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# Final report

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## Maintaining momentum within the pearl livelihoods sector in the western Pacific

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### **Abbreviations**

ACIAR	Australian Centre for International Agricultural Research
ACPIR	Australian Centre for Pacific Islands Research
ANU	Australian National University
CSMC	Coral Sea Mari-Culture
HDR	higher degree research
MoP	mother-of-pearl
NFA	National Fisheries Authority
NFC	National Fisheries College
NGO	non-governmental organisation
NLA	National Library of Australia
NAA	National Archives of Australia
PAMBU	Pacific Manuscript Bureau
PC	partner communities
PNG	Papua New Guinea
SPC	Pacific Community
SRA	small research and development activity
SRS	Summer Research Scholarship
SuUB	Staats- und Universitätsbibliothek Bremen
TAR	Tropical Aquaculture Research group at UniSC
UniSC	University of the Sunshine Coast
WIL	work integrated learning

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## 2 Executive summary

This small research and development activity (SRA) sought to maintain, consolidate, and further develop partnerships, research activities, and strategies with government agencies, private individuals, and community groups developed during FIS/2014/060 to support seamless transition to the new project (FIS/2019/122) in 2023. This objective was achieved. While the main aim of the project was to maintain momentum between ACIAR projects, a number of key research activities and outputs laid important foundations for the new project. These include improved knowledge of market research diagnostics, improved business linkages and supply chain resilience, improved handicraft and design skills, financial literacy and business skills among partner agencies and communities, and planning for sustainable sector expansion. These outputs provided momentum supporting immediate impacts from within FIS/2019/122 in all four partner countries (Fiji, Tonga, Samoa and Papua New Guinea).

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## 3 Background

ACIAR has supported the development of pearl-based livelihood activities in western Pacific countries (Fiji, Tonga, PNG) for a number of years with success (Southgate et al. 2019a, 2023). Numerous communities and small enterprise groups are now generating income from activities such as pearl oyster spat collection and sale of oysters, production and sale of mabé pearls, sale of mother-of-pearl, and shellcraft production (Simard et al. 2019, Southgate et al. 2019b, Johnston et al. 2020a, 2020b). ACIAR project FIS/2014/060 “Developing pearl industry-based livelihoods in the western Pacific” was completed in 2021. Review of the project in February 2021 recommended continued support from ACIAR towards consolidation and expansion of pearl-based livelihood activities in western Pacific countries, with particular focus on sector organisation, enterprise development, market development, and business training. A new ACIAR project (FIS/2019/122) had been proposed to address this recommendation, but the COVID-19 global pandemic necessitated delaying its implementation.

To ensure the design of FIS/2019/122 remained appropriate after a lengthy hiatus in project momentum (since 2021), there was need to conduct foundational groundwork to attain a full understanding of how the COVID-19 global pandemic had shifted contexts since completion of FIS/2014/060 – particularly in relation to elements of local capacity and viable markets for mabé pearl and mother-of-pearl shellcraft. Furthermore, without continued project support, there was risk of losing momentum generated from FIS/2014/060 and related ACIAR projects<sup>1</sup> in many areas that are key to continued development of the pearl-based livelihood activities, such as spat collection, that can only be done at certain times of the year, mabé pearl production, that requires a production period of 12 months, and provision of production support and business and marketing training, to maintain current market sales and develop new opportunities.

This small research and development activity (SRA), FIS/2022/168 “Maintaining momentum within the pearl livelihoods sector in the western Pacific” therefore sought to maintain, consolidate, and further develop partnerships, research activities, and strategies with government agencies, private individuals, and community groups developed during FIS/2014/060 to support seamless transition to the new project (FIS/2019/122) in 2023, where approved by proposed partner countries.

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<sup>1</sup>FIS/2016/128 “Reef colonization and socioeconomic impacts from trochus translocations to Samoa – final report” and FIS/2018/129 “Monitoring and evaluation of socio-economic impacts of pearl-based livelihood development”

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## 4 Methodology

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### 4.1 Objective 1: To support sector planning, improve market knowledge and stakeholder capacity in Tonga

- Revise the pearl livelihoods sector development plan
- Market research diagnostics and market development for Tongan products
- Design and handicraft skills training of stakeholders in Vava'u
- Stakeholder workshops for enterprise development, financial literacy, business skills (Vava'u and Ha'apai)

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### 4.2 Objective 2: To improve market knowledge and community handicraft capacity in Samoa

- Market research diagnostics
- Assessment and upgrading of existing handicraft workshops
- Design and handicraft skills training and product development

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### 4.3 Objective 3: To assess sustainability in sourcing mother-of-pearl (MoP) and market options for MoP products in Papua New Guinea

- Sector review
- Assess the potential for pearl oyster spat collection in Milne Bay
- Marketing research diagnostics

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### 4.4 Objective 4: To support production and enterprise development within the Taveni 'pearl hub' in Fiji.

- Design and handicraft skills training of the Somosomo women's handicraft group
- Develop improved production and production scheduling at Qamea and Dreketi community groups for spat and mabé pearl production
- Market research diagnostics and market development for the Taveni pearl hub
- Stakeholder workshops for enterprise development, financial literacy, business skills (Qamea, Dreketi and Somosomo groups)

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#### 4.4.1 Objective 1: To support sector planning, improve market knowledge and stakeholder capacity in Tonga

**Revise the pearl livelihoods sector Development Plan:** The first pearl livelihoods development plan for Tonga ("Supporting development of cultured pearl industries in Fiji and Tonga") was developed ten years ago during the ACIAR Pacific Agribusiness Research for Development Initiative (PARDI) project. Subsequent research in Tonga has improved culture methods (e.g., survival, yield and pearl quality), generated data relating to the economics of various scales of pearl production, improved our knowledge of appropriate farming sites and developed improved knowledge of potential markets for mabé pearl products. Some revision of the Plan was undertaken on the basis of this new knowledge generated during FIS/2014/060 relating to economics (e.g., Johnston et al., 2020a, 2020b, 2022) and FIS/2016/126 relating to culture methodology (e.g., Gordon et al., 2019, 2020, 2021). There was some confusion as to whether revision of the sector

development plan was to be undertaken by the ACIAR project or as part of the World Bank project ('Pathway to Sustainable Ocean – Tonga'), which also supports the Tongan mabè pearl livelihoods sector. After consultation, Tonga Fisheries confirmed that the ACIAR project would undertake this task. However, key considerations of the revised development plan would deal with identification and targeting of specific markets for Tongan mabè pearl, product development to satisfy these markets, market access and quality control/branding etc. In 2023 the World Bank project engaged an international consultant to investigate and report on potential markets and marketing opportunities for Tongan mabè pearls. Given that the information generated by this work would provide key baseline data for revision of the Development Plan, further revision of the Plan was postponed until the consultant's report is presented (expected May/June 2024). As such, final revision of the Development Plan for the Tongan mabè pearl sector will be completed during FIS/2019/122.

**Market research diagnostics and market development for Tongan products:** As discussed above, in 2023 the World Bank project engaged an international consultant to investigate and report on potential markets and marketing opportunities for Tongan mabè pearls, to be reported in mid 2024. This development negated planned marketing research in this project which, instead, collaborated with the consultant to broaden the scope of reporting. The consultant's report will identify potential markets and marketing opportunities (low hanging fruit) which will then be targeted and investigated within the following ACIAR project (FIS/2019/122). Planned market research via consumer surveys were not undertaken as planned because of the very slow return of cruise ship tourism to Tonga following the COVID-19 pandemic. However, individual sales data was collected from artisans as well as information from overseas sales ([Tonga's Mabé Ocean Pearls – New markets open new horizons \(worldbank.org\)](https://www.worldbank.org/en/news/feature/2023/05/15/tonga-mabe-ocean-pearls-new-markets-open-new-horizons)) which will be used to inform product development during FIS/2019/122.

**Design and handicraft skills training of stakeholders in Vava'u:** In partnership with the MoF in Tonga, FIS/2014/060 developed the Vava'u Pearl Centre (VPC) as a central workshop, educational, training and sales facility for pearl farmers and artisans in Vava'u. Around half the floor area was established as a dedicated handicraft workshop equipped with a range of power tools and hand tools and areas for product assembly, display and sales. All prior handicraft training during FIS/2014/060 was carried out at the VPC. Unfortunately, the VPC facility has been derelict and unusable for the majority of this project following floods in December 2022 which caused major damage to the facility and destroyed power tools permanently housed at the facility. Planned refurbishment of the VPC was delayed and had not begun by the end of this project. On this basis, the project was unable to provide any of the planned handicraft skills training.



*Broken power tools within the Vava'u Pearl Centre following floods in December 2022 which caused major damage to the training facility.*



Despite this setback, artisans are still productive and collaborate through sharing personally owned equipment with others. Renovation of the VPC, overseen by World Bank, will be completed during 2024.



*High quality mabèpearl products from Vava'u, Tonga*

#### **Stakeholder workshops for enterprise development, financial literacy, business skills (Vava'u and Ha'apai)**

Stakeholder workshops were not conducted as planned because of disruptions caused by natural phenomena that impacted, potential venues for such workshop, availability of artisans and their priorities, and travel. These include flooding of the Vava'u Pearl Centre in 2022 (see above), long-term impacts of the Hunga Tonga-Hunga Ha'apai volcanic eruption in Ha'apai in particular, and severe tropical cyclone Kevin in March, 2023. Stakeholder workshops will recommence later in 2024 on completion of the VPC and facilities in Ha'apai.

#### **4.4.2 Objective 2: To improve market knowledge and community handicraft capacity in Samoa**

**Market research diagnostics:** Surveys of retail outlets and markets in Apia supported collection of data relating to those outlets stocking pearl/mother of pearl and *Trochus* shell handicraft items, the types of products available and sales prices. Research identified potential outlet for product sales trials in the following ACIAR project (FIS/2019/122).

