods project, economic modelling of the benefits of mabé production was undertaken to better understand production costs and the profitability of mabé farming, including viable farm size³. The economic model was based on production and sales data collected from mabé farmers and assumed a farm size of one 50m long line producing 100 oysters. Key features of the model are summarised in Table 17 below. The economic model used USD and these figures have been reported in USD and TOP for the purposes of this study.

Labour is the largest component of production costs at USD 759 (31%) (TOP 1,719), which amounts to 9 hours per week. The model assumes continuation of the current practice of free supply of spat by the Ministry of Fisheries. Should the Ministry introduce cost recovery for spat supply, this will have a minor effect on profitability.

The model indicates that a farm of this size is highly profitable (after all production costs including owner / operator wages), with an annual profit of over USD 9,000 (TOP 21,000). Given that the median per capita income in rural Tonga is around TOP 4,000 (USD 1,750), the modelling shows that mabé farming offers the opportunity for a substantial boost in incomes with minimal capital investment. In addition, the small labour inputs can

³ Johnston, W., Gordon, S., Wingfield, M., Halafihi, T., Hine, D. and Southgate P.C. 2020. Economic feasibility of small-scale mabé pearl production in Tonga using the winged pearl oyster, *Pteria penguin*. Aquaculture Reports. <https://doi.org/10.1016/j.aqrep.2020.100347>

be managed in the context of other income-generating activities, including increasing the size and scale of mabé farms.

Table 17: Economic model for mabé pearl production in Tonga (Johnston et al., 2020b).

Indicator	Result
Farm Size	
- No. of 50m longlines	1
- Total no. of juvenile oysters	126
- Total no. of seeded oysters	103
- No. of pearls produced	231
Time from implantation to harvest	12 months
Gross revenue	\$11,757 (TOP 26,823)
Average price per pearl	\$50.89 (TOP 116.11)
Annual production costs	\$2,420 (TOP 5,510)
- Spat purchase	nil
- Nuclei purchase	\$43 (TOP 98)
- Labour costs (490 hrs @ \$1.55 per hour)	\$759 (TOP 1,729)
- Fuel and energy	\$308 (TOP 701)
- Marketing	\$588 (TOP 1,338)
- Operating costs	\$235 (TOP 535)
- Repairs and maintenance	\$101 (TOP 230)
- Capital equipment purchase and replacement	\$386 (TOP 879)
Annual return	\$9,337 (TOP 21,243)
Capital investment	\$2,027 (TOP 4,611)
Years to recover initial capital investment	4 years

9.2.3 Mabé livelihoods and income diversification in Tonga

Almost all mabé farmers who participated in interviews indicated that they had at least one primary source of income in addition to income from mabé-based handicrafts. Only two individuals identified mabé handicrafts as their primary source of income. Income earning activities included agricultural activities such as farming (taro, cassava, yams, vanilla, sheep). Four female participants had family businesses involving whale watching and tourist accommodation. Other sources of income included paid jobs such as taxi driving, handicraft trainer (Tonga skills), plantation work, or carpentry, general store, farming, fishing and making other handicrafts (mat weaving, wood carving and jewellery making). Only two households were single headed households. Most mabé farmers involved other family members in mabé farming operations. Some farmers indicated that they saw farming mabé and handicraft production as an opportunity for their children or youth in the community in the future. Table 18 shows the range of income generating activities of interviewees by gender.

Table 18: Income generating activities by gender Tonga.

Income generating activities	Female	Male
Farming (vanilla, kava, livestock)		2
Fishing		1
Mabé farming/ MOP handicrafts	6	5
Other handicrafts (wood, mat weaving, jewellery)	1	2
Self-employed - carpentry		1
Family business – accommodation / whale dive	4	1
Store		2
Wage job (teaching, retail, labour)	1	1

Similar findings regarding income diversity were found by Parks (2017) in a socio-economic survey involving 226 household interviews and 14 community focus group discussions within seven marine Special Management Area (SMAs)⁴ around Vava'u. Seventy five percent of all households surveyed identified at least one secondary occupation or part-time supplemental income source.

9.2.4 Income generation in Tonga

Of the 10 mabé farmer / handicraft makers interviewed only 8 (5F and 3 M) provided information regarding monthly income and 7 about annual income. Individuals provided best guestimates of their monthly income from various sources and annual income from all sources. Business owners were more certain of monthly and annual incomes. Some income streams were seasonal and dependent on the tourism sector (e.g. whale dive businesses, harvests from vanilla or other farming activities or paid contract work). The peak tourism period in Tonga operates from July to October.

Some provided monthly income estimates as a range such as 200-3000 TOP depending on the season. Others provided annual incomes on the basis of income earned during the peak whale season only e.g. 30,000 TOP earned for three months during whale swimming season (female business operator). Due to the lack of consistent reporting of incomes throughout the year and difficulties of estimating monthly and annual income accurately, income ranges rather than mean incomes are reported below in Table 19.

Table 19: Income range from all sources of income Tonga.

Mabé farmers and handicraft makers	Monthly income range - all sources N=8	Annual income range - all sources N=7
TOP	200 - 40,000	4,000 - 50,000 +

Table 20 shows annual incomes range categories by gender. Four of the five women farmer / handicraft makers interviewed owned successful tourism-based enterprises. Three reported incomes in excess of 30,000 TOP and one chose not to provide details of

⁴ SMA's (Special Management Areas) are marine managed areas being used as a community-focused fisheries management and coral reef conservation tool throughout Tonga

annual income. Men were more likely to earn income from farming, fishing, paid labour or other handicrafts. At least four individuals reported generating incomes above the average Tongan income.

Table 20: Annual incomes in range categories by gender (n=7).

Annual Income	Gender	
	Female	Male
0-5000	1	
5001-10000	1	
10001-20000		1
20001-30000	2	
30001 – 40,000		1
40,000 – 50,000 +	1	

9.3 Income from mabé-based activities in Tonga

Information on incomes from mabé pearl-based activities were gathered from mabé farmers and handicraft makers through interviews and surveys, Ministry of Fisheries monitoring data collected from the Pearl Information Centre in Vava'u. Sales of mabé handicrafts by market vendors, retail outlets and resorts in Tongatapu were not included in the scope of the IAS. Only one female mabé farmers in Ha'apai had sold mabé to a local handicraft maker for sale at the time of data collection.