**Assessment and upgrading of existing handicraft workshops:** Handicraft workshops were inspected along with existing machinery used in prior handicraft training exercises in Samoa. Prior training workshops have been established in an *ad hoc* manner in space at the Fisheries facility that is adapted temporarily for this purpose. Following consultation with Fisheries personnel, a dedicated handicraft training facility was considered preferable and a building within the adjacent fish market area identified for development as a handicraft training centre. Internal plans developed with inputs from the handicraft trainer, and a program of renovation for the new training centre were developed and quotes for the required renovation obtained from local companies. It is anticipated that the new dedicated handicraft training facility will be completed by the end of 2024. A dedicated handicraft training manual for *Trochus* shell has been compiled to support training.

**Design and handicraft skills training and product development:** Significant delays were experienced during this project in identifying an appropriate central site for handicraft training and production and, once identified, in organisation of local contractors to make make required renovations to the facility to support training needs. As such, planned handicraft skills training in Samoa will not take place in Samoa until Q4, 2024

#### **4.4.3 Objective 3: To assess sustainability in sourcing mother-of-pearl (MoP) and market options for MoP products in Papua New Guinea**

**Sector review:** The sector review focused on addressing key questions (i.e., what, how much, where, when, who, and how) to assess sustainability in sourcing MoP and market options for MoP products in PNG. Market options for three MoP product categories were considered: (1) unworked pearls, (2) unworked MoP, (3) worked pearl and MoP transacted as shellcraft.

Primary data of relevance was attained from the electronic data management system maintained by the NFA. Lack of coherent information policies coupled with poor conservation of public records meant primary data collected prior to 1990 were not digitised. Records containing these data could not be located by the NFA despite reasonable effort, and it proved necessary to source these records from repositories of former colonial administrations (i.e., NAA, NLA, SuUB) and international agencies (i.e., SPC). Available data were extracted, standardised, and validated to permit construction of datasets documenting MoP production and trade from 1888 to present.

Additionally, key documents were identified using the Aquatic Resources Bibliography of Papua New Guinea, published by SPC (Kailola 2003). This bibliography catalogued more than 1200 documents held by the NFA. A recent inventory of these documents, however, revealed a third (i.e., 411 documents) could not be located, including several of relevance to MoP (Kinch 2021). Many were presumably lost when the NFC library burnt down. On such basis, the scope of activities undertaken as part of the sector review was extended to locating and digitising duplicate copies of missing documents. All available documents were catalogued as part of the current NFA electronic library, which is managed by the librarian of the NFC.

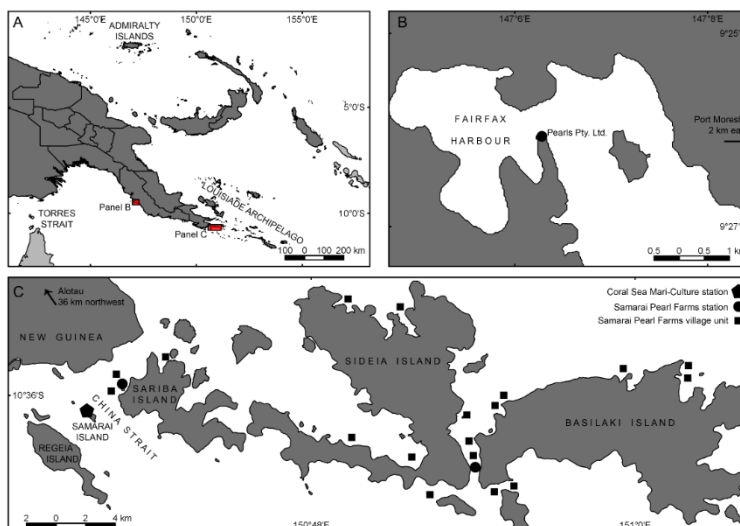


*The NFC library was lost to a fire in 2010 (©Jeff Kinch). By working closely with Julie Sengi, librarian of the NFC, duplicate copies of more than 200 lost documents were located and digitised for the NFA electronic library.*

The data and documents identified as part of the aforementioned activities placed emphasis on formal market options for unworked pearl and MoP, and were insufficient to address the key questions for assessing sustainability and market options related to worked pearl and MoP transacted as shellcraft. To address this deficiency, the review also considered unpublished data and information generated during FIS/2014/060.

Quantitative and qualitative approaches were then adopted to analyse the consolidated data and information. Results were communicated through targeted publications in peer-reviewed journals, public presentations, and social media.

**Assess the potential for pearl oyster spat collection in Milne Bay:** The sector review (Objective 3.1) guided identification of sites with potential to support pearl oyster spat collection in Milne Bay and improved understanding of enablers and barriers to pearl oyster culture enterprise in Papua New Guinea. With this knowledge, a scoping visit to Milne Bay was undertaken in 2023 to validate site potential.



*The sector review identified several sites as having previously supported pearl oyster culture in PNG. Sites in Milne Bay (C) were visited in July 2023 to validate potential to support pearl oyster spat collection.*

The scoping visit involved site inspections and interviews with community, government and commercial stakeholders in Milne Bay. While several sites were confirmed to be environmentally suitable, local knowledge revealed the COVID-19 global pandemic had engendered unforeseen logistical and social barriers to successful spat collection in Milne Bay. As these barriers were of an institutional nature and likely to persist for the duration of the SRA, direction was received from NFA not to proceed with planned spat collection trials.

Effort was re-directed to assess sustainability of alternative pathways for sourcing MoP, such as capture-fisheries, using the data and information consolidated as part of the sector review (Objective 4.3.1). Results were communicated through targeted publications in peer-reviewed journals, public presentations, and social media.

**Market research diagnosis:** The sector review (Objective 3.1) guided market research diagnostics for MoP products in PNG. Face-to-face interviews and focal group sessions with artisans occurred in 2022 (Tigak Islands and Lavongai regions) and in 2023 (Samarai Islands region). More than 100 interviews were completed. The new information generated permitted mapping of market structures, levels of participation, and product performance following the COVID-19 global pandemic. Consultations with government and commercial stakeholders identified future target channels for MoP products. Controlled experiments were then carried out to validate conclusions formed from interviews and consultations.



*Focal group sessions with artisans at Neitab Island in the Lavongai region revealed new insights into how market structures, levels of participation, and product performance had shifted following the COVID-19 pandemic.*

**International market access:** the COVID-19 global pandemic was reputed to have created a lasting barrier to international market access due to deterioration of postal service reliability and regularity. To validate this conclusion, six batches of seven parcels that consistently varied in weight, contents, and declared value were sent to private sector partners in Papua New Guinea over the course of this SRA (2022 to 2024). This permitted quantification of the regularity and reliability of the postal service and the effect of various factors (e.g., weight, contents, declared value, season).

**Product quality:** artisan skills were reputed to have deteriorated during the COVID-19 global pandemic resulting in inconsistent product quality. To validate this conclusion, a standardised product was commissioned from 10 artisans at each of four communities in 2022. An analysis of these products, coupled with demographic data attained through interviews, permitted an evaluation of product consistency at three levels (inter-community, intra-community, and intra-individual) and in relation to factors such as age, experience, and tool ownership.

**Product diversity:** artisan capacity to produce a diverse range of products was reputed to have deteriorated during the COVID-19 global pandemic as a result supply-chain disruptions impacting tool availability. To validate this conclusion, interviews with artisans included questions related to tool ownership and products produced. Data were analysed for significant relationships between each tool, or type of tool, owned, the taxa utilised, and the products produced.

The data and information generated were communicated through targeted publications in peer-reviewed journals and will inform capacity-building activities with partner agencies as part of FIS/2019/122.

#### 4.4.4 Objective 4: To support production and enterprise development within the Taveni 'pearl hub' in Fiji

##### **Design and handicraft skills training of the Somosomo women's handicraft group:**

Regular handicraft skills training workshops were conducted by design and handicraft trainer Marie Erl from New Zealand. Seven 14-day training periods were provided during the project. New designs were introduced in response to specific briefs relating to commissions received during the project (see below).



*Example of a new design developed in response to commissions*

**Develop improved production and production scheduling at Qamea and Dreketi community groups for spat and mabé pearl production:** Improved scheduling of spat collection activities at Qamea improved spat supply to the local pearl farm (Civa Fiji Pearls), and community income. Production of mabé pearls at Dreketi relies on provision of blacklip pearl oysters no longer used for round pearl production from Civa Fiji Pearls, so mabé pearl production scheduling is not within the project's control. Some oysters were provided in early 2024 for mabé pearl production in 2025, however, a small number (35) of blacklip pearl oyster shells, containing mabé pearls, were secured from another ACIAR project community in northern Viti Levu (Namarai) and shipped to the Somosomo women's handicraft group in early 2024. These oyster shells/mabé will be used to develop new products for the Suva Women's Expo in November 2024 (see below).

**Market research diagnostics and market development for the Taveni pearl hub:** Broad market diagnostic research was not conducted because of rapid development of new market segments during the Project, sufficient to absorb current production. These include establishment of regular bulk sales of handicrafts to a major Fijian jewellery and handicraft retailer, and commissions from a major Fijian web-based jewellery retailer and a large well-

established livelihoods-focused NGO, which greatly expanded market options for 'pearl hub' products. These opportunities were generated as additional income streams to regular sales at resorts and at local and distant Fijian markets and special events such as open-days and the 'Women's Expo' in Suva in November 2023.



*Members of the Somosomo women's handicraft group and their sales display at the Women's Expo, Suva, November 2023.*

Improvements to the handicraft workshop (e.g., bench space and lighting) and product display area of the Somosomo women's handicraft group facility, as well as improved signage, helped boost tourist visits and drive-by sales.

**Stakeholder workshops for enterprise development, financial literacy, business skills (Qamea, Dreketi and Somosomo groups):** In line with Fiji Government policy and Ministry of Fisheries priorities, significant efforts were made towards establishing a formal co-operative within the Taveuni pearl hub group of communities. Consultations with communities and with senior and local Fisheries staff determined that the preferred way forward was to (at least initially) establish the Somosomo handicraft group as a formal co-operative.

Consultation and information sessions relating to establishing and operating cooperatives were provided to the Somosomo women's handicraft group by Mr. Ian Buck (Project Business Consultant) and representatives of the Ministry of Trade, Co-operatives, Small and Medium Enterprises (MTCSME) with whom Mr. Buck worked very closely. Mr Buck provided financial literacy and business skilling training/workshops to the Somosomo women's handicraft group, particularly relating to development of a Business Plan and other documentation required for a formal application by the Somosomo women's handicraft

group (as Nasomo Ra Marama Handicraft Co-operative Limited) to the MTCSME to become a co-operative. This application was submitted to MTSCME in June 2024.

## 5 Achievements against activities and outputs/milestones

### Objective 1: To support sector planning, improve market knowledge and stakeholder capacity in Tonga

no.	Activity	outputs/ milestones	completion date	comments
1.1	Revise the pearl livelihoods sector development plan	N/A <sup>2</sup>	N/A	<ul style="list-style-type: none"> <li>The Development Plan has been revised on the basis of ACIAR-funded research in FIS/2014/060 relating to economics and FIS/2016/126 relating to culture methodology.</li> <li>Completion of the revised Plan is a milestone of FIS/2029/122 and will include market/marketing information generated by World Bank research completed in June 2024.</li> </ul>
1.2	Market Research diagnostics and market development for Tongan projects	-	-	<ul style="list-style-type: none"> <li>The project engaged collaboratively with the World Bank consultant investigating and reporting on potential markets and marketing opportunities for Tongan mabè pearls</li> <li>Results of the World Bank market study will be reported in mid 2024 and will provide a basis for more focuses research of key markets and marketing opportunities (low hanging fruit) to be investigated within FIS/2019/122.</li> </ul>
1.3	Design and handicraft skills training of stakeholders in Vava'u	-	-	<ul style="list-style-type: none"> <li>The project was unable to provide any of the planned handicraft skills training because of damage to the Vava'u Pearl Centre (VPC) which rendered the workshop and its equipment unusable.</li> <li>Planned refurbishment of the VPC was delayed and had not begun by the end of this project.</li> <li>The project facilitated World Bank's purchase of handicraft machinery and equipment to be used to reestablish handicraft workshops in Vava'u and Ha'apai during 2024.</li> </ul>
1.4	Stakeholder workshops for enterprise development, financial literacy, business skills (Vava'u and Ha'apai)	-	-	<ul style="list-style-type: none"> <li>Planned stakeholder workshops were not conducted for a number of logistic reasons. Stakeholder training recommenced in 2024 as part of follow-on project FIS/2019/122.</li> <li>Applications to Australian Volunteers International (AVI) for two volunteer placement in Tonga to support development of the mabè pearl sector were successful. Two well qualified people were interviewed and selected to assist with 'business development' and 'technical' aspects of this and the follow on project FIS/2019/122. Their deployment to Tonga in early 2024, however, was terminated as a result of change in AVI policy. Volunteers have proven to have vital support roles in prior ACIAR projects in Tonga.</li> </ul>

<sup>2</sup> Outputs/Milestones and Completion dates are not included in the project document.



### Objective 2: To improve market knowledge and community handicraft capacity in Samoa

no.	activity	outputs/ milestones	completion date	comments
2.1	Market research diagnostics	N/A <sup>3</sup>	N/A	<ul style="list-style-type: none"> <li>• Surveys of retail outlets and markets collected data relating outlets stocking pearl/mother-of-pearl/<i>Trochus</i> shell handicraft items, the types of products available and sales prices.</li> <li>• Research identified potential and willing outlets for product sales trials in the following ACIAR project (FIS/2019/122).</li> </ul>
2.2	Assessment and upgrading of existing handicraft workshops	N/A	N/A	<ul style="list-style-type: none"> <li>• Handicraft workshops were inspected along with existing machinery used in prior handicraft training exercises in Samoa.</li> <li>• A building suitable to house a dedicated handicraft training facility has been identified and a renovation plan approved</li> <li>• It is anticipated that the new dedicated handicraft training facility will be completed by the end of 2024.</li> <li>• Minor equipment list for workshop completed</li> </ul>
2.3	Design and handicraft skills training and product development	N/A	N/A	<ul style="list-style-type: none"> <li>• For various logistic reasons (some outlined above), design and handicraft skills training was not conducted during this project, but will begin in Q4 2024.</li> <li>• A dedicated handicraft training manual for <i>Trochus</i> shell has been compiled to support training.</li> </ul>

### Objective 3: To assess sustainability in sourcing mother-of-pearl (MOP) and market options for MOP products in Papua New Guinea

no.	activity	outputs/ milestones	completion date	comments
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<sup>3</sup> Outputs/Milestones and Completion dates are not included in the project document.

3.1	Sector review	N/A <sup>4</sup>	N/A	<ul style="list-style-type: none"> <li>• Available data were extracted from physical records and the electronic data management system of the NFA. These data were standardised and validated to permit construction of datasets documenting MoP production and trade between 1888 and 2020. The approach taken in construction of the datasets was peer-reviewed and published as: <ul style="list-style-type: none"> <li>Simard, N.S.M., Militz, T.A., Kinch, J., Southgate, P.C. 2022. From past to present: Construction of dataset documenting mother-of-pearl exports from a Pacific Island Nation, Papua New Guinea. <i>Frontiers in Marine Science</i> 8: 762610.</li> </ul> </li> <li>• These datasets are now held by the NFA and publicly available from the UniSC Research Data Collection: <ul style="list-style-type: none"> <li>Simard, N.S.M., Militz, T.A., Kinch, J., Southgate, P.C. 2022. Mother-of-pearl exports for Papua New Guinea from 1888 to 2019. DOI: <a href="https://doi.org/10.25907/00080">https://doi.org/10.25907/00080</a>.</li> </ul> </li> <li>• The datasets permitted further analyses to be undertaken that generated new insights into the sustainability of sourcing MoP and market options for MoP products in PNG. This component of the sector review was peer-reviewed and published as: <ul style="list-style-type: none"> <li>Simard, N.S.M., Militz, T.A., Kinch, J., Southgate, P.C. 2022. Shocks within a Pacific island fishery: A historic study of events impacting the mother-of-pearl fishery in Papua New Guinea. <i>Marine Policy</i> 143: 105173.</li> </ul> </li> <li>• Unpublished data and information generated during FIS/2014/060 was consolidated and analysed to address key questions for assessing sustainability and market options related to worked pearl and MoP transacted as shellcraft. This component of the sector review was peer-reviewed and published as: <ul style="list-style-type: none"> <li>Simard, N.S.M., Militz, T.A., Kinch, J., Southgate, P.C. 2022. Utilization of marine taxa within an artisanal shellcraft sector of the Indo-Pacific region. <i>Frontiers in Marine Science</i> 9: 1074996.</li> <li>Simard, N.S.M., Militz, T.A., Kinch, J., Nunn, P., Southgate, P.C. 2024. Social ecological factors, stock status, and governance relating to a shellcraft fishery in the Indo-Pacific region. <i>Journal of Ethnobiology</i> 44(3): 320-337.</li> </ul> </li> </ul>
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<sup>4</sup>Outputs/Milestones and Completion dates are not included in the project document

3.2	Assess the potential for pearl oyster spat collection in Milne Bay	N/A	N/A	<ul style="list-style-type: none"> <li>• The sector review (Objective 3.1) guided identification of sites with potential to support pearl oyster spat collection in Milne Bay. With this knowledge, a scoping visit was undertaken in July 2023 to validate site potential.</li> <li>• The scoping visit identified unforeseen logistical and social barriers to successful spat collection in Milne Bay. As several barriers were of an institutional nature and likely to persist for the duration of the SRA, direction was received from NFA not to proceed with spat collection trials.</li> <li>• Effort was re-directed to assess sustainability of alternative pathways for sourcing MoP, such as capture-fisheries, using the data and information consolidated as part of the sector review (Objective 3.1). One pathway identified involves the use of shell wastes generated from the consumption of molluscs. Relevant results were peer-reviewed and published as:  Simard, N.S.M., Miltz, T.A., Kinch, J., Southgate, P.C. 2023. Consumption of mollusks and potential utilization of resulting shell wastes for shellcraft within a Pacific Islands context. <i>Human Ecology</i> 51: 1057–1069.</li> </ul>
3.3	Market research diagnostics	N/A	N/A	<ul style="list-style-type: none"> <li>• The sector review (Objective 3.1) guided market research diagnostics for MoP products in PNG. Face-to-face interviews and focal group sessions with artisans occurred in the Tigak Islands, Lavongai, and Samarai Islands regions of PNG. More than 100 interviews were completed.</li> <li>• Further research was then carried out to validate conclusions formed from interviews. These experiments concerned: <ul style="list-style-type: none"> <li>➤ International market access</li> <li>➤ Product quality</li> <li>➤ Product diversity</li> </ul> </li> <li>• The data and information generated will inform capacity-building activities with partner agencies as part of FIS/2019/122. Additionally, results pertaining to the influence of tool availability on product diversity were peer-reviewed and published as:  Miltz, T.A., Simard, N.S.M., Kinch, J., Southgate, P.C. 2024. Human dimensions in shellcraft: tool ownership differentiates taxa utilised and products produced. <i>Frontiers in Marine Science</i> 11:1354163.</li> </ul>

**Objective 4: To support production and enterprise development within the Taveni ‘pearl hub’ in Fiji**

no.	activity	outputs/ milestones	completion date	comments
3.1	Skills training at Somosomo	N/A <sup>5</sup>	N/A	<ul style="list-style-type: none"> <li>• Seven 14-day handicraft skills training workshops were provided during the project by handicraft trainer Marie Erl from New Zealand.</li> <li>• Training included development of new designs responding to specific briefs from commissioned orders (see below).</li> <li>• Improved sales and income by the Somosomo women’s handicraft group attracted new members with the group increasing from 8 to 12 members during this project.</li> </ul>
3.2	Improved production at Qamea and Draketi	N/A	N/A	<ul style="list-style-type: none"> <li>• Improved scheduling of spat collection activities at Qamea improved spat supply to the local pearl farm (Civa Fiji Pearls), and community income.</li> <li>• Mabé pearl production scheduling was not within the project’s control, so a small number (35) of blacklip pearl oyster shells, containing mabé pearls, were secured from another ACIAR project community in northern Viti Levu and shipped to the Somosomo women’s handicraft group. These oyster shells/mabé will be used to develop new products for the Suva Women’s Expo in November 2024.</li> </ul>
3.3	Market research diagnostics	N/A	N/A	<ul style="list-style-type: none"> <li>• Broad market diagnostic research was not required because of rapid development of new market segments during the Project which is more than sufficient to absorb current production. In addition to regular income streams from sales at resorts, markets and special events, these include: <ul style="list-style-type: none"> <li>➤ Regular bulk sales of handicrafts to a major Fijian jewellery and handicraft retailer</li> <li>➤ Commissions from a major Fijian web-based jewellery retailer</li> <li>➤ Commissions from a large well-established livelihoods-focused NGO</li> <li>➤ Enquiry for regular sales from an Australian retailer</li> </ul> </li> </ul>