Incomes from pearl-based livelihoods are a secondary source of household income for most farmers and families. The 2017 Annual Production Survey indicates that of 15 farmers, only three regarded pearl farming as their primary income source. This was supported by our discussions with producers.

Reported incomes from mabé handicrafts for individual producers varies markedly. Sales figures for the Pearl Information Centre indicate that total sales incomes for individual producers range from TOP 90 to TOP 8,110 for the period July-September (encompassing the whale-watching / tourist season), with two producers accounting for 61% of sales income.

In addition, the most recent figures available from the Ministry of Fisheries Annual Production Survey 2017 (unpublished report) show that 15 farms produced 4,235 saleable pearls, with a total value of TOP 628,000 and an average of TOP 41,860 per farm. In 2016, 14 farms produced a total of 3,840 pearls with a total value of TOP 467,000 and an average of TOP 33,350 per farm. Over 90% of the mabé reported in this survey was sold as worked mabé. Given that the average annual household income in Tonga is TOP 32,540 (27,190 in Vava'u) production of mabé handicrafts is a significant supplementary income for producers and their families.

Information gathered *directly* from farmer / handicraft makers in Tonga about income gained specifically from mabé-based activities varied as some had not yet harvested shells (1F) or been trained in handicrafts (1M, 1 F) or sold products that had been made. Two individuals provided an estimate of the proportion of total income generated from mabé-based handicrafts as 5% (F) and another as 12-15% (M). Only three people interviewed (1M, 2F) reported that mabé handicrafts were their only source of income. The range of monthly incomes reported from the sales of MOP handicrafts at the time of interviews were 200-1,990 TOP per month. Income from the sale of mabé generally remains with the individual farmer / farm family and flows to the households.

Incomes from mabé production

The Ministry of Fisheries has conducted annual production surveys since 2015. The 2018 and 2019 survey reports had not been released at the time of the study. Key findings from the 2017 survey, *Tongan Mabé Pearl Industry, 2017*, are summarised in Table 21 below. Note that the questions relating to pearl pricing appear to mostly relate to **worked mabé** rather than raw mabé as only 7% of the mabé was sold as raw mabé, with a very small proportion sold 'on the shell'. The data shows that the average gross income per farm is TOP52,333, while the average income per person engaged in pearl production is TOP14,900. It should be noted that as the survey report does not provide information on production costs, the net income is not reported.

Table 21: Mabé Production, Tonga, 2015-2017.

Indicator	2015	2016	2017
No. of farms surveyed	not stated	14	15
No of farms in production	4	12	12
Total length of longlines (metres)	565	1,175	1,100
% of longline stocked		73	75
No. of pearls produced	2,700	3,840	4,235
Average no. of pearls produced per farm	675	320	353
Average pearl price (TOP)	94.05	121.50	148.40
Total value of pearl production	263,000	467,000	628,000
Average value of production per farm	65,750	38,916	52,333
No. of people engaged in pearl production	13	40	42
Percentage paid labour used			36
Pearl production is primary income			3
Pearl income per person			14,900
Equivalent full-time labour force (FTEs)		7	11.5
Equivalent full-time income			54,400

Comparing mabé pearl production between 2016 and 2017 (when there were 12 farms in production each year), it can be seen that production value increased by 35%, both due the higher number of pearls produced and the higher average pearl price. The increase in production is directly related to the availability of hatchery-produced spat, facilitated by the mabé pearl livelihoods project.

The Ministry's survey also confirms FIS/2018/029 survey results in relation to multiple income streams in that of the 42 people engaged in pearl farming, only three identified this as their primary source of income. The survey report suggests the average income for mabé pearl farming in 2017 was TOP 14,900, although this is based on the gross farm production income and does not reflect production costs. The actual amount paid to farmers or workers is not reported in the survey. This survey data indicates that mabé pearl farming generated employment for 42 people working an average of 0.25FTE. This is significant improvement on the 13 people working in mabé pearl farming in 2015.

The average price per pearl, mostly sold as handicrafts, is in line with the average prices for items sold through the Pearl Information Centre at Vava'u. (discussed further below).

Incomes from mabé handicrafts

Reported incomes from mabé handicrafts for individual producers varies markedly. Sales figures for the Pearl Information Centre indicate that total sales incomes for individual producers range from TOP 90 to TOP 8,110 for the period July-September (encompassing the whale-watching / tourist season), with two producers accounting for 61% of sales income.

In addition, the most recent figures available from the Ministry of Fisheries Annual Production Survey 2017 show that 15 farms produced 4,235 saleable pearls, with a total value of TOP 628,000 and an average of TOP 41,860 per farm. In 2016, 14 farms produced a total of 3,840 pearls with a total value of TOP 467,000 and an average of TOP 33,350 per farm. Over 90% of the mabé reported in this survey was sold as worked mabé.

Given that the average annual household income in Tonga is TOP 32,540 (27,190 in Vava'u) production of mabé handicrafts is a significant supplementary income for producers and their families.

Information gathered from farmer / handicraft makers in Tonga about income gained specifically from mabé-based activities varied as some had not yet harvested shells (1F) or been trained in carving (1M, 1 F) or sold products that had been made. Two individuals provided an estimate of the proportion of total income generated from mabé-based handicrafts as 5% (F) and another as 12-15% (M). Only three people interviewed (1M, 2F) reported that mabé handicrafts were their only source of income. The range of monthly incomes reported from the sales of MOP handicrafts at the time of interviews were 200-1,990 TOP per month. Sales data provided from the Vava'u Pearl Information Centre through the ACIAR project provides more detail on individual incomes and is also discussed in the later section on monitoring data.

The Pearl Information Centre has provided detailed and summary data of pearl sales through the Centre for the months of July, August and September 2019. The data includes the number of pieces and total sales for each producer for these months.

Key findings for these results include:

- a pattern of increasing sales overall
- increased sales in September and October associated with the tourist / whale watching season, with a peak of TOP16,275 in sales in October
- the average price per piece over the period Jul-Sep is TOP119

The detailed sales data is shown in the table below. Note that these sales figures are gross and do not include the 10% sales commission paid to the Centre.

These figures reflect sales through the Centre and do not include sales by individual producers through other outlets and are shown in the tables 22 and 23 below.

Table 22: Pearl Handicraft Production and Sales, Vava'u, Jul-Dec 2019.

	Jul	Aug	Sep	Oct	Nov	Dec	Jul-Dec
Sales (TOP)	2,525	6,590	14,175	16,275	7,650	9,075	56,290
Items Produced (n)	26	56	117				
Average Price (TOP)	97.11	117.67	121.15				

Sales data for individuals selling through the Centre for the period July-December 2019 are provided in the table below, which show that:

- prices for individual pieces range from TOP10 to TOP400
- total sales incomes for individual producers range from TOP90 to TOP8,110, with two producers accounting for 61% of sales income
- there are significant differences between producers in terms of number of pieces sold, price of pieces and total incomes.

Table 23: Pearl Handicraft Production and Sales by Individuals, Vava'u, Jul-September 2019.

Producer	July		August		September		Jul-Sept	
	Pieces	Sales	Pieces	Sales	Pieces	Sales	Sales	Av. Price
1			13	2,180	25	5,930	8,110	213.42
2	12	1,065	19	1,700	30	3,620	6,385	104.67
3	3	300	3	230	2	80	610	76.25
4	5	310	4	210	11	545	1,065	53.25
5	4	850	2	240	10	1,950	3,040	190.00
6			2	40	6	110	150	18.75
7			6	770	5	610	1,380	125.45
8	2	65	3	95	2	110	270	38.57
9					3	410	410	136.67
10			1	150			150	150.00
11					1	20	20	20.00
12					1	25	25	25.00
13			3	650	1	500	1,150	287.50
14					16	752.50	752.50	47.03
15					3	97.50	97.50	32.50
16					1	90	90	90.00

9.3.1 Other economic benefits

Employment opportunities

As the project sites are seeking to re-establish the pearl industry in Tonga, there are increased opportunities for employment, though as a secondary income activity it provides supplemental employment rather than new employment. Secondary employment was generally taken up by young men who could dive, assist with maintenance of pearl lines and harvests. Some male and female artisans received payment to carve for mabé farmers. A number of resorts who have pearl farms employ young men and women to make handicraft items or manage pearl lines. Some people act as handicraft sellers in the markets and receive a portion of the profit of the items sold.

In the Ministry of Fisheries Annual Production Survey 2017, the Tonga annual a total of 42 people were directly involved in pearl farming activities across 14 farms. In this context 'pearl farming activities' included the actual farming and farm management activities as well as farm-based value adding activities (handicrafts). It did not include off-farm artisanal or retail activities. The report suggested that the total number of people that have some direct involvement in pearl farming, pearl and shell handicraft, post-harvest and retail activity was 92 persons. Reports for 2018 and 2019 are not yet available.

Savings

While the incomes earned from mabé production provided increased incomes, most respondents did not indicate an intention to save or invest in assets. For most, the extra income provided an opportunity to repay loans, pay school expenses and family or special events (such as weddings) and donate to the church (tithe). One male handicraft maker from Vava'u said: *Us Tongans have church activities. It really helps to give to church for fees and church feasts and to give money for family weddings and events.*

Assets

Assets for mabé production

Infrastructure for mabé and handicraft production is provided by the project and the Ministry of Fisheries. The Pearl Information Centre will ultimately become responsible for maintenance and replacement of handcrafting equipment as sales income increases.

Assets personal and community use

A small number of producers indicated that they use some of their income to purchase / replace machinery and tools, etc. to establish workshops in their homes or retail outlets. One woman indicated she had spent TOP 3000 for handicraft tools.

Grants

The Pearl Farmers Association been successful in gaining funds for the purchase of a boat for use by members. This will assist with management and maintenance of their lines and will be supported by Ministry of Fisheries aquaculture staff.

9.4 Socio-cultural benefits of mabé livelihoods in Tonga

Five key socio-cultural impact areas were examined in Tonga (Appendix 1): participation and inclusion; skills and knowledge; relationships and networks; self-confidence and wellbeing; and cultural compatibility. Findings from each of these indicator areas are presented below. Gender and age differentiated impacts are integrated into the discussion.

9.4.1 Participation and inclusion

The Sustainable Development Goals (SDGs) emphasise inclusion as a principal characteristic of economic growth and development. The idea of 'inclusive development' indicates a particular form of participation that aspires to the equal distribution of benefits among populations, regardless of individual circumstances (Shand, 2017). Participation and inclusion in development projects is the first step in enabling individuals and communities to reap the benefits from these projects.

Mabé farmers and handicraft makers included males and females, younger and older people, single and married individuals. Information was not actively sought on disability. Currently, there are 11 family mabé pearl farms in Vava'u and three in Ha'apai. These include individuals, family farms and one community farm. In Tongatapu there are three resort based mabé farmers and Ministry of Fisheries have R&D sites in Tongatapu and Vava'u.

Of the 17 pearl farms in Tonga, 11 are headed by men and 6 by women. These figures may not represent the actual involvement of women on family farms. In some cases, women are active partners or participants in mabé farming, supporting husbands or fathers in farming activities. In Tongatapu there are a number of women handicraft makers working for resorts. Where women were the primary mabé farmer they were also supported by husbands or children. Two unmarried women have established pearl farms. While most mabé farmers are also handicraft makers a number of skilled male and female handicraft makers do not have established farms. Some because of the costs of licences and some as their family already owns a farm cannot register a second farm.

Participation in the ACIAR-funded projects is influenced by a number of factors. In Tonga this was driven by the project objective to support and expand mabé pearl farming and handicraft production to community groups and women. The selection of communities and farmers is constrained by marine environmental conditions. However, involvement can also be influenced by already established groups (those previously involved in pearl farming), individuals or families who are influential in the community and Ministry of Fisheries knowledge of local communities. Rules and regulations of the Pearl Farmers Association of Vava'u and of the Ministry of Fisheries are also likely to have an influence on who can become members of the Association or meet the licencing requirements of MAFFF. In Vava'u and Ha'apai prospective mabé farmers indicated that MAFFF licence fees were an obstacle for entry for those with limited resources. Currently the ACIAR project and MAFFF have supplied all the infrastructure for the establishment of pearl farms and handicraft equipment enabling those on lower incomes to participate.

The ACIAR project personnel have played an important role in mediating and maintaining access to the Pearl Information Centre and Workshop for women, new members and youth. Principles and guidelines about inclusion and access to MAFFF and ACIAR project resources and training will continue be important as increased interest in pearl farming grows in Tonga. Tongan people need to be actively involved in all aspects of the mabé industry in Tonga in order to shape the industry and not operate as recipients of programs.