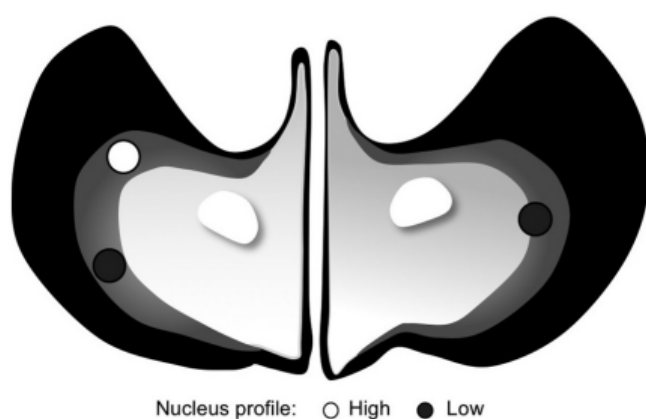
<sup>5</sup>Outputs/Milestones and Completion dates are not included in the project document

3.4	Workshops for enterprise development	N/A	N/A	<ul style="list-style-type: none"> <li>• Enterprise development activities focused primarily on the potential for the Somosomo women’s handicraft group to become a formal co-operative in line with Fiji Government policy and Ministry of Fisheries priorities.</li> <li>• Consultation and information sessions relating to establishing and operating cooperatives were provided to the Somosomo women’s handicraft group by Mr. Ian Buck (Project Business Consultant) and representatives of the Ministry of Trade, Co-operatives, Small and Medium Enterprises (MTCsME).</li> <li>• Mr Buck provided financial literacy and business skilling training/workshops to the Somosomo women’s handicraft group, relating particularly to development of a Business Plan and other documentation required for a formal application by the group (as Nasomo Ra Marama Handicraft Co-operative Limited) to the MTCsME to become a co-operative. This application was submitted to MTCsME in June 2024.</li> </ul>
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## 6 Key results and discussion

### 6.1 Tonga

**Revised Development Plan for the mabè pearl sector:** A Development Plan for the Tongan mabè pearl sector was finalised and endorsed by government as part of the ACIAR-PARDI project in 2013. Since then, much research was conducted into mabè pearl culture methods, culture site preferred characteristics and economics within ACIAR Projects FIS/2014/060<sup>6</sup> and FIS/2016/126<sup>7</sup> in particular, and results have direct implications for future strategies of the sector. For example: (1) hatchery production costs are now known (Johnston et al., 2020c) and options for government to sell spat to farmers (currently supplied free of charge), and the financial impacts of this, can be assessed; (2) knowledge of latitudinal variation in nacre secretion rates (Gordon et al. 2021; Gordon, 2020a) and culture site characteristics (Gordon et al. 2021; Gordon, 2020a; Smallhorn-West et al., 2021) influences the duration of the pearl production cycle, pearl yield and quality, and designation of new areas for mabè pearl culture; (3) oyster culture methods have improved (e.g., Gordon et al. 2020b) leading to improved growth rates and survival, and improved knowledge of the pearl production process (Gordon et al., 2019) has improved pearl yield, quality and crop value; and (4) profitability of varying levels of subsistence mabè pearl farming (and required labour inputs) are now established (Johnston et al., 2020b). Revision of the 2013 Development Plan was begun during this project to incorporate recent research findings. However, at this stage of sector development, a major consideration of the revised Plan is that of markets and marketing. World Bank commissioned a report into potential markets and marketing of Tongan mabè pearls in 2023 with the report to be submitted in mid 2024. Project personnel collaborated with this effort. The report will identify key potential markets as a basis for market and marketing strategies to be considered in the revised Development Plan. Completion of the revised Development Plan will be an output of FIS/2019/122 and will involve stakeholder consultations, inputs from government, business specialists, World Bank and SPC.



*Suggested optimum nucleus arrangement to maximise nacre thickness and quality of mabè pearls produced by 130–150 mm DVH Pteria penguin (Gordon et al., 2019)*



*Protected culture of juvenile Pteria penguin in protective culture cylinders has become standard culture methodology to maximise growth rates and survival (Gordon et al., 2020).*

<sup>6</sup> FIS/2014/060: Developing pearl industry-based livelihoods in the western Pacific

<sup>7</sup> FIS/2016/126: Half-pearl industry development in Tonga and Vietnam

## 6.2 Samoa

**Development of dedicated handicraft training facility:** Prior handicraft training with *Trochus* shells in Samoa, as part of ACIAR project FIS/2016/128<sup>8</sup>, utilised a temporary training workshop within the Ministry of Fisheries (MoF) facility in Apia, which was dismantled following training. Given the goal of the follow-on project (FIS/2019/122) to establish a viable trochus shell-based handicraft sector in Samoa, discussions and site visits involving project personnel, MoF staff and the project handicraft trainer, identified a stand-alone Fisheries building adjacent to the MoF facility and fish market which, with suitable renovation, will function as a permanent handicraft training and production centre and retail outlet. Plans for renovation have been agreed and should be completed in Q4, 2024. A dedicated and permanent training/production facility will best support future project activities, access for artisans and sector development.

**Collation of training info:** Samoa is the only south Pacific island nation which utilises primarily *Trochus* shell for shell-based handicraft production. Although other manuals are available to support shell-based handicraft training (e.g., Simard, 2019), instructive information specific to *Trochus* shell was unavailable. A short manual outlining aspects of power tool use and maintenance and methods to produce a range of *Trochus* shell products (e.g., polished shells, bangles, key rings) as well as findings and componentry, was developed to support future handicraft training in Samoa.

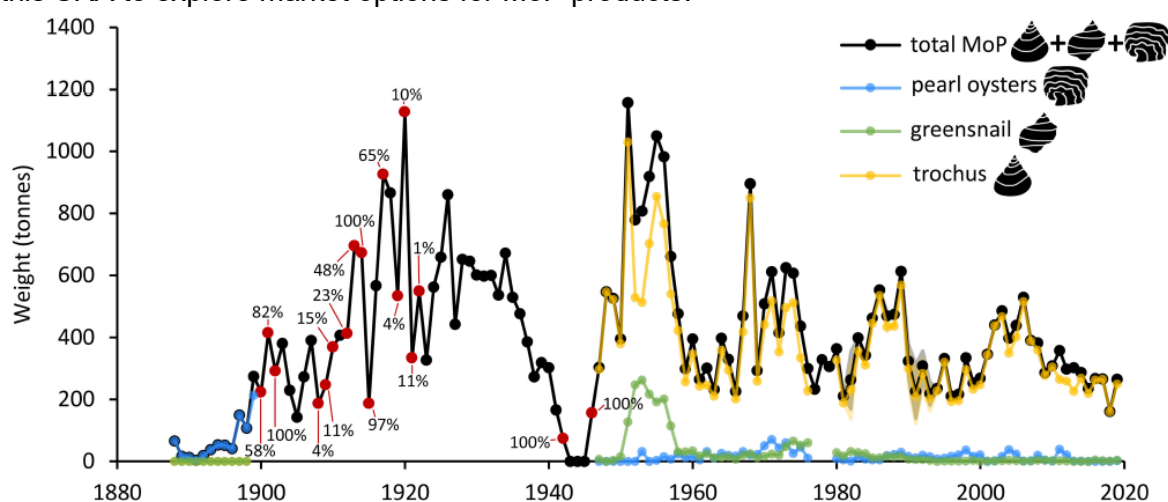


*Excerpts from the Trochus handicraft training manual*

<sup>8</sup> FIS/2016/128: Reef colonisation and socioeconomic impacts from trochus translocations to Samoa.

### 6.3 Papua New Guinea

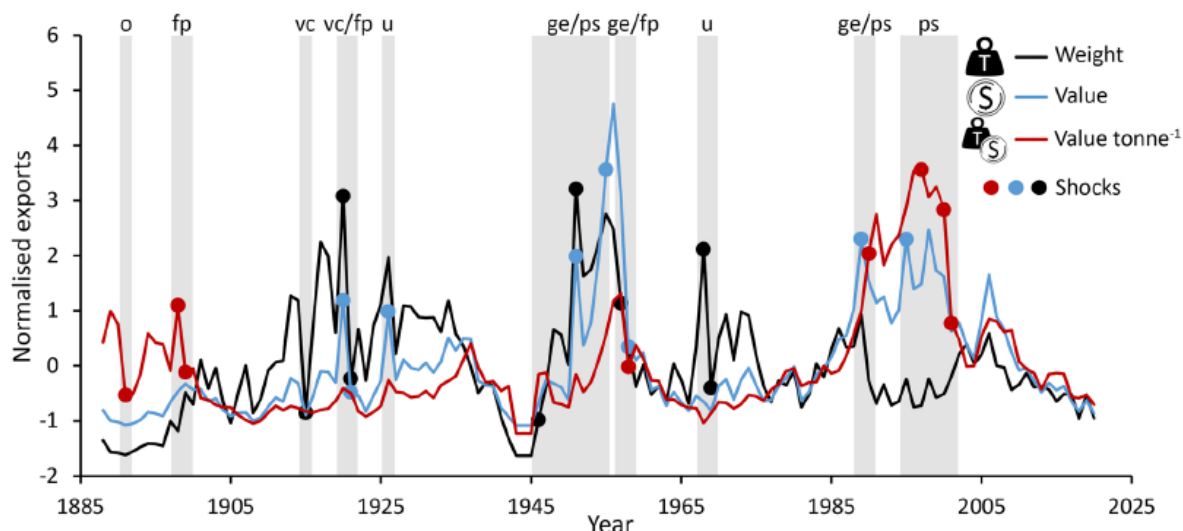
**Construction of datasets documenting trade in MoP products:** With extensive reef systems and abundant MoP resources, PNG is regarded as a main regional producer of MoP, where the harvest and sale of MoP is estimated to support 20–30% of the coastal population, accounting for as much as 75% of income in some areas. Expanding coastal human population and increasing pressure on marine resources emphasise the need for accessible fisheries information for analysis and to support effective fisheries management in the region. Since little attention has been given to MoP fisheries in PNG over the last 40 years and historical information is important in guiding appropriate policy, the datasets produced by this SRA provide a basis for raised awareness and improved management of MoP fisheries within both national and regional contexts. The datasets present and facilitate access to MoP trade information, which can be used to estimate and analyse fisheries production, bioeconomic trends, shocks, and their potential drivers. The datasets could further be evaluated against other economic and social variables as well as ecological information to inform development of broader marine policy and management strategies. Such potential was leveraged during this SRA to explore market options for MoP products.