9.4.2 Skills and knowledge

The training program developed by the ACIAR project team has been highly effective in building capacity in the Ministry of Fisheries to establish and maintain a hatchery facility in Tongatapu. Aquaculture officers in Tongatapu, Ha'apai and Vava'u are in high demand for support from farmers. Aquaculture officers in Vava'u, Tongatapu and Ha'apai have developed skills and knowledge in pearl culture and husbandry. They assist mabé farmers in the establishment of farm infrastructure and the ongoing monitoring and maintenance of mabé farms, harvesting and transport of shell within Tonga when needed. The Ministry of Fisheries aquaculture program conducts an annual pearl survey important to an understanding of the growth of the industry in Tonga. Learning resources such as

manuals have also been produced and distributed to MAFFF, farmers and handicraft makers. Ongoing training and development for new aquaculture extension officers will be needed as the industry grows and the number of farmers increase.

Mabé farmers have received training in oyster husbandry and farm maintenance from ACIAR project staff and MAFFF aquaculture officers aim to visit mabé farmers at least once a month however this can be challenging in the more remote island areas. Fisheries officers indicated it remains a challenge for farmers to take more responsibility for managing farms and for costs associated with production after the initial establishment. A number of farmers in Ha'apai indicated that the timing between trainings could be reduced to enable them to progress more quickly. This is limited by availability of project staff and MAFFF. Handicraft makers in Vava'u and Ha'apai and the islands of Pangai, Hihifo, Felema and Uiha, have received training from specialist handicraft trainers and many have developed considerable proficiency in producing MOP products for sale at the Pearl Information Centre, local markets and other outlets. As with any craft some have a developed higher level of proficiency than others and this is reflected in the quality and sales prices. The quality, standard and volume of items being produced through the Vava'u Pearl Centre has been incrementally increasing as a result of ongoing training and peer learning within the pearl centre workshop environment. Recently training has included a greater focus on design and setting in silver (Sue McCuaig). The availability of specialist trainers (Tongan artist Andrew Motuliki and internationally recognised Maori jewellery designer Neke Moa) has increased the standard, uniqueness and quality of items.

Motivations for handicraft makers are varied. Some are involved because they enjoy the process of making, others because they want to earn money and some because they want to produce objects of beauty. The journey from learning to make a MOP handicrafts, to becoming an artisan or master of one's craft requires years of practice. Not all handicraft makers aspire to become artisans however many of those who are currently involved are recognised as master craftsmen/women within Tonga. Many are developing high-level skills and personalising their own styles and designs within their products.

The presence of the Australian project volunteers living in Vava'u has meant that farmers and handicrafts makers and MAFFF officers have had ongoing, day to day support and assistance as part of the project team (Emma Krusic and Dearne Kershler). This has been a successful strategy for enhancing farmer husbandry practices and supporting the Pearl Farmers Association members with other skills in areas such as governance and pearl centre management. In 2019, AVI volunteer Michelle McGinity began work to improve the business operations of the Pearl Centre and this had a significant positive impact on the use, functioning and outputs by handicraft makers through the centre. Training has also been provided to a local Tongan woman pearl farmer and handicraft maker to become the workshop supervisor, Centre sales-manager and develop an understanding of business management and marketing. This strategy of local capacity development for men and women within groups and communities will be critical to the transition to sustainability over time.

9.4.3 Relationships and networks

Relationships and the development of networks can be influenced by space and proximity. The project team and Ministry of Fisheries facilitated the establishment of Pearl Farmers Association of Tonga and the Pearl Information Centre and workshop in Vava'u. This has enabled mabé farmers and handicraft makers to work, learn and support each other in a common location. They have direct access and regular contact with the Fisheries officers and the project team who are co-located next to the Pearl Information Centre. The Centre is also located next to the town wharf and close to the main town centre, market and providing access to tourists and cruise ship visitors. In Ha'apai and surrounding smaller islands, farmers and handicraft makers are dispersed and have less regular contact with MAFFF officers and have more difficulty in meeting together. The project team is planning

to create a hub of farmers and handicraft makers in the Ha'apai region to facilitate farmer networking. The MAFFF and the project team have assisted farmers and handicraft makers across Tonga to participate in the royal agricultural shows enabling them to meet other producers as well as display quality products.

Due to the dispersed nature of pearl farms in Ha'apai, farmers are particularly dependent on Fisheries staff and training from the ACIAR project team. The expansion of the Pearl Farmers Association or the establishment of a Ha'apai group could help farmers to support each other through a regional network.

The formation of groups inevitably comes with challenges. In Vava'u, the Association and Pearl Centre was initially attended primarily by male farmers many of whom came from families who had a historical involvement in mabé farming. Some felt membership should be restricted to indigenous Tongans or only those with existing farms. Over time, with advocacy from the project team, many of these issues have been resolved. More women and youth have become association members and are showing an interest and talent in both pearl farming and handicrafts. Costs associated with licenses for mabé farmers as well as Association membership fees appear to have been a point of contention among the group in Vava'u and may restrict those with less income from starting mabé farms. However, this also regulates the number of farmers entering the industry that will require support from MAFFF. The ACIAR project team and AVI volunteers invested considerable time in supporting the members to resolve some of these matters. Governance and small business management training provided by Tongan organisations may be helpful as new members continue to join the association in the future.

Although most farmers in Vava'u use their own shells to make handicrafts some purchase shells from others or have exchange relationships to access raw mabé. Pearl farmers and handicraft makers show considerable support for each other and collaborate to assist each other particularly younger farmers or handicraft makers. Supportive arrangements have developed where a farmer will provide shells to someone without a farm or whose oysters have not yet been harvested. In some cases, strong exchange relationships have developed where a farmer will provide shell to the handicraft maker who produces items for sale for both the farmer and the handicraft maker. Focus group discussions identified friendship and social contact as an important part of being involved in the Centre particularly for men. The workshop space has become a focal meeting point not only to produce handicrafts but to spend time together. Competition between makers over sale prices, product quality and design appear to be relatively amicable and channelled towards increasing productivity.