Annual weight of mother-of-pearl (MoP) exports from PNG between 1888 and 2020. Data partly or entirely derived through interpolation are marked in red and the relative contribution of interpolated data indicated as a percentage.

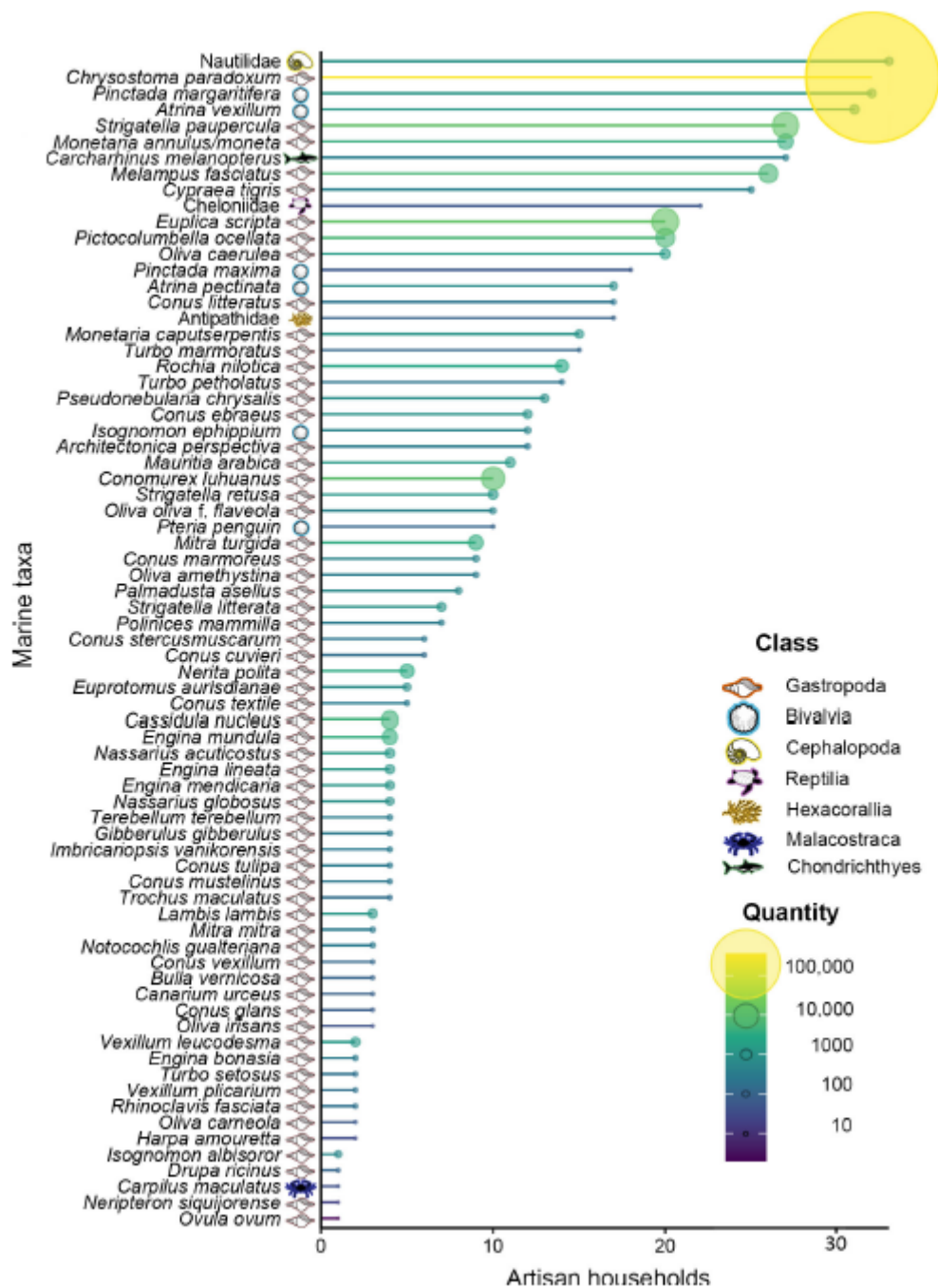
**Market options for MoP products:** The rippling economic effects from market and trade disruptions due to the COVID-19 global pandemic were anticipated to reduce market demand and interrupt transport links, but do not appear to have materialised as shocks, or sudden unexpected disturbances, in the MoP fishery system in PNG. This is surprising because at least one major domestic company issued a notice early in 2020 that the purchasing of MoP would cease until further notice. While MoP exports certainly decreased in 2020, the absence of a shock can be attributed to already low annual MoP exports preceding the pandemic. Much like the lead up to the Second World War, MoP exports were in steady decline prior to the pandemic such that a further decrease was consistent with the pre-existing trend. With the weight, value, and price of MoP products exported from PNG now at their lowest point in the last 50 years, there is need to explore alternative market options for MoP products. These results highlight the potential future importance of informal domestic sales of worked pearl and MoP transacted as shellcraft at tourist destinations in PNG (e.g., Militz et al. 2021).





Co-occurrence of shocks across weight, value, and value tonne<sup>-1</sup> of MoP exports from PNG between 1888 and 2020 with associated events categorised as overfishing (o), fishery-related policy (fp), private-sector (ps), geo-economic (ge), violent conflict (vc), or unknown events (u).

**Sustainability in sourcing mother-of-pearl:** Sustainable utilisation of marine taxa is critical for maximizing social and economic goals of livelihood development within PNG. Yet, despite an increasing importance of shellcraft as a livelihood activity within PNG, information on the taxa utilised within shellcraft sectors remains scant. A key result of this SRA was identifying not just MoP but 73 taxa, representing at least 77 species, are utilised for shellcraft in PNG. Many of these taxa had not previously been linked to this activity. In terms of quantity, the majority of taxa were molluscs of either class Gastropoda (83.6%), represented by 37 genera, or class Bivalvia (9.6%), represented by four genera. Substantial variation was evident in the diversity of taxa utilised among artisans engaged in shellcraft ( $H' = 1.09 \pm 0.71$ ;  $D = 0.43 \pm 0.27$ ), with each artisan utilising a unique composition of  $19.1 \pm 10.6$  taxa.



Utilisation of marine taxa for shellcraft among the Tigak Islands of PNG. Utilisation is represented by the number of artisans utilising each taxon and the quantity of each taxon utilised by all artisans.

Source habitats ranged from pelagic to benthic intertidal and subtidal substrates, with the geographic scale of exploitation extending up to 417 km away from individual artisans. There was complete reliance on capture-fisheries to source MoP and other taxa utilised. Fishing was infrequent and quantities fished were low for most taxa when compared with other small-scale fisheries in PNG. Only low-impact fishing techniques, such as gleaning, combing, and free-diving, were used. For most taxa (76%), there was consensus among fishers that local stocks had not declined in the recent past. While for no taxon was there a consensus that local stocks had declined, there were seven taxa for which a consensus on stock status could not be reached. These taxa included the MoP-bearing molluscs, *Pinctada margaritifera* and *Rochia*

*nilotica*. The latter species is also fished for home consumption and it may prove practical for artisans to use leftover shell waste for shellcraft. At present, only a third of the shells attained when consuming *R. nilotica* are subsequently used for shellcraft. It was concluded that capture-fisheries can provide a sustainable source of shell for most taxa utilised in shellcraft and the abundant shell waste generated through subsistence fishing could, with appropriate training, become a novel source of material for shellcraft.

**Potential for pearl oyster spat collection in Milne Bay:** Site inspections and interviews with community, government and commercial stakeholders in Milne Bay confirmed several sites were environmentally suitable for spat collection. Local knowledge, however, revealed the COVID-19 global pandemic had engendered unforeseen logistical and social barriers to successful spat collection in Milne Bay, relating to (1) law and order, (2) limited capacity for partner agency (i.e., NFA) support, (3) pending sale of Coral Sea Mari-Culture (CSMC), and (4) altered market structures for MoP products.