While most sell finished handicrafts through the Pearl Centre a number of alternative markets have developed. One female farmer employs a highly skilled craftsman to produce MOP jewellery that is sold locally to tourists or exported internationally. Another male handicraft maker sells his products in his own retail outlet in town. Another sells her products wholesale to other handicraft sellers who then sell them on. Others send finished products to Australia or New Zealand to relatives and some provide raw mabé or finished jewellery to relatives in Tongatapu for sale.

Handicraft producers who also own businesses or accommodation services also market products through these outlets. Currently the approach to marketing products is dispersed and although training has been provided on grading of mabé and pricing of final MOP handicrafts, price variations are considerable. This can create tensions and misunderstandings regarding the value of products between producers, sellers and buyers.

Handicraft training workshops have connected artisans with Tonga Skills. Tonga Skills for Inclusive Economic Growth (a training organisation) is a key investment of the Australian Government in Tonga and the latest in a succession of skills development initiatives funded through the Australian Aid Program. Tonga Skills is a five-year investment to support skills sector reform in Tonga with a key focus on skills development linked directly

to inclusive economic growth. Tonga Skills works closely with the Tonga Ministry of Education and Training (MET) and Tonga National Qualifications and Accreditation Board (TNQAB). The Program operates nationally with offices in Neiafu, Vava'u and Nuku'alofa. Continuing partnerships with training organisations such as Tonga Skills are valuable as potential employers for mabé handicraft artisans who may wish to become trainers for others interested in learning the craft.

9.4.4 Self-confidence and wellbeing

Through interviews and focus groups a range of factors emerged that could be associated with wellbeing. These included happiness, social connection, income and health. During focus groups male and female handicraft makers and farmers spoke of the enjoyment and pleasure in making handicrafts and working in a marine environment. Some felt a strong affiliation and cultural attachment to the sea and the nature of mabé farming was experienced as a highly satisfying form of work. Many conveyed a tangible happiness gained from participation in these activities, particularly the creative element of handicrafts.

For some male mabé farmers/ handicraft makers, working together in the workshop contributed to building strong social connections and sustaining friendships. It offered the opportunity to work away from home and interact within the community of farmers. Social interaction was a valued aspect of attending the workshop for men. One male handicraft maker explained he liked working with the group. He said *"it was beneficial professionally as he got motivation and support and it was fun to work with others"*. Women discussed the enjoyment and satisfaction gained in the process of making handicrafts, rather than the social benefits. As most women had other businesses or family responsibilities, time spent in the Centre was limited. Both males and females spoke of pride in their new abilities to produce uniquely Tongan designs and products. One woman spoke of how her family now perceived her in different light as a result of her capacity to earn an independent income.

Most handicraft makers indicated that the additional income helped them support families or to employ younger people in the community to assist with mabé farming. One older male farmer (a leader in his community) was employing youth to maintain his pearl lines. Although the cost incurred was greater than the income made from his mabé harvest he felt great satisfaction that he could mentor and support youth in his own community. His motivations were more altruistic than economic. Additional income had helped individuals meet church commitments and family events such as weddings and funerals. Mabé farmers spoke of the additional food from oysters during harvest times. For one single mother the income gained from mabé handicrafts was enabling her to support her family of five children independently.

However, two experiences described by individuals might be considered as having negative impacts on wellbeing. A female handicraft maker was considering leaving the industry and no longer making MOP handicrafts due to the negative health impacts of working with shell dust over the last 10 years. Personal protective equipment was expensive and as she had worked for many years in her own workshop at home where she had not been able to invest in equipment to reduce shell dust. Another male mabé farmer expressed frustration about the ongoing theft of oysters from his farm and the loss of income that resulted. Others spoke of the disruption and distress that inter-group conflicts within the Pearl Farmer Association were having on their experience at the Centre.

9.4.5 Cultural compatibility

Many Tongans live in coastal village communities where marine resources provide livelihoods. The Many Tongans live in coastal village communities where marine resources provide livelihoods. The management of fishing and aquaculture is important to meet the demand from growing populations relying of marine resources. Mabé pearl

aquaculture and value adding handicraft activities enable families and communities to engage in traditional marine dependent livelihoods in a sustainable way. Some mabé farming activities in Tonga are now within designated Special Management Areas (SMA). SMAs represent a type of marine managed area being used as a community-focused fisheries management and coral reef conservation tool throughout Tonga. Ongoing opportunities to maintain coastal livelihoods are important for future generations of Tongan families and to counteract urban drift particularly for youth.

In Tongan family's celebrations such as birthdays, weddings, funerals and community events are characterised by the giving of gifts including tapa, woven mats or bone and wood carvings. In Tonga the tradition of gift giving and exchanging gifts forms an important part of relationships including with overseas relatives who provide cash remittances. Three cultural concepts associated with gift exchange are the expression of ofa (love and generosity), faka'apa'apa (respect) and fetokoni'aki (mutual assistance). While formal economic activity forms a significant part of contemporary Tongan life, the gift economy and exchange remain an important part of relationships (Evans, 2001).

Members of the Pearl Farmers Association spoke of the high value placed on mabé pearl products as traditional gifts. Mabé pearl jewellery items produced by handicraft makers from Vava'u had been presented to the King of Tonga as well as to the Prince and Duchess of Sussex. In Tonga, mabé handicrafts are increasingly being recognised not only for the potential economic value but also within the gift and exchange economy. Some mabé artisans are beginning to integrate traditional designs into jewellery, reproducing old designs and integrating elements of Tongan design into new unique mabé handicraft products. Figure 6 below shows the cover from Cartmail's, 1997 book, *The Art of Tonga* (left) and a reproduction from the book showing a carved breast plate with pearl inlay (centre) and to the right a MOP mabé pendant produced by Vava'u mabé artisan Andrew Fakatava (right).



Figure 6: Images from *Art of Tonga* (left) and traditional bone breast plate (centre) (Cartmail, 1997), and pendant produced by Vava'u mabé shell craft artisan Andrew Fakatava (right)

Handicrafts such as tapa, wood carving and MOP handicraft items are imbued with cultural values, knowledge and access to heritage resources. They contribute to the preservation of local stories, history, art and craft forms (McGehee, Bannon and Perdue, 2010).