1. Law and order in regional areas of Milne Bay has deteriorated significantly since FIS/2014/060. All stakeholders expressed concern relating to sea piracy and its implications for spat collection. As an example, the pearl farming activities of CSMC are now considered feasible at only three islands (Samarai, Kwato, Ebuma) because of security concerns. This greatly limits the scope, and potential community impact, of any research program around regional spat collection in Milne Bay.
2. The NFA office in Alotau is currently vacant. While stakeholders advised that NFA is planning to reassign a Field Officer to this post, it remains unclear when this will occur. Any interim activities in Milne Bay would need to be facilitated by a third-party, a provincial or private-sector entity, outside the contractual arrangement with NFA/NFC.
3. Coral Sea Mari-Culture is no longer in operation, with the business and all assets having been listed for sale. As part of FIS/2014/060, CSMC was an important private-sector partner that assisted in delivery of project activities to partner communities in Milne Bay. Whilst the Director of CSMC remains keen to assist, he cannot commit to long-term arrangements given the possible sale of the business.
4. Of 50 artisans trained at Kwato, Logea, and Samarai Islands in FIS/2014/060, only three remain active in producing shellcraft. Many indicated limited market access (cessation of tourism and, more recently, change in cruise itineraries) prompted them to pursue alternative occupations. During FIS/2014/060 cruise ships would dock at Samarai Island and nearby Doini Island. This no longer occurs and the nearest market options (e.g., Alotau) require a rough, wet 2.5 hour sea voyage. In the absence of active artisans, the need for MoP has greatly reduced. For example, CSMC still has stockpiles of MoP leftover from pearl farming activities which, prior to COVID-19, were sold to artisans. No sales of significant volume have occurred since. In the absence of ready markets and demand, the strategy of establishing community-based pearl oyster spat collection in the Samarai Islands region is now questionable.

Several of these barriers were of an institutional nature and are likely to persist for years to come. All stakeholders are of shared opinion there is need to formulate a new strategic plan for regional development of shellcraft in Milne Bay prior to commencing with community-based training activities. There is interest in developing regionally unique shellcraft products that rely on capture-fisheries, rather than aquaculture, as the primary source of MoP and other shells.



*In the absence of cruise arrivals, facilities at Samarai Island supporting sales of shellcraft to tourists have fallen into disrepair.*

*Thane Militz (centre) spoke with Alotau-based artisans from the Trobriand Islands who supply most of the shellcraft available from hospitality venues and informal markets in Alotau. The artisans highlighted difficulties in producing shellcraft at home (in the Trobriands), due to the lack of tools and components, as the reasons for their emigration to Alotau. The shell used is fished by family in the Trobriand Islands and sent to Alotau by boat.*



**International market access:** FIS/2014/060 supported several artisan enterprises in establishing web-based sales of MoP products to an interprovincial and international customer base. Interviews and focal group sessions with artisans found this business model is no longer feasible due to three main factors: (1) postal service reliability, (2) postal service regularity, and (3) cost of alternative courier services.

1. Of the 42 parcels sent from Australia to private sector partners in PNG over the course of this SRA, only 31 (73.8%) arrived. It was not possible to identify a pattern associated with lost parcels based on their weight, contents, or declared value.
2. Of the 31 parcels that arrived, the average (mean  $\pm$  SD) time taken to reach the destination was  $55 \pm 22$  days. With such variability, it hard to provide customers an ETA and many are too impatient to wait months to receive products purchased. Faster options are also no longer available, with AusPost having suspended their Express Mail service to PNG.
3. Whilst TNT/Fedex and DHL remain alternative options, costs for these services have risen dramatically. For instance, a standard 1 kg satchel sent through TNT to an inter-provincial destination, which cost 40 PGK during FIS/2014/060, now costs 77 PGK.

In response to these challenges, artisans have either ceased web-based sales of MoP products or transitioned to wholesale-only models where, due to economies of scale, the increased costs of TNT/FEDEX and DHL can be absorbed. In this context, domestic sales of shellcraft at tourist destinations in PNG will likely be the most feasible market option in the near future.

**Product quality and diversity:** Products were highly-variable in quality between communities, between artisans within a community, and even from the same artisan. This

appears to be an inherent attribute of producing shellcraft from home. Market research (e.g., Militz et al. 2021) suggests products which are obviously handmade will sell well to tourists in informal market settings of PNG. A variable product, however, does not amend itself to formal enterprise development or branding where a certain level of consistency in quality is required. Production at centralised workshops, as developed in Fiji and Tonga, has not been pursued in PNG, but may prove necessary to diversify market access.



*Products of PNG include (A) bangles, (B) bracelets, (C) earrings, (D), necklaces, or (E) pendants.*

How tool ownership differentiates taxa utilised and products produced is important for determining if access to a specific tool is necessary, or an encumbrance, for producing desired products and product diversity. This SRA identified tools used and variation in tool ownership among artisans engaged in shellcraft to afford an accurate and realistic understanding of the tools required to participate in this activity. Results indicated ownership of neither all nor any specific tool was required to participate in shellcraft, with artisans typically owning a unique combination of tools. Furthermore, results identified that some specific tools were critical for affecting the attractiveness of utilising certain taxa and products. On this basis, there is a need to ensure local supply of a range of tools and components to maintain adequate product diversity. Interviews revealed international market access challenges are affecting not only sales, but also supply of tools and components. There is an urgent need to explore avenues for supply-chain resilience to ensure the full complement of tools and components remain accessible to artisans.



*Tools that were used for shellcraft in PNG: (A) mechanical hand drill, (B) pump drill, (C) coping saw, (D) jewellery saw, (E) cutter pliers, (F) jewellery pliers, (G) needle file, (H) stone file, (I) grinder, and (J) electric rotary.*

## 6.4 Fiji

**Fiji's first handicraft cooperative:** More than twelve cooperatives have been developed for fisher communities in Fiji in line with Fiji Government policy and Ministry of Fisheries priorities. Consultation and information sessions relating to establishing and operating cooperatives were provided to the Somosomo women's handicraft group by Mr. Ian Buck (Project Business Consultant), representatives of the Ministry of Trade, Co-operatives, Small and Medium Enterprises (MTCSE) and Ministry of Fisheries, towards a goal of establishing the handicraft group as a formal cooperative. Required documentation, including development of a Business Plan, were developed over several months during this project and an application for a cooperative called 'Nasomo Ra Marama Handicraft Co-operative Limited', was lodged with MTCSE in June 2024 (within FIS/2019/122). Establishment as a cooperative will allow the group stronger representation to government, business skill and business development training, greater connection to initiatives supporting business development and retail opportunities (including export pathways), regular interaction with MTCSE and improved access to government funds for infrastructure and equipment upgrades etc. This cooperative will be the first to focus on fisheries-based handicrafts and the development process, and new collaborations it fostered, provides a framework for similar developments in other parts of Fiji.



*Consultation between the Somosomo women's handicraft group, the Minister for Fisheries (Centre), Fisheries Regional Manager (northern region), project business consultant (Ian Buck). Local Fisheries staff and representatives of the Ministry of Trade, Co-operatives, Small and Medium Enterprises.*

**New market segments and product diversity:** New markets developed for products of the Somosomo women's handicraft group during this project offer improved income and have stimulated increased membership of the group to 12 members. New buyers seeking recurrent supply of the regular products made by the group now include domestic and international

(Australia and New Zealand) interests. Commissions from well-established Fijian retail interests have required development of new products, often requiring improved or new handicraft skills, brought to the group as part of their regular training program. This broader range of products is likely to open up further market opportunities, and improve income and resilience of the group.



*Minister for Fisheries, Fiji inspects pearl shell handicraft displays at the Somosomo women's handicraft group, Fiji.*

*The Vava'u Pearl Farmer's Association won first prize for best innovative booth at the Tonga Trade Show in 2022.*



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## 7 Impacts

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### 7.1 Scientific impacts – now and in 5 years

Immediate scientific impacts from this SRA will stem from research-informed development of activities and strategies with government agencies, private individuals, and communities groups involved in FIS/2014/060 to support seamless transition to FIS/2019/122. The foundational groundwork undertaken during this SRA has improved understanding of how the COVID-19 global pandemic had shifted contexts since completion of FIS/2014/060 – particularly in relation to elements of local capacity and viable markets for mabé pearl and MoP transacted as shellcraft. This information will be critical over the life span of FIS/2019/122.

To support the use of historical data by agencies concerned with managing MoP fisheries, this SRA produced quantitative, standardised, and quality-validated datasets covering more than 130 years (1888–2020) of MoP exports from PNG, a key producer in the Pacific Islands region. As the datasets present and facilitate access to MoP trade information, they can be used to estimate and analyse fisheries production, bioeconomic trends, shocks, and their potential drivers. Indeed, within this SRA, the utility of these datasets had scientific impacts by permitting the first comprehensive assessment of MoP industries in PNG to be undertaken since the seminal work of Glucksman and Lindholm (1982) more than 40 years ago. Attaining permission for the datasets produced to remain accessible through unrestricted repositories, UniSC Research Bank and Research Data Australia, ensures an enduring legacy of this SRA and potential for future scientific impacts over the next five years.

Efforts made during this SRA to restore the NFA library collection will have lasting and far-reaching scientific impacts. More than 200 documents were recovered through a file sharing arrangement between the NFA and PAMBU that evolved during this SRA, and many others were attained through inter-library loan arrangements with institutions outside PNG. These documents are now accessible at the NFC, the academic and training institute of the NFA, and will benefit staff and students engaged in technical and applied training in capture fisheries, post-harvest processing, aquaculture, and marine resource management. Furthermore, a large portion (778 documents) of the NFA library collection has now been made available online through the NLA since NFA agreed to revoke all prior restrictions placed on the use and distribution of these documents. For the first time, a large portion of the NFA library collection has become publicly accessible outside PNG.

This SRA supported UniSC PhD candidates Nitya Simard (Thesis title: “Investigating small-scale fisheries supporting shellcraft in Papua New Guinea”) and Bill Johnston (Thesis title: “Applied economics within pearl farming value chains supporting community livelihoods in Fiji and Tonga”), who commenced their candidature during FIS/2014/060, to finalise their research. Both submitted their thesis in Q4, 2023.

The combined theses generated twelve peer-reviewed journal articles (Johnston 7 and Simard 5), all which have worldwide audience. Both graduates are engaged in FIS/2019/122 and will be involved in translating the new knowledge generated during this SRA into community impacts over the next five years.





*This SRA supported PhD candidates, Bill Johnston (left) and Nitty Simard (right), who commenced their candidature during FIS/2014/060, in finalising their research. Both submitted their theses for examination in 2023.*

## 7.2 Capacity impacts – now and in 5 years

**Emerging leaders in research:** This SRA improved partnership and collaboration among a cohort of young scientists who are emerging leaders in ACIAR-funded research. Dr Thane Militz, Dr Pranesh Kishore, and Dr Nitty Simard developed a productive collaborative relationship during FIS/2014/060 and their teamwork helped to amplify impacts of this SRA. These three scientists will form part of the Project Leadership team for FIS/2019/122. In five years, it is anticipated they will be independently qualified to lead ACIAR-funded research projects in the Pacific region.