Makers of traditional crafts/ arts are also able to benefit economically and socially from the sale of these products. Although the production of such items requires hard work and time, those who produce them are held often held in high regard (Addo and Besnier, 2008). The 2009 Household Income and Expenditure Survey of Tonga showed that over one third of rural households relied on handicrafts for subsistence income, an industry

made up mostly of women. Tongan women producing traditional crafts have established themselves successfully selling in craft markets, to cruise ships, in specialty shops and to the LangaFonua women's handicraft cooperatives which Queen Salote III founded in 1953. These are sold to support household needs such as groceries, bills, school fees etc. but they are also valued because they form part of the cultural fabric of the nation.

9.5 Women's empowerment through mabé-based livelihoods in Tonga

Women were identified as specific populations of interest for this study. ACIAR project FIS/2014/060 and FIS 2016/126 objectives sought to expand pearl and mother-of-pearl (MOP) handicraft production by community and women's groups and examine socio-economic aspects of half pearl culture in Tonga. A number of empowerment indicators were developed to consider benefits of mabé-based livelihoods for women (Appendix 1). These included women's access and control over resources and income, decision making about productive assets, time and workloads, changes in community perception and leadership opportunities.

9.5.1 Access and control over resources and income

To understand women's access and control over resources and income from pearl-based livelihoods in Tonga it is important to understand the structure of the enterprise and the inter-dependencies between actors.

Women mabé farmers/ handicraft makers have not yet reached parity with the numbers of men engaged in pearl-based livelihoods in Tonga however women are achieving success in gaining access to significant supplemental incomes for themselves and their families. In Tonga six women are recognised as pearl farmers leading pearl-based activities in their families. In some cases, women's activity may be under-represented as they are often engaged in supporting their husbands or relatives who are the registered pearl farmer or seller of handicrafts. One man explained that he and his wife work together 50/50. His wife can do seeding and she helps with sanding and adds features on mabé jewellery but she is not registered as the pearl farmer or a member of the Pearl Farmer Association. Most mabé farms are family enterprises with contributions from various family members however only one farmer from a family is usually registered with MAFFF.

Currently all pearl farmers registered with the MAFFF are provided spat free of charge through the hatchery in Tongataupu provided they have paid licence fees. This involves a TOP 345 fee to MAFFF and an annual licensing fee of TOP 100 per year. In addition, handicraft makers who use the PICW pay a TOP 50 membership fee and contribute 10% of handicraft sales to the Centre for every item produced and sold in the workshop. To be an Association member a person also needs to be a registered pearl farmer. This was identified as a challenge for some farmers, including women heads of households. Some handicraft makers expressed concerns about the fee structure, operational and maintenance costs (water, electricity, repairs) of the Centre. There have been some differences in views about who should have access to the Association and who should be able to use the equipment and at what cost. This has affected both men and women who have indicated they have been unable to meet the costs proposed by the Association. This has been of less concern to those farmers and handicraft makers with sufficient wealth from other income streams or business ventures.

Many farmers are heavily supported by MAFFF aquaculture officers to monitor and manage their pearl farms. Farmers rely on boats or other self-made watercrafts to access oyster lines. The PFA in Vava'u have been successful in gaining a grant for a boat to be used by members of the PFA but this is not yet available. Similarly, members of PFA have relied heavily on the staff and volunteers of FIS/2016/060 for the upkeep, management

and operations of the PICW. Four women mabé farmers who also have other business ventures indicated that they had sufficient resources to employ labour when needed.

In many cases pearl-based enterprises rely on cooperation or collaboration. While most mabé farmers use their own mabé for handicrafts, cooperative exchange arrangements exist between farmers and handcraft makers at the PICW when insufficient mabé is available. In some cases, a handcraft maker will make products for another handcraft maker to sell in exchange for mabé.

9.5.2 Decision making

Individual pearl farmers who were interviewed indicated that they either made production decisions about pearl farming themselves or that it was a collaborative enterprise with family including husbands, wives and children. Of the five women interviewed three indicated they made decisions about the use of income from pearl-related activity themselves and two made decisions jointly with husbands. Four males interviewed indicated that decisions were made with a family member (son, wife, daughter, father).

In Vava'u, the Pearl Farmers Association has monthly meetings to discuss the running of the association and make decisions about operations. The representation of women on the Association Committee is low. The ACIAR project team has been involved in the development of the governance and business model for the PICW and has encouraged the inclusion and participation of women in decision-making. The project has provided capacity development, training and mentoring to one female mabé farmer/ handcraft maker to take up a full-time paid position as the supervisor and sales manager of the PICW. The job has enabled her to become independent of financial support from her family and to be able to support her five children as a sole parent. She spoke of the importance of gaining employment and said with her new job she felt had a new life:

I know my kids can be proud of it.” “When I wear my apron here [PICW], when its dirty and wet I am proud that I am a hardworking Mum.” “I know some people look down on farmers...but I am proud to be a [mabé] farmer.

9.5.3 Leadership

Women are represented in senior positions in MAFF and Aquaculture in Tonga however there are no women aquaculture extension officers. For farmers and handcraft makers formal leadership opportunities in the developing industry are currently limited. The PFA has an executive with designated governance roles such as president and secretary. A Tongan woman is also currently paid as the workshop supervisor at the PICW. A number of farmers identified themselves as 'leading the way' for other farmers or family members in the future. One older male farmer in Ha'apai, who described himself as a leader in the community was motivated to maintain his pearl farm to provide opportunities for youth to gain work experience and income from mabé farming. He pays up to nine youth per month to work diving and cleaning oysters. Another female farmer in Ha'apai was also motivated to develop pearl farming in her community and particularly for youth.

Among the group of farmers interviewed a number of men and women were members of other associations or committees within the community or were successful business operators with considerable capacity in management. They could be a valuable asset to the Pearl Farmers Association.

9.5.4 Work and time

Most mabé farmers and handcraft makers manage the time involved in these activities alongside their other income earning activities. Three women with other businesses indicated it could be difficult to manage mabé farms as well as their businesses but they are able to employ young men to assist with the maintenance of mabé lines and harvest activities or even pay someone to make handicrafts from their mabé. Another woman who

did not farm mabé said in order to earn enough from making handicrafts to support her family she needed to sell at the markets during the day and make handicrafts at home in her own workshop at night. For most, making handicrafts was a secondary income earning activity. This meant that time in the workshop needed to be balanced with other work and responsibilities. Most did not find this to be a burden. For many men and women interviewed, making MOP handicrafts was a relaxing activity and the PICW in Vava'u enabled them to socialise with friends while working.