**Australian Centre for Pacific Islands Research (ACPIR):** In Australia, this SRA helped support development and delivery of two ACPIR Summer Research Scholarship (SRS) programs: (1) “*Variability in shellcraft products*” and (2) “*Construction of a dataset documenting pearl exports from Papua New Guinea*”. These programs were developed for UniSC undergraduate students considering HDR studies or a career in the research-for-development space to participate in a fourth-month internship, co-mentored by a UniSC HDR candidate (Nitty Simard) and staff member (Thane Militz). The two students, Inaliguyau Lutschini and Eddie Hay, participating in these programs had previously lived in PNG and were eager to contribute to activities of this SRA. Inaliguyau is now working towards her PhD and Eddie is employed as a UniSC research assistant.

*“I would highly recommend the ACPIR SRS program to future undergraduate students as it offers insight into being part of a research team and taught me everything involved in the research process. The highlight this program was knowing my efforts were contributing to an improved understanding of livelihoods that are significant to local communities in Papua New Guinea” –  
Inaliguyau Lutschini*

*Inaliguyau Lutschini examined variability in shellcraft products as part of the SRS program.*



Through ACPIR, this SRA also helped support development and delivery of a Work Integrated Learning placement for a UniSC BBusMgt student, Lovelyn Daki. The placement afforded opportunity for Lovelyn to gain hands-on experience in the research-for-development sector. Lovelyn completed her BBusMgt degree in 2023 and is now working in PNG.

**Local support agencies:** In PNG, this SRA worked closely with a newly formed (since 2022) NGO, Brave Partners, that directs its efforts towards safeguarding unique cultural heritage in New Ireland Province. The director, Mathew Tules, was engaged as a research assistant in FIS/2014/060 where he oversaw activities in the Lavongai region. This SRA afforded opportunity to further mentor Mathew and his team in research methods and, in 2023, Brave Partners was engaged to independently conduct research at the Tabar Islands. This NGO is now pursuing linkages with other funding bodies to establish a portfolio of projects that seek to benefit remote island communities in New Ireland.



*Mathew Tules (right) assisting with artisan interviews at Kung Island in the Lavongai region of PNG.*

In Fiji, movement towards establishing a new formal cooperative ‘Nasomo Ra Marama Handicraft Co-operative Limited’ required close collaboration between project personnel and representatives of the Ministry of Fisheries and the Ministry of Trade, Co-operatives, Small and Medium Enterprises (MTCSME). This very productive exercise resulted in development of a business plan for the handicraft group, as part of a formal application procedure to establish a cooperative. As well as providing enterprise development experience and broadening key network contacts for the handicraft group, this exercise provided both ministries with experience in developing fisheries-based enterprises in Fiji, which will be useful in informing similar developments in the future.

**Formal training activities supported by this SRA**

Location	Trainer(s)	Activities	Trainees
Somosomo, Fiji	Marie Erl <sup>9</sup>	Product design Handicraft skills Handicraft production	Somosomo women's handicraft group
Somosomo, Fiji	Ian Buck <sup>10</sup>	Basic business skills Financial literacy Business planning Cooperative application	Somosomo women's handicraft group
PNG	Thane Militz	Training in delivery of artisan interviews	Brave Partners (NGO)
UniSC	Thane Militz	WIL placement on data and project management	Lovelyn Daki (UniSC BBusMgt student)
UniSC	Nitya Simard Thane Militz	SRS supervision and project management	Inaliguyau Lutschini Eddie Hay (ACPIR SRS recipients)
UniSC	Paul Southgate	HDR supervision and project management	Nitya Simard Bill Johnston (UniSC PhD students)
PNG	Thane Militz	Research supervision	Brave Partners (NGO)

**7.3 Community impacts – now and in 5 years**

Community impacts of this SRA have been realised through participation in activities by the following individuals, groups, and NGOs:

- Partner agency staff (in Fiji, Tonga, Samoa and PNG)
- Partner communities
- Somosomo women's handicraft group, Fiji
- Vava'u Pearl Farmers Association, Tonga
- Brave Partners
- UniSC HDR and undergraduate students
- ACPIR SRS recipients

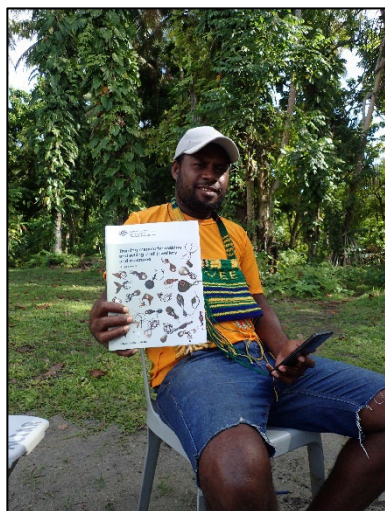
Community impacts resulting from a number of ACIAR-funded projects focused on developing the mabè pearl sectors Fiji and Tonga have been well-documented (e.g., Southgate et al. 2019b; Mikahilovic et al., 2022). Community impacts from an economic perspective are discussed in section 7.3.1, and from a social perspective are discussed in section 7.3.2.

In PNG, collaboration occurred primarily with NFA / NFC and a local NGO, Brave Partners. Both were involved in interviews and focal group sessions within partner communities and assisted in distribution of the Training Manual for Making and Selling Shell Jewellery and Macramé (Simard 2019), developed during FIS/2014/060, to artisans. This manual will serve as a primer for artisans to rebuild confidence, following disruptions caused by the COVID-19

<sup>9</sup> New Zealand based design and handicraft/jewellery trainer

<sup>10</sup> Australia-based project business consultant

global pandemic, in their skills and capacity to produce a diverse range of quality shellcraft products over the next five years.



Artisans in PNG were grateful to obtain copies of ACIAR Monograph 208, which will empower them to refresh their skills and capacity to produce a diverse range of quality shellcraft products.

### 7.3.1 Economic impacts

Engagement with ‘pearl-livelihoods’ value chains in partner countries can have significant positive economic impact. For example, prior research has shown that both pearl oyster spat collection and mabè pearl production are profitable at community level in Fiji (Johnston et al., 2020a) while, in Tonga, mabè pearl production from only 100 oysters annually can produce an income of more than twice the average national income and requires less than 10 hours labour input per week (Johnston et al. 2020b). Mikahilovic et al (2022) reported that such income was commonly used for community-determined infrastructure priorities (e.g., community hall, generator) or reinvested in pearl farming infrastructure and tools.

However, the main market for mabè pearl and pearl shell products within all four partner countries of this project is that related to cruise ship tourism. When the COVID-19 pandemic struck, cruise ship traffic in the region came to a halt which greatly impacted income for the sector. This is illustrated in sales figures from the Vava’u Pearl Centre where, for the 6-months from July to December 2019, sales totalled US\$24,926 (Mikhailovic et al., 2022), but this declined to annual sales of US\$4,048 in 2020, US\$239 in 2021 and US\$1,778 in 2022. While some recovery has occurred since tourism resumed and cruise ship visits are increasing to all partner countries, it is notable that in Tonga, cruise ship visitors in 2023 were less than 30% of pre-pandemic levels (Tongan Government Statistics). An important role of this and the follow-on project (FIS/2019/122) is to assist this recovery and to establish and access new and diversified market for mabè pearl and pearl shell products.

Mikhailovic et al. (2022) noted that “mabé based aquaculture holds values which extend beyond the monetary, notably social, cultural, and environmental values”.

### 7.3.2 Social impacts

**Fiji and Tonga:** Many of the social impacts of individual and community involvement with the ‘pearl-livelihoods’ value chains in Fiji and Tonga were investigated in FIS/2018/129<sup>11</sup> and reported by Mikhailovic et al. (2022). The social benefits they noted included:

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<sup>11</sup> FIS/2018/129 “Monitoring and evaluation of socio-economic impacts of pearl-based livelihood development”

- mabé pearl production was a cooperative activity enabling community and family enterprises, involving men, women, and youth to participate in a range of farm activities together;
- for women, new skills build confidence in their capacity to earn income from work outside of the home and contributed to women's perceptions of empowerment and to their standing in their community and family; and
- creation of unique handicrafts from local resources provided men and women with a form of creative expression representing elements of their culture in new ways, and that handicrafts continue to be valued as cultural resources.

Mikhailovic et al. (2022) also noted that in Tonga, establishment of the Vava'u Pearl Centre enabled mabé farmers and handicraft makers to work together, learn, and support each other in a common location. This was critical for 'breaking up the routines of daily life and in forming social networks with other women, and had direct positive effects on productivity. Similar benefits are likely within the communities of the 'Taveuni Pearl Hub' in Fiji and within the Somosomo women's handicraft group.

**Papua New Guinea:** Management of a shellcraft fishery was found to be a contentious topic within partner communities in PNG. Half the households at the Nusa Islands, for example, expressed the need for regulatory measures while the other half felt regulatory measures were unnecessary. Those expressing a need collectively proposed regulatory measures for 25 of the 69 taxa (36%) fished for shellcraft. There was, however, no consensus for a particular regulatory measure to be applied to any single taxon. Such diverse options on management with inexorably complicate efforts to establish effective governance. From an environmental perspective (see Section 7.3.3), however, it was found that regulatory measures were unlikely to be required for most taxa now or in the next five years. This diminishes the risk of negative social impacts that can arise when opinions on management differ at times of resource scarcity (e.g., Hair et al. 2020).

Further investigation of social-ecological factors related to sourcing MoP for shellcraft in PNG, found that fishing most taxa had no association with the main demographic divisions within households, although in terms of participation and catch richness, women were the main actors. Gleaning, combing, and free-diving were the only fishing techniques used, with taxa primarily fished by gleaning intertidal habitats during the day. The present accessibility of shellcraft implies the positive social impacts of this activity captured as part of FIS/2014/060 (Simard et al., 2019; Militz, 2023; Southgate et al., 2023) will continue to be increasingly realised over the next five years as international tourists begin to return to PNG.