9.5.5 Community perception

Family support and involvement in mabé-based enterprises in Tonga is strong. Gradually women are gaining recognition as mabé farmers and for their skills as MOP handicraft makers and artisans within the community of farmers and artisans. Mabé pearl culture is increasingly being recognised as a valuable economic aquaculture commodity by the MAFFF in Tonga and international organisations such as the World Bank are seeking to provide further opportunities for women farmers in the future. A small number of male artisans have received recognition and attention nationally and internationally for mabé handicrafts gifted to dignitaries and Tongan royalty.

10 Conclusions and recommendations

The socio-economic impacts identified through the IAS are similar in Tonga and Fiji. They are primarily differentiated in the structure or operational models of the industry. Fiji is organised around village community and small group production. Tonga has fewer community operations and more family-based farming and small group handicraft production located within a regional hub of producers. Conclusions drawn from findings of the IAS are summarised below by country

10.1 Conclusions

10.1.1 Fiji conclusions

Spat and mabé farming and MOP handicraft production is now providing a substantial supplementary income for women's, youth and community groups engaged in pearl-based enterprises in Fiji. Annual enterprise incomes collected from monitoring data is shown below.

- Annual income from sales of spat range from FJD 500 to FJD 4,000.
- Annual incomes from the sales of mabé range from FJD 800 to FJD 2,200.
- Annual incomes from the sales of MOP handicrafts range from FJD 3000 to FJD 14,700

Further to this recent economic modelling (Johnston et al., 2020a; 2020b) shows that spat collecting and mabé farming offers the opportunity for a substantial boost in incomes with minimal capital investment.

Income distribution structures were varied across the research sites in Fiji, depending on the type of pearl-based activity participants engage in, whether they employ other community members to assist, and village cultural norms, customs and priorities. In Fiji, spat and mabé production is led by groups that are community-based rather than individually driven and income derived from spat or mabé production belongs to the village community or handicraft groups. Both men and women benefit economically from mabé-based livelihoods within community-based enterprises and at a household level through women's handicraft incomes. Incomes from pearl-based livelihoods are a supplementary source of income for spat and mabé farming communities and for individual handicraft makers. Those who make handicrafts retain a proportion of the income from sales that then flows to individual households. However, to reach the full economic potential of the industry, further development of markets is necessary for both raw and worked mabé. Spat production continues to be viable and profitable in Fiji due to the demand from round pearl farmers.

For many women handicraft makers this has been their only opportunity to earn an income of their own although the majority of women indicated that the money was used primarily for supporting family or contributing to community or group infrastructure and assets.

Women's mabé-based economic activity contributed to an increase in recognition and value of women within families and the community:

Working together in groups provided women with opportunities to make decisions about production and income use, built confidence to speak up within the family, group or community and negotiate challenges within and beyond the group. Most women identified goals for their future in mabé-based enterprises both as individuals and as part of a group. For many women mabé-based enterprises provided a reprieve from domestic or village work and offered a vehicle for creative expression through which cultural traditions could be expressed in new ways.

A number of challenges to pearl-based enterprises identified through the IAS include access to markets for handicraft producers and the subsidisation of capital infrastructure and purchase of mabé by FIS/2014/060. Over time the industry as a whole will need to monitor the balance of mabé supply and demand between mabé producers, handicraft makers and markets. The development of pearl culture and handicraft skills is a time-consuming activity and requires training and support, over a number of years. Critical to this endeavour is the time and resources on Ministry of Fisheries.

10.1.2 Tonga conclusions

Mabé pearl aquaculture and handicrafts are enabling families and communities gain significant supplementary incomes. FIS/2016/060 and FIS/2016/126 have fostered the development of the contemporary industry based on the inclusion of women, men and youth and provided models of production in handicrafts that enable farmers to come together to develop skills, build networks and maximise market opportunities through the development of a Pearl Information Centre and Workshop and sales centre. Although men still outnumber women in pearl enterprises in Tonga more women are gaining interest in the industry.

Most income is generated through the production and sales of handicrafts that flow directly to the individual producers and their families. Individual handicraft producers' incomes ranged from TOP 90 to TOP 8,110, with two producers accounting for 61% of sales income over a 6-month period. Total sales by 16 producers over a 6 months period was TOP 56,290.

Economic modelling for mabé production in Tonga (Johnston et al., 2020) indicates that small scale farming could be highly profitable with an annual profit of over USD 9,000 based on the average price for a saleable pearl of USD 50.98 and on the assumption that a market for raw unworked mabé is available. The *Tongan Mabé Pearl Industry Report*, 2017, indicated that only 7% of the mabé was sold as raw mabé, with a very small proportion sold 'on the shell'. Given that most handicraft makers use their own farmed mabé and that purchase of mabé continues to be subsidised, most of the economic benefit is gained through the sale of value added mabé handicrafts.

Sales results for the Pearl Information Centre at Vava'u for the period July-December 2019 indicate that the Centre has been able to leverage the sales opportunities of the whale watching season to find a market for mabé handicrafts, although without more recent sales data it is not possible to draw conclusions about sales performance outside this peak tourist season.

The main constraints to participation in the industry relate to wealth and the capacity to pay for licence fees to MAFFF, PICW registration fees and replacement pearl farm infrastructure. The established of the PICW has enhanced networks of support for farmers and handicraft makers and provided the skills for the development of new traditional forms of craft and artistry increasingly gaining value within the formal and informal economy. In Tonga the tradition of gift giving and exchanging gifts forms an important part of relationships including with relatives living overseas. Members of the Pearl Farmers Association spoke of the high value placed on mabé pearl products as traditional gifts. Some mabé artisans are beginning to integrate traditional designs into jewellery, reproducing old designs and integrating elements of Tongan design into new unique mabé products.

A number of entrepreneurial women mabé farmers and handicraft makers were already economically independent entrepreneurs in local businesses (resorts, whale diving, accommodation operators). Although they worked together with members of their family, they identified themselves as leading the mabé enterprise and making decisions about production independently or together with members of their family. For most producers, money was not the only motivation for participation, although all identified the potential for high profitability from the sale of handicrafts as the industry develops in the future. Some

women were able to re-invest in farm infrastructure or equipment for handicrafts independently from the project. These women could be described as 'path makers' and leaders for other women interested in entering the industry. They were in a position to take risks and could be described as being driven by intrinsic motivation to succeed at a new enterprise of interest.

Only two women derived all their income from mabé farming and making handicrafts and both were the sole income earners in their family. One single woman with five children spoke of the importance of gaining employment as a supervisor of the PICW to herself, her family and to her children. For this woman, involvement in the mabé enterprises was transformative both economically and personally.

Most women were time limited due to other work and family responsibilities, but some had the capacity to pay for labour to assist with pearl farm management or outsourcing the production of handicrafts. Some women supported other handicraft makers and shared resources with new farmers and makers entering the industry. Some also saw this as a future income stream for young family members.

Handicrafts are significant cultural products utilised in traditional ceremonies, community and family events such as weddings, births and funerals and contribute to both the formal and informal exchange economy in Tonga. The MOP handicraft industry gaining recognition locally and nationally and enhancing the economic opportunities of individuals and families.

10.1.3 Women's empowerment through pearl-based industries

Empowerment does not always express itself in uniform or incremental steps as a result of interventions or programs. Women's pathways to empowerment are diverse. ACIAR pearl livelihood projects have supported women in Fiji and Tonga to develop skills and capacity for successful engagement in mabé pearl-based livelihoods. Feminists have argued that empowerment is more than access to resources, income and assets and it is not something that is done to or for women. Rather it is multi-dimensional and entails relationships between individuals, groups and institutions. (Cornwall, 2016). Kabeer's (1999) frequently cited definition considers empowerment as the process by which people expand their ability to make strategic life choices and take control over their own life circumstances. While few women spoke directly of being empowered the agency expressed through their actions and choices in pearl-based enterprises are contributing to a sense of empowerment for some.

"We have been empowered by learning new things, new skills, working on the machines and earning money" [Women's focus group Somosomo].

The women engaged in pearl-based enterprises expressed their agency to take by making decisions and taking action about life directions. While income was a motivating factor for all it was not the only motivator or purpose. Some were motivated by family tradition or to contribute to the maintenance of Tongan designs and culture. For others, the opportunity to extend their learning to satisfy personal goals was a driver. Through participation in mabé enterprises many women began to think differently about themselves, their capabilities and their aspirations for the future, building confidence to achieve their goals.

Agency can also be expressed through taking action and making strategic decisions. Four successful women business owners in Tonga incorporated mabé farming and handicrafts into their business operations as a form of diversified income and as a supplement to other tourist activities. Some talked about making decisions now that will help to shape their families and their own future. In Fiji women are actively negotiating within traditional community hierarchies and structures about the use of community income earned from women's enterprises in spat and mabé farming. In handicraft groups women are negotiating to maintain a proportion of income from their own labour to be used for

families or themselves. Women are taking responsibility and action for maintaining all aspects of mabé production and some handicraft makers are opting to extend their skills into management, sales and marketing. In Tonga and Fiji, while groupwork has inherent challenges, working collectively has enhanced networks of support for farmers and handicraft makers and contributed to increase productivity, learning and collaboration.

10.2 Recommendations

Recommendations for further research into pearl-based livelihoods and industry development in Fiji and Tonga are:

1. A major constraint to profitability of pearl-based enterprises in Tonga and Fiji are insufficient markets for mabé and MOP handicrafts. Expanded local, regional and international markets will need to be developed to ensure current production does not exceed demand for handicrafts. Further research is required to assess possibilities for the expansion of markets for raw mabé pearls and handicrafts and mabé jewelry.
2. Mabé farmers and handicraft makers are currently supported and subsidised in production by FIS/2016/060, FIS/2016/126 and Ministries of Fisheries in Tonga and Fiji. Further consideration and research could be directed at enhancing producer uptake of production costs and operations.
3. Continue to build capacity of local producers to manage, govern and maintain essential infrastructure and operations.
4. Build capacity of individuals within existing production groups to increase the capacity of local trainers in handicrafts and model farmers in regional hubs (through a train-the-trainer approach).
5. Undertake further research into income distribution models which enable both the community and individual producers to benefit from spat, mabé and handicraft income.
6. Extend opportunities for training in governance, dispute resolution, micro-business, finance and marketing. This may support production groups to move from the informal subsistence sector to a more established small business enterprise.
7. Facilitate linkages between women's groups and external organisations and expand opportunities for women's leadership within the industry.
8. Strengthen monitoring of production and sales data across and between partner agencies and producers.
9. Extend research into the enablers and barriers associated with successful engagement of women and youth into the industry.
10. The establishment of the Pearl Farmers Association in Vava'u has been successful in building a network of farmers and artisans and for enhancing production and training. Expansion of the Association and the development of a national network could expand these benefits beyond Vava'u in Tonga. Similar structures and networks could be established in Fiji.

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11.2 List of publications produced by project

No publications were produced during the project. A publication will be produced after the completion of the final report with expected submission in August 2020. Potential journals being considered include:

- Oceania
- Aquaculture
- Journal of the Asian Fisheries Society
- Gender and Development

12 Appendixes

12.1.1 Appendix 1: Impact area indicators

Social impact indicators

Socio-Cultural impact area	Indicator
<i>Participation and inclusion</i>	Numbers of men, women and youth trained in pearl-related production Participation from broad range of community members (age, gender, ability, ethnicity)
<i>Skills and Knowledge</i>	Increased skills and knowledge of pearl-related production (farmers, handicraft makers, extension officers, institutions)
<i>Relationships and networks</i>	Increased community collaboration and networks (specifically women) Improved community cohesion Increased interactions with government agencies Increased interaction with actors in supply chain
<i>Self-confidence and wellbeing</i>	Improved confidence and enhanced wellbeing
<i>Culture</i>	Pearl-related activities compatible with cultural values, customs and practices

Women's empowerment indicators

Socio-Cultural impact area	Indicator
Access and control of resources	<i>Have access and control over resources (equipment) and income</i>
Decision-making	<i>Participate in decision-making about productive assets and use of income</i>
Workload and time	<i>Can engage in pearl-related activities without additional burdens to other work and responsibilities Are able to participate in pearl-related activities while maintaining some leisure time.</i>
Community Perception	<i>Community valuing women's / youth entitlements and achievements / enhanced status</i>
Leadership	<i>Are engaged in leadership of pearl-related enterprises</i>