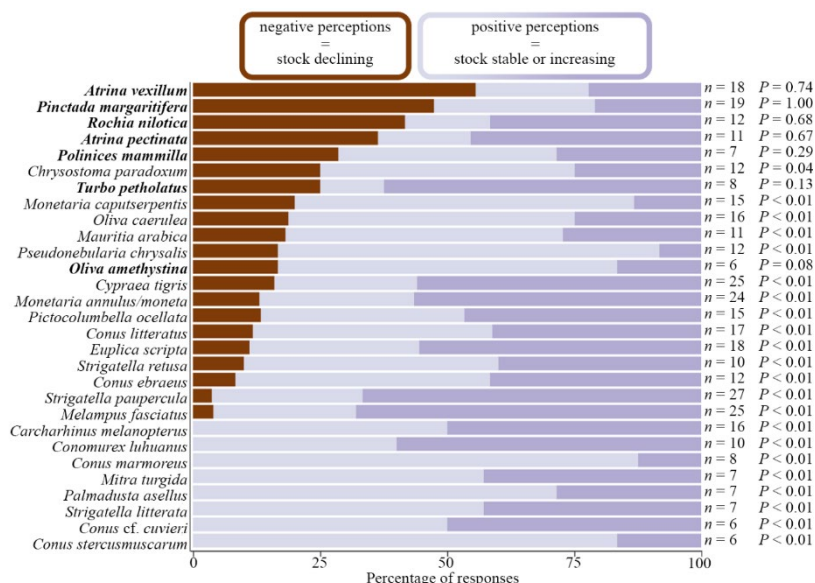
### 7.3.3 Environmental impacts

Pearl culture is an environmentally benign form of aquaculture. It is a form of suspended culture which minimises benthic impacts and it is usually conducted away from coral reefs to minimise predation of farmed oysters. Pearl farming often has positive environmental impacts including: (1) pearl oyster culture equipment may act as fish aggregating devices and can result in increased local availability of food fish; (2) cultured pearl oysters breed and contribute to local stock; (3) cultured pearl oysters are able to remediate turbid waters and remove harmful materials as a result of filter-feeding activity (O'Connor and Gifford, 2008); and (4) routine hatchery production of culture stock for pearl farmers does not deplete wild stocks and is likely to reduce collecting pressure on local wild oysters.

**Papua New Guinea:** Concerns of potential resource access limitation due to the expanding shellcraft sector in PNG (Simard et al. 2019) were further interrogated in this SRA. Evaluation of social-ecological factors in a shellcraft fishery centred at the Nusa Islands of PNG found that fishing was infrequent and quantities fished were actually low for most taxa when compared with other small-scale fisheries in PNG. For most taxa (76%), there was consensus among fishers that local stocks had not declined in the recent past. While for no taxon was there a consensus that local stocks had declined, there were seven taxa for which a

consensus on stock status could not be reached. These taxa included the MoP-bearing molluscs, *Pinctada margaritifera* and *Rochia nilotica*. The latter species is also fished for home consumption and it may prove practical for artisans to use leftover shell waste for shellcraft. At present, only a third of the shells attained when consuming *R. nilotica* are subsequently used for shellcraft. Key results of this SRA were knowledge that wild-capture fisheries can provide a sustainable source of shell for most taxa utilised in shellcraft and the abundant shell waste generated through subsistence fishing could, with appropriate training, become a novel source of material for shellcraft. With aquaculture of MoP unlikely to be successful in Milne Bay for at least the next five years (see Section 6.3), it is proposed that any future ACIAR-investment in support of shellcraft focuses on capture-fisheries, their management, and a better use of existing shell wastes.

Perceptions of stock status for marine taxa fished for shellcraft at the Nusa Islands by a significant number ( $n \geq 6$ ) of artisans. For taxa in bold, perceptions were not significantly positive (Simard et al. 2024)



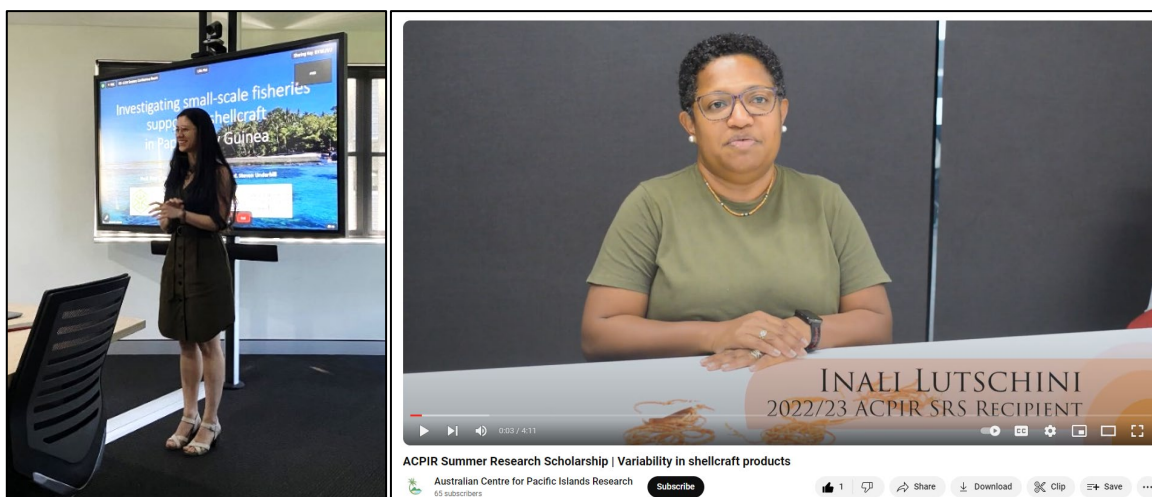
## 8 Communication and dissemination activities

**Internal:** Clear and frequent communication between project personnel was facilitated by regular face-to-face and/or technology-enabled (i.e., Zoom) meetings. Trip reports were prepared for all SRA-related activities involving travel to partner communities and monthly progress reports kept the Project Leader informed of the evolving and varied responses to the COVID-19 global pandemic within partner countries.

**Public presentations:** Public presentations disseminated research findings and drew attention to the activities being undertaken. This included Nittyta Simard delivering an invited talk during UniSC Sustainability Week 2022 on behalf of Researchers in Agriculture for International Development (RAID). Presentations given by project personnel include:

1. Simard, N.S.M. 2022. Research and coastal livelihoods development. UniSC Sustainability Week 2022 at Sippy Downs, Australia.
2. Lutschini, I. 2023. Variability in shellcraft products. ACPIR Summer Research Scholarship 2022/23 at Sippy Downs, Australia. Available: <https://www.youtube.com/watch?v=FvmeHemvQ-E&t=32s>
3. Simard, N.S.M. 2024. Investigating small-scale fisheries supporting shellcraft in Papua New Guinea. Public lecture at Sippy Downs, Australia.

All presentations were made available to stakeholders in partner countries through technology-enabled delivery or by posting recordings on social media platforms such as Youtube.



*Nittyta Simard (left) delivered a public lecture on SRA-related research to a live international audience of more than 30 persons. A recorded presentation of Inali Lutschini's (right) involvement in the ACPIR SRS program received more than 100 views.*

**Social media:** Updates in relation to project activities, publication, upcoming presentations disseminated via ACIAR, ACPIR, and Tropical Aquaculture Research Facebook pages.



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## 9 Conclusions and recommendations

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### 9.1 Conclusions

The role of this project was to maintain partnerships and research and development activities developed during FIS/2014/060, to a point at which the follow-on project (FIS/2019/122) could continue with them. In doing so, it has provided a sound foundation for the follow-on project to support further development and diversification within the mabè pearl and pearl shell handicraft sector in partner countries. While not a topic directly addressed by this project, a key observation during this interim period relates to the resilience of partner communities relative to the impacts of the COVID pandemic. Despite almost total reliance on the cruise tourism market, which fell to zero during the pandemic, mabè pearl farming and handicraft production continued. New markets were explored by producers, and included regular export of Tongan mabè pearls to Hawaii, and developed during COVID lockdown. Such activities not only kept the sector alive, but provide opportunities for further diversification of post-COVID markets during FIS/2019/122, to reduce reliance on visitor markets. Other key issues to be developed during FIS/2019/122, for which the current project had a foundational role, include improved business linkages and supply chain resilience, improved handicraft and design skills, financial literacy and business skills among partner agencies and communities, and planning for sustainable sector expansion in all four partner countries (Fiji, Tonga, Samoa and Papua New Guinea).

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### 9.2 Recommendations

Prior ACIAR-funded research has shown that livelihoods developed around mabè pearl and pearl shell handicraft production are economically viable, sustainable and compatible with community life-styles. They also have broad regional relevance and application. However, it is important to note that outputs and benefits so far, although very positive, have been proven at relatively small (research) scale. Developing and demonstrating this potential at scale is the next big challenge and is addressed in the follow-on project FIS/2019/122. However, as we transition from a purely biological/mariculture project to one with a more commercial footing, often requiring private-sector engagement, new business development skills are required in the project team and should be available to the project team as part of ACIAR's project development and oversight obligations.



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## 10 References

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## 10.2 List of publications produced by project

### 10.2.1 Datasets

Simard, N.S.M., Militz, T.A., Kinch, J., Southgate, P.C. 2022. Mother-of-pearl exports for Papua New Guinea from 1888 to 2019. DOI: <https://doi.org/10.25907/00080>.

### 10.2.2 Articles (peer-reviewed)

Simard, N.S.M., Militz, T.A., Kinch, J., Southgate, P.C. 2021. From past to present: Construction of dataset documenting mother-of-pearl exports from a Pacific Island Nation, Papua New Guinea. *Frontiers in Marine Science* 8: 762610.

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### 10.2.3 Theses

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Johnston, W.L. 2024. Applied economics within pearl farming value chains supporting community livelihoods in Fiji and Tonga. *PhD thesis*. Sippy Downs, Australia: *University of the Sunshine Coast*.

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## 11 Appendixes

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### 11.1 Appendix 1: