



Australian Government

**Australian Centre for
International Agricultural Research**

Project proposal

project

Pacific Agribusiness Research for Development Initiative (PARDI)

project number PC/2008/044

proposal phase Full Proposal

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1 Project outline

Project number	PC/2008/044
Project title	Pacific Agribusiness Research for Development Initiative (PARDI)
ACIAR program area	Agribusiness
Proposal stage	Full
Commissioned organisation	University of Queensland
Project type	Large
Geographic region(s)	Papua New Guinea and Pacific island countries
Country(s)	Solomon Islands, Fiji, Samoa, Vanuatu, Tonga and Kiribati
Project duration	4 years
Proposed start date	1 December 2009
Proposed finish date	30 November 2013
Time to impact	Category 2

1.1 Funding request

		Amounts	Totals
Year 1 (09/10)	Pay 1	\$1,500,000	\$1,500,000
Year 2 (10/11)	Pay 2		\$2, 500 000
	Pay 3		
Year 3 (11/12)	Pay 4		\$2, 500 000
	Pay 5		
Year 4 (12/13)	Pay 6		\$2, 500 000
	Pay 7		
Year 5 (13/14)	Pay 8	\$1,000,000	\$1,000,000
Total		\$10,000 000	\$10,000 000

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¹ QAAFI is a partnership between the University of Queensland and the Queensland Department of Employment, Economic Development and Innovation.

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1.3 Project summary

Pacific island countries (PICs) face significant challenges in improving livelihoods and overcoming poverty, particularly with the food and fuel price surges in 2008, the impact of the global economic crisis, a number of natural disasters, difficulties maintaining infrastructure, and the negative effects of climate change. In addressing some of these challenges, both PICs and international agencies recognise that improving the competitiveness of industries—which also provides a platform for stronger economic growth—is the basis of overcoming many of these challenges.

Among the issues affecting food and agricultural sector development include isolation from key growth markets and limited coordination of supply chains that have been driven by the modernisation of the food retail and food service sectors. The growing presence of internationally supported economic development programs, which address some of these issues in the region, will be complemented by ACIAR's Pacific Agribusiness Research for Development Initiative (PARDI) PC/2008/044. PARDI focuses on research for development to underpin the competitiveness of targeted high-value agricultural (including horticulture), fisheries and forestry products.

Although a broad range of industries within the sector face challenges, PARDI aims to target a range of products and supply chains—identified through market-orientated analysis—that exist in international and domestic markets. The project plans to focus on improving competitiveness in existing markets and to seek opportunities to expand into new markets. The initial project activities include work on sectors that build on current ACIAR activities (e.g. the pearl and Canarium nut sectors) and previously identified chains with researchable constraints that, once overcome, will improve chain competitiveness (e.g. the breadfruit sector).

Many of the internationally supported economic development programs in the Pacific engage strongly with the private sector. Most of this engagement is based on the premise that the 'private sector will thrive where government provides the platform for private sector led growth' (AusAID 2009). As such, PARDI will also work closely with the private sector, both directly and through other existing programs, encouraging better engagement between the public and private sectors.

The initial geographical focus will be in Solomon Islands, Vanuatu and Fiji, based upon current capacity and product focus, with likely expansion into Tonga and Samoa. Initial analysis will be conducted for the likely impact of PARDI activities in Kiribati, recognised as the least developed of ACIAR's PIC partners; further activities may be possible within the scope of the project.

With the identified challenges and capacity within the Pacific, the overall aim of the project is to improve the livelihoods of people in the Pacific island partner countries by underpinning development of more competitive high-value agricultural, fisheries and forestry products that are based on strengthening the market chains. The objectives of PARDI are as follows.

1. Identify markets and supply chains that have the potential to deliver substantial livelihood benefits to Pacific island peoples.
2. Identify researchable constraints that limit the ability of these market chains to be more competitive.
3. Develop research-based and product-oriented interventions that enable identified supply chains to overcome these constraints.
4. Develop and apply appropriate methodologies to evaluate how PARDI activities and interventions contribute to sustainable and efficient supply chains, improve livelihoods

and increase our understanding of the factors underpinning competitiveness in Pacific Island supply chains.

5. Build agribusiness growth, leadership and change capabilities of PIC communities to ensure the viability and sustainability of PARDI-driven activities and programs.

These objectives will be delivered through a partnership of Australian and PIC agencies including the **Secretariat of the Pacific Community (SPC)**, the University of the South Pacific (USP), national agricultural, forestry and marine departments in each country, National Agricultural Research Systems (NARS), the University of Queensland, Queensland Primary Industries and Fisheries (DEEDI), the University of Adelaide, University of the Sunshine Coast, James Cook University and Rural Solutions, SA (PIRSA).

The approach of the partnership is to:

- identify opportunities for high-value Pacific products based on sound market and supply chain analysis
- link appropriately to other Pacific-based programs of relevance
- develop strategies to address researchable constraints through the identified intervention points
- focus interventions at a value-adding level, where appropriate
- use interventions to improve chain competitiveness
- apply lessons learnt on improving competitiveness to influence supply chains in other sectors
- develop a methodology to evaluate the impact of the PARDI initiatives on supply chains and associated livelihoods
- develop and implement a capacity-building strategy to ensure PIC communities gain agribusiness growth, change and leadership skills

Collectively, PARDI seeks to enable PICs to achieve long-term viability and sustainability by building skills to develop robust businesses and supply chains that can better compete in the marketplace. PARDI plans to link with related activities such as AusAID's Pacific Horticulture and Agriculture Market Access (PHAMA) program.

As PARDI has been designed around intervention priorities generated by supply chain and market analysis, we had to construct robust management and review protocols within the project framework. This includes establishing the PARDI Advisory Group specifically to review identified researchable priorities and provide independent investment decision-making. The PARDI Advisory Group will also assist in monitoring the performance of key activities. Ensuring effective coordination between the six PIC project partners and supporting in-country project activities will require a dedicated in-country coordinator—likely to be based in Fiji—for the duration of the project.

Impacts are derived from targeted supply chain interventions, including production, postharvest, marketing and supply chain research activities, as appropriate. PARDI outcomes will be delivered through a portfolio of activities that will include commodity, supply chain, marketing and capacity-building initiatives. Australian benefit will be derived from an improved understanding of factors influencing Australian supply chain competitiveness and assisting these chains to develop sustainable competitiveness.

2 Justification

The last 18 months has been one of the most challenging periods in the history of the Pacific island region (Hayward-Jones 2009). Food and fuel price surges in 2008, the impact of the global economic crisis, a number of natural disasters, difficulties maintaining infrastructure, continuing effects of poor diet and nutrition, and the negative effects of climate change pose complex challenges. These challenges are being felt in different ways throughout the region. For example, worsening economic conditions in Tonga and Samoa are being felt through a reduction in remittances; Fiji and Solomon Islands are experiencing macro-economic management stress due to the results of the economic crisis.

In the face of these challenges and effects, the Pacific has fallen behind Asian countries in its progress to achieving the Millennium Development Goals (MDG) and is not on track to achieve them by 2015. *Tracking the development and governance in the Pacific 2009* (AusAID 2009) shows that: poverty is rising; economic growth is insufficient; too few children complete schooling; and basic health challenges are significant.

The increased pressure from the global economic crisis in the region requires better-targeted aid, investment in infrastructure in rural areas, and more efforts to support and encourage investment by the private sector (Hayward-Jones 2009). Enabling the private sector to learn lessons from the past challenges and develop sustainable solutions for future development is critical. We urgently need to develop better enabling environments for private sector growth in the region; evidence is clear that 'private sector will thrive where government provides the platform for private sector led growth' (AusAID 2009). The emerging consensus is that the private sector is of the key to future economic growth thus greater engagement between private sector, governments, community-based organisations and regional organisations is essential for the private sector to build sustainable industries.

2.1 Partner country and Australian research and development issues and priorities

Across Asia, rapidly transforming modern food retail sectors are contributing significantly to on-farm and off-farm rural income growth. Despite suitable production conditions, freedom from many pests and diseases, and the availability of under-employed labour, the Pacific islands have not been a part of this revolution, even though agriculture, fisheries and forestry are a major source of income for communities in the Pacific islands.

Developing more competitive sectors that can trade in the export and domestic markets can generate smallholder income and underpin improved food security and economic development; this is especially true where local processing adds value to primary products, providing off-farm employment and additional income at community level.

PIC agricultural and food sectors have a range of challenges, including distance from markets, small and inconsistent scale of production, high transport costs, eroding tariff preferences, migration of skilled labour, resource depletion and degradation, and risks from climate change. However, profitable markets have been developed for some products, and significant domestic urban demand exists for high-value vegetables and aquaculture products, as well as opportunities for selling into the tourist industry.

PARDI project activities aim to foster high value, high quality, high efficiency value chains, improving competitiveness and profits of products in both domestic and export markets.

Importantly, experience elsewhere suggests that livelihood improvements through increased market engagement are not only reliant on international markets but can be derived from both common and more specialised products in the domestic market. These

specialised products often relate to traditional knowledge in production, processing and marketing of indigenous products. Due to the importance of recognising alternative market development and product-based strategies, PARDI will engage in three product type supply chains:

1. products that have a competitive place in the domestic market
2. products that can profitably enter (or re-enter) the global market
3. high value specialty products placed in niche markets

PARDI is designed as a flexible cross-discipline project, with core elements that underpin the development of more competitive sectors. These elements include market and supply chain research and analysis to enable improved targeting of supply chain interventions (including production, postharvest, marketing and supply chain research activities, as appropriate) and a focus on knowledge transfer and innovation diffusion to build capability both along and between supply chains. The interventions will be product based and will involve other supply chain stakeholders, but will also use the strong technical expertise within Australia and the Pacific to resolve current constraints.

PARDI will address identified constraints in a range of different PIC industry sectors. These industry sectors have various priorities and issues, including those outlined below.

2.1.1 Crops and horticulture issues and priorities in PICs²

- Identification, development and adoption of new market-driven opportunities for the improvement of horticultural crops.
- Development and adoption of integrated and more sustainable production management packages for food staple, fruit and vegetable crops.
- Integration of existing knowledge into information packages for food staples, and fruit and vegetable crops.
- Selection and adoption of staple crops with enhanced nutritional content.
- Use of marketing research to help producers and industry identify market opportunities for agricultural commodities.
- Identification and analysis of processing and value-adding opportunities for crops, and design and implementation of research and development (R&D) interventions.
- Consolidation of product from a large number of diverse smallholders.
- Requirements for the domestication of some species.
- Lack of information flow in supply chains.

2.1.2 Forestry issues and priorities in PICs

- Identification, development and adoption of new market-driven opportunities for the improvement tree crops.
- Domestication of multipurpose trees for forestry and agroforestry, including selection of suitable germplasm, silvicultural management and protection from pests and diseases.
- Value-added processing of forest products.
- Use of marketing research to help producers and industry identify market opportunities for agricultural commodities.
- Identification and analysis of processing and value-adding opportunities for forestry products, and design and implementation of R&D interventions.

2.1.3 Fisheries issues and priorities in PICs

- New opportunities for inland aquaculture, including the domestication of promising indigenous species and integration into existing farming systems.

² ACIAR Country Profiles 2009–10 – Pacific islands

- Value-added processing of fisheries products.
- Identification and analysis of processing and value-adding opportunities for aquaculture products, and design and implementation of R&D interventions.

2.1.1 Australian issues and priorities

Australian high-value agricultural, horticultural, fisheries and forestry sectors are continually pursuing the development of more competitive supply chains. These sectors use product and technical innovations, but are also turning to supply chain innovation to maintain competitiveness. To continue this development, Australia needs to:

- develop innovative supply chain analysis methodologies and performance assessment frameworks
- improve efficiencies in supply chains
- develop new business-to-business initiatives
- identify new trade and marketing opportunities
- develop new products
- improve production and processing systems
- pursue joint venture value-adding

Australian commodity-specific priorities include:

- product innovation, market access, supply chain, overcoming pests and diseases, and sustainable production systems³
- new floriculture and ornamentals products and postharvest technologies
- diversifying aquaculture production systems
- developing sustainable and profitable high value vegetable crops
- improving the production of veneers and other high value timber products
- assessing new products based on market driven value-adding opportunities

2.2 Research and/or development strategy and relationship to other ACIAR investments and other donor activities

The fragmentation of aid in the Pacific is a significant obstacle to getting the most out of development assistance. The number of development partners has expanded, and increasing donor inputs are placing additional stresses on governments in the region. The 'agenda for action' developed at the Cairns Pacific Island Forum (AusAID 2009) includes a call for coordinated technical assistance mechanisms targeting economic management, amongst other suggested reforms.

In preparation for the 2009 Pacific Island Forum Meeting, the Australian and New Zealand (NZ) governments commissioned a report, 'Surviving the global recession: Strengthening economic growth and resilience in the Pacific' (AusAID 2009), that focused on developing country members of the Pacific Island Forum.

The main challenges identified for those countries were the need to:

- adjust to reduced revenues and offshore incomes that safeguard macro-economic stability and protect funding for core services
- improve competitiveness and provide a platform for stronger economic growth

Even before the onset of the global recession, economic growth in the region had been mixed. Some countries that had instigated appropriate economic reforms were shifting to reasonable economic development paths, whilst others experienced flat and volatile economic conditions. As an example of the benefit of reform, Vanuatu has achieved average annual gross domestic product (GDP) growth of more than 6% since 2004. This

³ Source: Horticulture Australia Limited Annual Industry Report 2008/09 - Papaya

has been achieved through reform outside the agriculture sector, such as in tourism and telecommunications. This economic growth also has significant benefits in achieving the MDG.

Although maintaining macro-economic stability is a necessary condition for economic development, it is not sufficient to sustain broad-based growth. The report, *Pacific 2020: Challenges and opportunities for growth* emphasised that reforms to improve countries competitiveness are needed to underpin stronger growth. To improve competitiveness, growth and resilience there is a need to:

- improve the efficiency of state-owned enterprises (SOEs)⁴
- introduce competition where monopoly services operate
- reduce government involvement in economic activities and deliver better services to enable private sector development
- strengthen the role of non-government organisations (NGOs)
- reduce costs for private sector activity
- improve the regulatory environment for private sector operations

While the challenges of implementing reforms are significant, the benefits for economic growth and development can be substantial. When reforms are implemented, such as those outlined above from the *Pacific 2020* report, countries can expect to achieve growth well in excess of that achieved in the last decade. They can use such growth to make a substantial difference to the progress towards the MDG.

A range of programs are being implemented by the Australian Government that are addressing the issues of improving competitiveness and providing a platform for stronger economic growth. These programs are outlined below.

Pacific Agreement of Closer Economic Relations

The Pacific Agreement of Closer Economic Relations (PACER Plus) is a unique free trade agreement that offers significant opportunities for the Pacific island economies to accelerate their growth (Hayward-Jones 2009). Australia's motivation in supporting PACER Plus is to help the Forum Island Countries promote their own sustainable economic development. The negotiation of a new regional trade and economic agreement provides opportunities to create jobs, enhance private sector growth, raise standards of living, and boost long-term economic growth in Forum Island Countries.

PACER Plus negotiations will include elements of trade capacity building and trade development assistance designed to strengthen Forum Island Countries' ability to trade.

However, the opening of markets through mechanisms such as PACER Plus, which lowers tariff barriers, will not guarantee better outcomes for Pacific island countries. Pacific island economies will need to develop more competitive industries to achieve any real benefits from international trade.

Pacific Horticulture and Agriculture Market Access program

The Pacific Horticulture and Agriculture Market Access Program (PHAMA) will focus on obtaining, maintaining and improving access into key markets for selected high-value agricultural and horticultural products by addressing regulatory constraints. PHAMA will follow a highly targeted approach aimed at improving market access for highest priority agricultural and horticultural products into specific markets.

⁴ *There is significant evidence to support privatisation as a means to improve efficiencies*

It will be based on existing trade patterns. Key markets will include Australia and NZ. The program will also address access issues into other markets where important market opportunities are identified, such as Japan, USA and the EU, and potentially other Pacific island countries and territories markets will include Australia and NZ. Product scope potentially includes plant and animal products, both fresh and processed.

The private sector will be a key implementing partner. It will need to drive the identification of products to be targeted. It should be fully consulted during the development of market access submissions and agreements and it will play a major role in determining R&D priorities. The private sector will be an important partner in the implementation of biosecurity and quarantine measures required to maintain market access.

PHAMA plans to create additional market access opportunities for agricultural business by addressing regulatory constraints. An important objective for PARDI is to identify products and chains that are able to take advantage of these emerging opportunities, enabling greater market penetration for a range of Pacific products.

Enterprise Challenge Fund

The Enterprise Challenge Fund (ECF) is an instrument for risk sharing with business in support of pro-poor growth objectives. Through open competition, grants of between a\$100,000 and a\$1.5 million are awarded to business projects. Eligible projects justify public intervention through demonstrating significant externalities, innovation and discernible pro-poor benefits. Projects should be commercially sustainable within three years. Through its focus on innovation and overcoming externalities, the ECF aims to contribute to wider systemic change. This means demonstrating new and successful ways of working with the poor, which in turn improves private sector perceptions (and those of other development partners) on the costs and benefits of doing business with the poor. As a result of these systemic changes (changed perceptions and practices), the ECF expects to multiply the impact of any projects it actually funds.

Market Development Facility

The Market Development Facility is expected to support a common approach (market development) in each of the three participating countries, with programs that are tailored to the specific context in each country. It will have a coordinated management and governance structure, and share expertise and lessons across the three countries. The proposed structure includes a Multi-Country Management Group and a Country Steering Committee with representation from government, private sector, civil society, other donors and AusAID. The steering committee will facilitate broader stakeholder engagement in the program and ensure relevance to the country context and coherence with other programs. The committee will advise on implementation arrangements, oversee implementation and review program performance.

The market development approach requires insightful and continuous analysis of sectors where poor people live and engage. A local implementation team that has some market development experience, the aptitude to make perceptive analyses of market systems, and local business knowledge and networks will be recruited. This team will explore different sectors seeking to identify market failures facing poor people and opportunities to intervene and correct them. They will interview relevant stakeholders (e.g. women farmers, traders, exporters, radio stations, NGOs, government regulators) and may conduct rapid surveys to ascertain patterns and trends in a sector, and to gain a sense of the scale of opportunity. Where market failures or blockages are identified, the team will explore options to rectify them. Examples of interventions might include encouraging a business to try a different business model with the help of a risk-sharing grant, convening a meeting between two stakeholders with different information and interests around a common problem, or demonstrating how similar problems have been overcome in similar countries. Continuous and real-time monitoring and updating of the 'prediction' of what

each intervention will lead to is a core feature of the approach. So is having a team that can respond rapidly and flexibly to opportunities as they arise.

2.2.1 Strategic intent of improved coordination

One of the key outcomes of the Pacific Island Forum Meeting was an ‘agenda for action’ that called on development partners to establish coordinated mechanisms for technical assistance targeting economic development. With the need for a more coordinated approach, it is important to understand the role of ACIAR, which is focused on research partnerships with the intent, in the case of PARDI, to underpin innovation and competitiveness in targeted supply chains.

Strategic Intent				
‘improve competitiveness and provide a platform for stronger economic growth’ Pacific Economic Forum, 2009				
Contributors				
PHAMA Overcoming regulatory trade barriers	MDP Market development support	PACER Plus Overcoming tariff constraints	ECF Business enabling environment	PARDI Research to underpin competitiveness

Figure 1: Simplified strategic intent to improve Australian aid coordination in agriculture for the Pacific

In summary, there are a number of programs focused on economic development in the Australian Government’s intent in the Pacific. These are primarily focused on improved trade, through regulatory access (PHAMA), tariff reductions (PACER), enterprise (ECF) and market development (MDP). In each case, there is the potential for PARDI to provide the underpinning innovation for supply chains to take greater advantage of these economic development opportunities.

Although many of these programs have been consulted to discuss linkages, the most developed approach is the relationship between PARDI and PHAMA. PARDI proposes to establish effective coordination with PHAMA through a series of initiatives:

- annual joint PARDI and PHAMA meetings and invited co-attendance at key workshops
- proposed co-location of in-country coordinators at the SPC
- PHAMA participation in the PARDI Advisory Group.

2.2.2 Coordination with other donor programs

A range of other donor activities, such as the EU’s Facilitating Agricultural Commodity Trade (FACT) and All ACP Agricultural Commodities Program (AAACP), focus on supporting improved international market penetration, but each lacks the research to underpin the development of more competitive supply chains.

In addition, in developing PARDI, a range of other international development agencies have been consulted, such as FAO, the International Trade Centre and the EU’s development programs. These organisations will continue to be consulted with the intent of establishing suitable partnerships, where there is value adding not only for the organisations involved, but improved impact for smallholders.

2.2.3 ACIAR medium-term strategy

ACIAR's program in the PICs concentrates on Fiji, Kiribati, Samoa, Solomon Islands, Tonga and Vanuatu, working through regional organisations, where appropriate. The strategy recognises the importance of the agricultural, fisheries and forestry sectors within these countries and works towards underpinning the competitiveness and security of these sectors. It supports R&D and capacity building to address three thrusts: improved food and nutritional security; integrated and sustainable agriculture, fisheries and forestry resources management and development; and improved market integration in agricultural, fisheries and forestry products. It recognises the need to address individual PIC priorities arising from differences in climate and soils, availability of natural resources, institutional capacity, infrastructure and potential for economic growth, while at the same time recognising that many challenges are common and best addressed through regional collaboration.

ACIAR focuses on three key stakeholder groups: smallholders producing for commercial markets; entrepreneurs who are developing value chains involving cooperative production, processing and marketing; and corporate producers and exporters providing market linkages for growers.

PARDI is aligned with ACIAR's strategic intent in the Pacific and makes a primary contribution to Subprogram 3: 'Underpinning the competitiveness of agriculture, fisheries and forestry supply chains', through:

- use of marketing research to help producers, supply chains and other stakeholders identify market opportunities for agricultural commodities
- analysis of strategic supply chains, and design and implementation of interventions to improve supply chain efficiencies
- development and strengthening of agribusiness linkages, including analysis of market-chain constraints
- identification and analysis of processing and value-adding opportunities for crops, aquaculture and forestry products, and design and implementation of R&D interventions
- building the capacity of PIC communities in terms of leadership and agribusiness skills and knowledge
- fostering economic independence by providing PICs with the tools to establish sustainable and efficient supply chains

Importantly, PARDI enables an improved understanding of market and supply chain-based constraints that influence the impact of a number of current ACIAR projects (see 'Methodology', below), including those outlined below.

FIS/2006/138 'Developing aquaculture-based livelihoods in the Pacific island region and northern Australia (Fiji, Samoa, Solomon Islands, Tonga, Vanuatu)'

The ACIAR fisheries program has been highly active in the Pacific, providing a range of technical-based projects to underpin the development of sustainable aquaculture systems. PICs projects have focused on high value, low-input aquaculture. This project seeks to capture opportunities from aquaculture systems to improve livelihoods in the Pacific.

The World Fish Centre is focusing efforts to 'support the adoption of sustainable aquaculture that benefits the poor' and 'makes small-scale fisheries more resilient and productive.' The goal of SPC's aquaculture plan is 'sustainable aquaculture development in the Pacific region that will simultaneously take into account social, economic and environmental factors' and recognises that the majority of export opportunities are from pearls and seaweeds, while the contribution to food security is sourced from carp, tilapia and giant clams.

FIS/2006/172 'Pearl production from the winged pearl oyster *Pteria penguin* in Tonga'

ACIAR has been supporting pearl culture in the region since 1991 with activities covering wild stock assessments (Kiribati), the investigation of wild spat resources (Solomon Islands, Fiji, Kiribati, Tonga), the development of productive low technology hatchery and nursery systems (Kiribati, and Tonga), experimental round pearl and half pearl production (Kiribati, Fiji, Tonga), and the use of shell and pearl products in the manufacture of local jewellery.

With production focused on high quality products that are technically demanding and incur increased input costs, appropriate marketing channels are becoming particularly important to maintain viable supply chains.

FST/2006/048 'Processing of *Canarium indicum* nuts: adapting and refining techniques to benefit farmers in the South Pacific'

Since the early 1990s, a number of projects have aimed for the wider commercialisation of *Canarium* nuts, with mixed success. A range of traditional methods for postharvest handling and processing the nuts were reviewed in ACIAR project FST/2002/010. The current project, FST/2006/048, is identifying best practice methods and technologies for postharvest handling and processing that are appropriate to smallholders, block and plantation farmers, and suited to local conditions in Vanuatu, Solomon Islands and Papua New Guinea (PNG). This project is being run in conjunction with another ACIAR project (FST/2004/055) in which *Canarium indicum* cultivars are being selected and developed for commercialisation with an associated marketing network to ensure supply through PNG and Vanuatu.

It is also envisaged that market-based information will also support the delivery of:

- PC/2005/077 'Integrated crop management package for sustainable home gardens in Solomon Islands'
- PC/2008/003 'Development of integrated crop production management systems in red papaya in Fiji'
- PC/2008/011 'Ornamental horticultural crop development for Fiji, PNG and northern Australia'
- PC/2008/046 'Rejuvenation of cocoa plantations in Solomon Islands and Samoa for increased productivity and quality'

ACIAR also recognises the critical importance of extension and communication to achieving empowerment and sustainable project outcomes. The proposed work builds directly on ACIAR's previous investment in SFS/2005/140 'Participatory needs assessment for capacity building in extension (Pacific islands)'.

SFS/2005/140 highlighted the overall weakness of extension services that adopted a participatory extension approach as well as the diverse needs of partner countries and organisations in the Pacific.

3 Objectives

To 'improve competitiveness and provide a platform for stronger economic growth', PARDI aims to improve the livelihoods of people in the Pacific island partner countries by developing more competitive high-value agricultural, fisheries and forestry products and strengthening value chains.

This will be achieved through the following objectives.

1. Identify markets and supply chains that have the potential to deliver substantial livelihood benefits to Pacific island peoples.
 - 1.1. Rank, assess and choose 'best bet' high potential supply chains: (i) review relevant project documents; (ii) interview experts; and (iii) reach a consensus (the project team and relevant partners)
 - 1.2. Establish the process for selecting additional supply chains, determine objectives and target groups, and select criteria
 - 1.3. Gather market intelligence to assist in identifying potential export markets
 - 1.4. Conduct the rapid market appraisal (or related method) to assess the sector or product to identify broad issues and opportunities along the chain, and assessing the best potential market (aligned with the project's 3 key strategies)
 - 1.5. Apply selection criteria in a consultative process
2. Identify researchable constraints that limit the ability of these market chains to be more competitive.
 - 2.1. A desk study highlighting past experiences with similar commodity focused projects in the PICs and reasons for their success or failures
 - 2.2. Perform the rapid market and chain appraisal on the best bet, selecting the most appropriate method to assess the sector or product
 - 2.3. Build on sector and market analysis carried out in the chain selection process undertaken for objective 1, focusing on target markets and specific chains relevant to that market
 - 2.4. Conduct more detailed market and consumer research to understand consumer drivers and market requirements
 - 2.5. Review international market access requirement and consider biosecurity challenges likely to be encountered by PICs
 - 2.6. Conduct a value chain mapping and analysis and on the specific chains to that target market
 - 2.7. In collaboration with all project partners, evaluate the results and evidence from the market analysis and value chain study, ranking the potential researchable to scope intervention projects
 - 2.8. Provide information into PHAMA project to help prioritise any market access issues, if appropriate
3. Develop research-based and product-oriented interventions that enable identified supply chains to overcome these constraints
 - 3.1. Researchable activities resulting from best bets reviews in objective 1 have been commenced
 - 3.2. Prioritise supply chain identified research inventions
 - 3.3. Implementation of researchable projects

4. Develop and apply appropriate methodologies to evaluate how PARDI activities and interventions: (i) contribute to sustainable and efficient supply chains, (ii) improve livelihoods and (iii) increase our understanding of the factors underpinning competitiveness in Pacific Island supply chains.
 - 4.1. Develop a framework for evaluating micro and macro impacts
 - 4.2. Develop livelihood multiplier effects for products & industries
 - 4.3. A household, community and industry chain stocks and flow analysis to track physical and monetary flows of resources through the livelihood chain
 - 4.4. Develop the model that will enable data from stocks & flows analysis be used to quantify the impacts of a product on income, health, and self-esteem of individuals, family and community and the industry as a whole
 - 4.5. Establish framework for monitoring, comparison and evaluation
 - 4.6. Use a range of evaluation tools to monitor project progress & guide project management
 - 4.7. Identify opportunities for new partnerships to strengthen or grow chains (A,PC)
5. Build agribusiness growth, leadership and change capabilities of PIC communities to ensure the viability and sustainability of PARDI-driven activities and programs.
 - 5.1. Establish a set of measureable indicators to assess capacity change.
 - 5.2. Develop communication group to enhance output sharing and linkage between programs
 - 5.3. Establish communication mechanism to share lessons learnt across countries and commodities
 - 5.4. Postgraduate training in areas relevant to PARDI in Australia and at the University of the South Pacific (USP)
 - 5.5. Technical (non-tertiary) capacity building initiatives

4 Planned impacts and adoption pathways

The PARDI team recognizes the need to develop an impact framework. In the early project implementation stages, these impact pathways will be outlined as part of the evaluation and monitoring activities (see Section 5, objective 4). In general, PARDI's project impact pathways are diverse and vary by product and chain, the overall social, economic, community and environmental impacts include: (i) improved livelihood benefits from participating in higher value product chains (jobs and profits); (ii) more sustainable natural resource management systems resulting from better science-based development; (iii) more resilient value chains resulting from new capacity to sustain added value in a dynamic competitive environment and to share equitably that added value along the chain.

The project aims to achieve these impacts through more competitive high quality products, better informed agricultural businesses, more equitable sharing of the expanding benefits along the chain, improved knowledge about product chains, and increased productivity of the higher value systems. The project outputs aim to benefit directly all key participants along the targeted selected value chains, and to benefit indirectly the community through the creation of a more sustainable economy.

Producers benefit from increased access to consumer driven supply chains and resource-conserving innovations. Traders and processors benefit from increased trade in higher value products, the availability of regular supplies of high quality products, and participation in niche markets. The research institutes, NGOs, and government agencies benefit from access to new research methods, better informed policy dialogues, from their strengthened capacity and through expanded linkages with regional networks, service providers, and the private sector.

4.1 Scientific impacts

PARDI will increase the understanding of what makes product supply chains more competitive in the domestic and international market with further insight to the value of high-value speciality crops entering niche markets. This will also identify areas of similarity and difference between different supply chains targeting the same sector, and will identify differences and similarities for products entering different sectors.

It is likely that a significant amount of scientific impact may be derived from the research-based and product-oriented interventions (objective 3), but each of these will be product specific. Some examples may include best management practices for freshwater fish aquaculture production in the Pacific, identification of regionally specific cocoa characteristics and improved postharvest handling of Pacific native flowers.

Other examples of interventions that could be conducted under this project include:

- production advice on plant health and prevention of pests and diseases
- effective management of agricultural and veterinary chemicals
- managing quality from harvest to the retail shelf
- monitoring of handling practices and conditions from harvest to retail shelf

PARDI will identify key determinants that are similar across diverse products or specific for particular products. This discovery is critical for future activities, ACIAR and others, in determining a market-orientated approach. This discovery also affects the ability of project outputs to be both scaled-up and scaled-out, which has significant impact on the sustainability of the project's impact.

This is critical because most market-orientated projects have produced results that are 'project specific' with little ability to use the results with either a greater number of

stakeholders in the supply chain, or in different supply chains. This limited effect was most recently reported by the '*Regoverning Markets*' program, a multi-country, multi-product, market-oriented project that was hindered by these types of 'project specific' issues.

4.2 Capacity impacts

A number of key partners in the Pacific have significant capacity in research-based and product-oriented interventions (objective 3), but have had limited ability in enabling smallholder-based practice change and being market orientated in the delivery of activities.

The diffusion of new technologies depends upon the mechanisms and limitations of existing communication channels, based upon the benefits that a technology affords its users. While an artificial dichotomy is often established between market-pull and technology-push innovations, the decision to adopt in a market is dependent upon community and individual user needs.

Demand for new technology is not just dependent on willingness to adopt, but on ability to adopt. This ability is impacted by capacity issues across the supply chain, such as the capacity to pay (economic), technology and market awareness (communication), awareness of benefits (education), know how to employ the technology (scientific technical), alignment with customs and beliefs (cultural), contravention of local laws (legal), market accessibility (geographic), ability to move product to market (logistics), appropriateness of growing conditions (climatic, meteorological and agricultural). These capacity issues cannot be considered in isolation as most are combinational, some adding to others or diminishing total capacity.

Additional to the capacity issues are capability issues. Capabilities are those actions aimed at enhancing competitive advantage, or reducing competitive disadvantage, through accumulating, coordinating, integrating and/or reconfiguring resources. Capability building is a significant area of social science research and practice, with analysis at firm, supply chain, community, regional, national and international levels. These are broadly separated into those capabilities that maintain competitiveness (zero-level and ordinary capabilities) and those focused on change (dynamic capabilities).

A capabilities approach, combined with capacity analysis, across the main product components of PARDI (forestry, fisheries, crops and horticulture) offers a three-dimensional, demand-driven, analytical framework upon which to base well-researched and well-founded community-based implementation strategies.

Those institutions working within the program will gain significant capacity in understanding how their specific activities can influence the competitiveness of supply chains to improve market engagement. This will then be used to improve the understanding of incentives to practice change when using a market-based approach.

As such, the capacity impacts will be focusing on, and using, the technical strengths of partners involved in PARDI, and improving capacity in delivering a market-orientated impact.

Importantly the private sector will be partners in the project, not just recipients of project outputs, as 'the evidence is overwhelming that the private sector will thrive where government provides the platform for private sector-led growth' (AusAID 2009). It is important to recognise that private sector involvement in the program will also improve its capacity to benefit from research outcomes, through the commercial use of these outcomes. However, importantly in the Pacific, will be the improved capacity of governments and private sector to work effectively together to enable the development of more competitive supply chains (objective 5).

Although many of these agencies have experience in collecting and analysing survey data, the proposed project will help develop the skills of their junior staff and graduate

students of the university. Their professional and policy exposure to various collaborative networks and publication outlets will enable them personally and institutionally to move closer to becoming national and even regional centres of excellence.

4.3 Community impacts

Primary welfare benefits, or community impacts, will principally be derived from the contribution to economic growth (see 'Economic impacts', below). This will, in turn, influence social impacts with a contribution to improving the rate of contribution to the MDG of improved education and health.

Assessment of community impacts (economic, social and environmental), through the delivery of PARDI needs to take into account the significant diversity of the agricultural sectors in the Pacific, and their impact on the community. Firstly, population sizes in the different countries range from less than 100,000 in Tonga and Kiribati to 800,000 in Fiji. There is also diversity based upon resource endowments, size and the importance of agriculture (McGregor et al. 2009) with the relatively large countries of Melanesia, middle-size countries of Polynesia and land-poor micro-states that are predominately atolls. It is also important to recognise that traditional farming systems are often the hidden strength of the economy (McGregor et al. 2009), providing high levels of nutritional security. This is because these traditional systems are very robust and productive in the face of adversity, such as erosion of genetic diversity, pest and disease threats, and rapid urbanisation.

Community impacts will include increased profitability of chains and the flow of profits along the chain, and will be influenced by the models of chain development and the nature of the public investment in the chains. The focus on competitive markets and high-value products suggests significant potential for profit generation, export earnings, and employment creation. The focus on effective and ethical agribusiness approaches will ensure that any negative impacts resulting from globalised supply chains on the community will be accounted for in training and development. The public benefit from supply chain development can be driven by a focus on value creation for customers and final consumers. It is likely that the businesses involved in the project will be given market advantages, necessitating care in the selection and justification of particular products, chains and partners, bearing in mind that the goal is to increase the competitiveness of the selected chains in the marketplace.

The flow on of project benefits throughout the agricultural, forestry and fisheries industries is promoted by the provision of supporting networks, training and educational opportunities to maximise project reach. The creation of an extension service working in the public interest, yet capable of business partnerships benefiting private enterprise, will serve as a balancing mechanism to promote community interests. They will disseminate lessons learned, promoting new models of business and contributing to training and education. A transformed extension service will serve as a means of achieving public policy goals relating to smallholders, such as desired environmental and social impacts. Greater orientation of farmer organisations towards agribusiness requirements will assist farming communities to orient their activities around markets.

4.3.1 Economic impacts

The proposed project's potential economic benefits include increasing incomes of producers, traders, processors and local retailers along the supply chain. Other potential benefits are greater employment opportunities, higher real wages, increased food security and expanded export income. Although economic impacts are an important PARDI goal, it is difficult to identify accurately likely impacts prior to commencement. As part of the initial project implementation, PARDI plans to identify a range of sector-based economic baselines to monitor impacts.

First, by identifying potential opportunities to enhance competitiveness of specific supply chains, the project could contribute to creating incentives for producers to meet the otherwise unmet demand for quality and related attributes or by value adding. One example is examining the preferences of consumers regarding specific agricultural, aquaculture and forestry product attributes as well as branding opportunities (e.g. certification, food safety, quality, eco-friendly, geographic, cultural, local production, fair trade). Another example is exploring options for product differentiation and ways to better transmit the associated price premium through the value chains.

Second, we expect that potential value-adding opportunities and the direct and indirect economic benefits from domestic and global market opportunities can lead to more informed policy debates about ways to expand production, increase competitiveness and add value to chains in global markets.

For example, global markets provide increasing opportunities for Samoa and Vanuatu as they join Fiji, Solomon Islands and Tonga in the World Trade Organization (WTO). Three regional trade agreements also provide opportunities: the intra-regional Pacific Island Countries Trade Agreement (PICTA); the European Union Economic Partnership Agreement; and the new trade agreement with Australia and NZ (PACER Plus).

It should be emphasised that while export markets are important both in volume and in the degree of incentive and signalling that they provide to producers, traders and processors to improve and differentiate quality, domestic procurement by local Pacific island consumers, retailers and the hotel industry is equally important. We expect some gains from this domestic market segment through upgrading. Farmer competitiveness, in national as well as export markets, is expected to have important economic impacts.

The primary welfare benefits (i.e. benefits to the state, community and individuals) are attributable to the economic impacts of PARDI. These economic impacts are derived from the development of more competitive supply chains that provide a greater monetary return to smallholders. In the scope of PARDI, this benefit to smallholder livelihoods can only be achieved by the whole chain being competitive, transparent and innovative, supporting practice change with all chain partners.

Agriculture in the Pacific has always been the basis of the economy and continues to play an important role, along with tourism and remittances. It contributes to the economy through readily identifiable outputs, such as sugar exports (which are under increasing international pressure), and through less obvious methods, such as the contribution of subsistence farming to improve community welfare (which is often highly resilient).

GDP per capita (US\$) varies markedly between the target Pacific island countries (Fiji 4014, Solomon Islands 798, Vanuatu 1,995, Samoa 2,750, Tonga 2,470 and Kiribati 762)⁵ and, as such, makes it difficult to accurately articulate possible GDP changes.

Throughout the Pacific, it is generally the case that the value of food production for home consumption exceeds significantly the value of production for sale. As an example, Solomon Islands and Samoa have significantly higher contributions to income from subsistence production (37% and 26%, respectively) than from sales (6% and 3%, respectively). Although Kiribati and Tonga show more equal contributions, with subsistence representing 21% and 17% of household income respectively and sales representing 11% and 14%, respectively (McGregor et al. 2009).

Significant differences in the contribution made to household incomes through subsistence farming are recognised. For example, subsistence farming makes a 71% contribution to household income in Solomon Islands, but makes a reduced contribution in Kiribati (50%), Samoa (42%) and Tonga (36%).

⁵ Source ACIAR Annual Operational plan 2009-10

4.3.2 Social impacts

The Pacific is not on track to achieving the MDG by 2015, as poverty is rising with growth insufficient to improve the rate of children completing schooling and basic health requirements. The focus of PARDI is to improve economic growth rates through the development of more competitive agricultural and food supply chains. Increased economic growth rates will present opportunities for communities (often based on families) to improve school attendance and meet basic health requirements.

The development of more competitive supply chains that engage with markets for a financial return—rather than subsistence production—will provide the means for families to enrol children in school for a longer period of time and access health care when required in both a preventative and curative form.

In addition, a number of likely innovations in the supply chain will create an increase in resource efficiency, including a possible reduction in labour requirements on-farm. As such, the requirements for all family members to assist in production-based activities will be reduced. This reduction in labour requirements will mean that children are no longer required to assist in production, freeing them to continue with schooling.

A focus on effective supply chains also implies opportunities post-farm gate in processing, value adding and market development based activities. Elsewhere, such as in Asia, this transition has required an increase in the skilled labour force working off-farm, but has benefited the competitiveness of the overall chain (the key to some sustainable competitiveness). PARDI-based interventions are likely to engage post-farm gate in the processing and value-adding sector, which is likely to lead to employment opportunities for a higher-skilled workforce that will be wage based rather than working in subsistence farming.

The creation of higher-skilled employment opportunities through the supply chain may also mean that the PICs become less dependent on remittances, which are influenced by other countries' economies. If this is achieved, there is an additional social benefit of keeping the family and community infrastructure intact, enabling the head of the family—the male—to remain with family members and support the community fabric.

Women often play an important role both in fishery, forestry and agricultural production as well as in post-harvest activities. To the extent that the project increases the importance of sales in the household economy, it will generate productive employment for women and perhaps give them greater responsibility in household decision-making. Although difficult to quantify in monetary terms, these changes would represent a positive social impact.

The project plans to explore the potential for certification programs like Rainforest Friendly and Fairtrade, which focus on community and livelihood benefits. Ensuring ethical labour practices are used along the chain is an important standard in these certification systems. Fairtrade and Rainforest Friendly programs are often effective in helping women and marginalised producers integrate with international markets. Fairtrade standards certify that women's work is paid and valued equally, and that women gain leadership, decision-making and managerial positions within their cooperatives (AusAID 2009).

To document the gender impacts, the project plans to collect indicators to provide baseline information, followed by assessments during the research activities and, in some cases, surveys to quantify gender impacts of the project's activities.

4.3.3 Environmental impacts

The net environmental impacts of value adding agriculture, product differentiation and market segment upgrading are complex, and we expect mixed effects. On the one hand, producers gaining certification or participating in many global value chains have access to better information on pesticide use, maximising profits by using only the amount needed, when needed. This is particularly true when trying to meet the requirements of consumers

who are willing to pay premium for low-residue or organic produce (see the case of guavas in Mexico in Berdegue et al. 2005).

On the other hand, cosmetic quality requirements of local markets may increase pesticide use (see the case of Guatemala in Hernandez et al. 2007). In this case, pesticide use decreases only when selling into export markets where residue standards are monitored and enforced.

Food systems are adjusting constantly to keep pace with evolving quality standards, social attributes requirements and environmental criteria. These broader demand-driven patterns influence the nature of agricultural, forestry and aquaculture supply chains within the PICs in terms of market concentration, increased size of processing, and economies of scale in production. These changes ultimately have an impact on natural resource use and environmental outcomes (as well as overall development, employment, poverty, and socio-cultural effects).

The project expects that the need to cater to increasingly discerning consumers is particularly important in the case of horticultural, forestry and aquaculture products. PARDI activities should provide net gains for environmental indicators as supply chains meet the demands of consumers for positive environmental impacts.

To document the impacts, the project plans to collect basic indicators to provide reasonable baseline information, followed by assessments during the research activities and, in some cases, surveys to quantify impacts of the project activities on the target populations and environment. The project plans to seek opportunities to link data from natural scientists with that of social scientists in assessing the impact of its interventions.

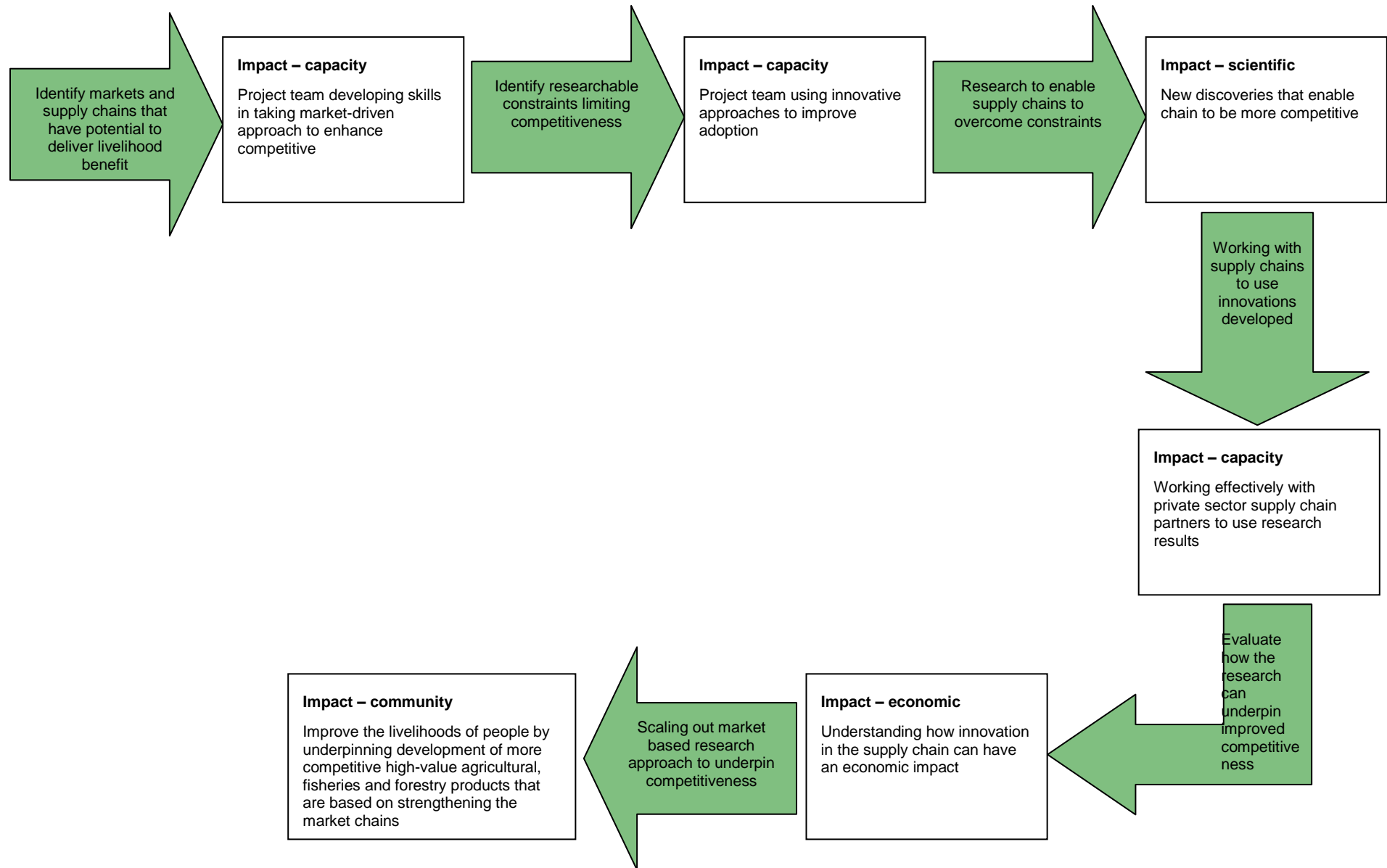


Figure 2: Possible impact pathway of PARDI

4.4 Communication and dissemination activities

The principle of all communication and dissemination activities will be focused on the development of partnerships within the supply chain. This approach recognises that government (and non-government) agencies play important roles in supporting and servicing these supply chains. Partners will be engaged in priority setting, decision-making regarding intervention points and activities, actual involvement in interventions, support in using these inventions, and evaluation of improved competitiveness.

Key communication steps in the delivery of the initiative include:

- stakeholder engagement for supply chain priority setting
- use of commercial linkages as part of the communication process
- review of market and supply chain analysis
- agreement on intervention points and key constraints
- review of intervention activities
- evaluation of effectiveness of interventions
- cross-program technical groups for information sharing and priority setting.

There are a number of current ACIAR projects, e.g. AGB/2006/112 and AGB/2005/113 that are engaged in the development of what is being termed as 'Farmer Business Schools⁶' (FBS). The development of FBS is based upon the use and development of Farmer Field Schools (FFS), which have historically been used to improve on-farm management with farmers engaged in a participatory manner, primarily meaning they are part of the decision-making process. This on-farm focus is beneficial, but it neglects critical aspects of livelihood improvement with limited connectivity to markets and an inability to resolve constraints that limit this market connection.

As such, part of the communication and dissemination strategy is to develop and support FBS by incorporating aspects and activities that relate to better market engagement and a through chain participatory approach to solving constraints that limit the flow of product and information through the supply chain.

PARDI will undertake a series of communication and dissemination initiatives that include:

1. participative workshops on supply chain analysis and marketing innovation, commodity-specific forums, and agribusiness information and knowledge exchanges
2. study tours associated with best practice operations based around PIC private sector collaborator visits both within PICs and to Australia
3. 'walk the chain' events that involve participative supply chain analyses
4. 'train the trainer' skills development that seeks to support current PIC extension services and capacities, as well as USP involvement
5. business-to-business mentoring and network development
6. web-based content provided to SPC and relevant PIC ministries covering PARDI activities, achievements and contacts
7. joint communication activities and outcomes in partnership with PHAMA, where relevant.

⁶ The FAO has commenced the development of the FBS approach as a 'new vision for improved livelihoods' where their services division envisions a 'learning by doing' approach to build farmer capacity.

PARDI will work closely with extension expertise within SPC and USP, including the Institute for Research, Extension and Training in Agriculture (IRETA).

5 Operations

The PARDI team and ACIAR RPMs recognize that this project differs substantially from past ACIAR approaches and experiences. First, PARDI is a relatively large project in a number of ways: sizeable funding, wide sector coverage and diverse disciplinary specialists. Second, PARDI is innovative. Rather than predefining a specific set of commodities, PARDI incorporates a 'market-oriented' approach to identify product and chain opportunities. The project establishes a research process to help define specific 'technical' chain interventions. Third, since its conception and, in practice, throughout its design stage, a large rationale for PARDI has been the integration of social scientists and market analysts with the agricultural, forestry and aquaculture scientists into a single project.

To cope effectively with the management complexities these innovations present, PARDI recognizes the need for a well-defined operational structure with clear roles and responsibilities. The project framework, methods and activities are described in detail below. First, however, we propose the following management framework for implementing, coordinating, and administering PARDI. We also propose that this management framework is reviewed at the end of the first year, adjusting if necessary.

The overall management, coordination, administration and decision making are the responsibility of the Project Leader, Steven Underhill reporting to the lead RPM David Shearer. The PARDI team proposes that Shearer liaises with all ACIAR RPMs, coordinating, interacting and seeking input and advise on their specific expertise project related interests.

After considerable discussion and reflection, the PARDI team judges a set of interlinked project components as the most appropriate operational structure (Figure 3). Each of the five project components includes: (i) a defined role with a clear set of responsibilities designed to meet specific objectives; (ii) a project coordinator responsible for implementation, reporting to Steven Underhill; and (iii) project staff (Australian and PIC) from one or more of the other components, ensuring both vertical and horizontal linkages.

Project component 1, the 'agricultural business and supply chain component' is responsible for carrying out all the activities required to achieve objectives 1 and 2. Randy Stringer is the component coordinator, managing and leading the project staff from Rural Solutions and the University of Adelaide's Global Food and Agricultural Business program. The responsibility for achieving objectives 1 and 2 is with the University of Adelaide team. However, in practice, the project activities related to component 1 require active participation by the project staff managing the other 4 component. Thus, the Adelaide team is supported by a project staff from UQ, JCU, DEEDI, USP and SPC.

Helen Wallace is responsible for Component 2, Forestry. Component 2's responsibilities focus on all forestry related interventions and activities (Objective 3), including: (i) working with the Component 1 team to help identify appropriate chain interventions; (ii) establishing a work plan for managing the intervention activities; (iii) collaborating with the component 5 team to promote capacity building and project monitoring and evaluation.

Paul Southgate is responsible for Component 3, Fisheries. Component 3's responsibilities focus on all fishery related interventions and activities (Objective 3), including: (i) working with the Component 1 team to help identify appropriate chain interventions; (ii) establishing a work plan for managing the intervention activities; (iii) collaborating with the component 5 team to promote capacity building and project monitoring and evaluation.

Kim Bryscean is responsible for Component 4, Crops. Component 4's responsibilities focus on all crop related interventions and activities (Objective 5), including: (i) working with the Component 1 team to help identify appropriate chain interventions; (ii)

establishing a work plan for managing the intervention activities; (iii) collaborating with the component 5 team to promote capacity building and project monitoring and evaluation.

D Hine and C. King are responsible for Component 5, Capacity Building. Component 5’s responsibilities focus on capacity building activities (Objective 5), including: (i) working with the Component 1 team to help identify appropriate activities for market and chain analysis training; and (ii) working with Components 2, 3, 4 to identify appropriate training activities for chian intervention.

5.1.1 Project framework and team structure

PARDI will be delivered through five interlinked program components (Figure 3) designed to meet the five project objectives and managed through QAAFI:

- C1: Agribusiness and supply chains; led by the University of Adelaide and the University of the South Pacific (USP). It will be supported by a team from UQ, JCU, DEEDI, Rural Solutions and the Secretariat of the Pacific Communities (SPC).
- C2: Forestry; led by USC and SPC Land Resource Division, Department of Trees and Forests. This reflects the expertise in subtropical and tropical forestry, but would include input from DEEDI and JCU and National Forestry Departments in the Pacific.
- C3: Fisheries; led by JCU and SPC’s Marine Resources Division, based on its clear leadership in marine and fresh water commodities, but is anticipated to include input from USC and National Fishery agencies.
- C4: Crops and horticulture; led by UQ and the Crop Production Department of SPC’s Land Resources Division. It will be supported by DEEDI, USC, JCU and National Agricultural agencies in the Pacific.
- C5: Capacity building, communications and training; led by UQ and SPC, with input from all collaborators.

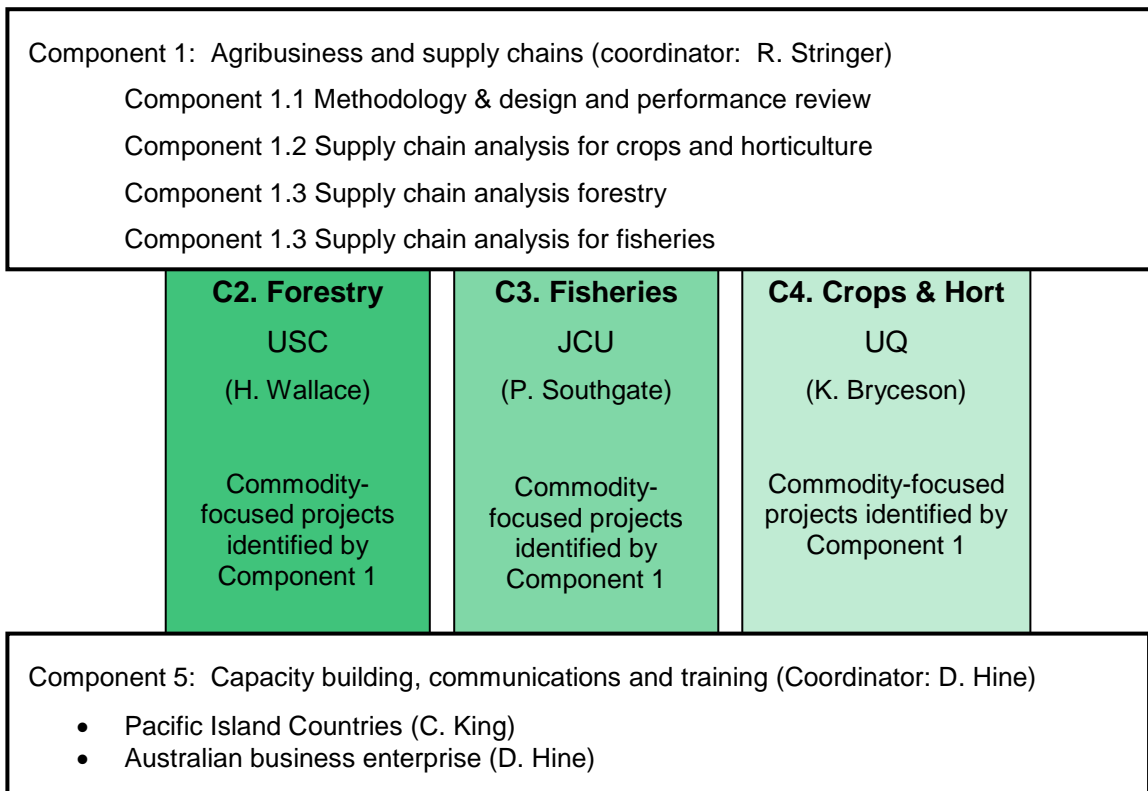


Figure 3: The PARDI project framework encompasses five interlinked program components

Deliverables within C2–5 will be constructed around a series of projects identified by C1. Project teams will be organized and staffed to ensure active Pacific Island Country participation and maximise cross organisational expertise.

Because PARDI has been designed around a supply-chain and market analysis approach whereby product-focused intervention priorities are identified, it is essential for the project to develop and establish a robust management process, review protocols and a clear decision making procedure.

One of the review protocols includes creating a PARDI Advisory Group with the specific function of reviewing identified researchable priorities and providing independent investment decision making. PARDI Advisory Group is envisaged to include a small team based on Secretariat of the Pacific Island Communities, and the University of the South Pacific, national agencies, private sector, PARDI, PHAMA, and ACIAR representation, with emphasis on independence and probity. The PARDI Advisory Group assists in the monitoring and performance of individual sub-projects.

The PARDI Advisory Group is an important project initiative, providing guidance in the selection of intervention-based activities, improving linkages between PARDI and other PIC development programs and, importantly, offering due diligence and probity in the decision making process. This aim is to develop a portfolio of sub-projects with identifiable project leadership based on relevant expertise. Component coordinators are responsible for ensuring relevant project portfolios are appropriately resourced.

The Project Leader and the lead RPM (David Shearer) collectively make the final decision whether or not to proceed with intervention based activities.

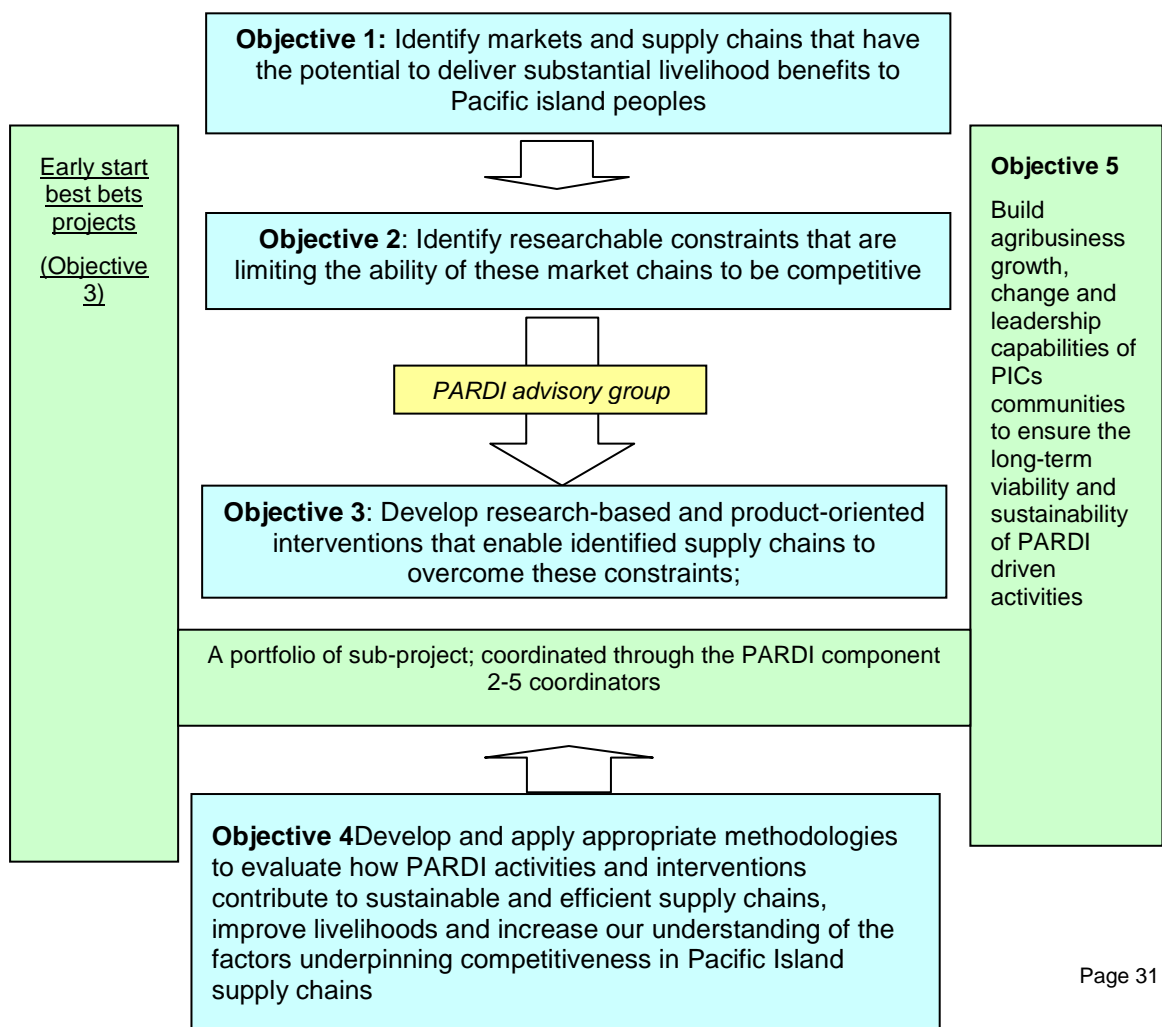


Figure 4: PARDI project objective framework

Supplementing this strategy, PARDI will also concurrently undertake a series of early start projects which have been selected through stakeholder consultation; and where prior in-country R&D and commodity experience have identified clear researchable priorities (such as high value timber veneer products, pearls and root crops) and a agribusiness and supply chain analysis.

5.2 Methodology

The methodology for PARDI will:

- confirm/identify opportunities for Pacific high-value products based on sound and detailed market analysis;
- identify and develop strategies to address researchable constraints focusing on developing linkages between farmers, agribusiness and other players in the market;
- identify value-adding opportunities, and where appropriate, focus interventions at this value adding level;
- be flexible to encompass identified and analysed opportunities with the ability to proceed and learn from 'best bet' options;
- aim to resolve technical constraints to improve chain competitiveness;
- develop capacity within research and agribusiness organisations within the Pacific to carry our research and development in these areas;
- develop the business and leadership capability of PIC communities to ensure self-reliance;
- review the impact of PARDI's activities on supply chains improvements; and
- use lessons on improving competitiveness to influence other chains in other sectors

To achieve this, PARDI plans to:

- identify markets and supply chains that have the potential to deliver substantial livelihood benefits to Pacific island peoples (objective 1), then;
- identify researchable constraints that are limiting the ability of these market chains to be competitive (objective 2);
- develop product and chain-oriented interventions to overcome constraints (objective 3);
- use product-oriented interventions to improve competitiveness and enable impact;
- evaluate the impact of PARDI activities and interventions in terms of developing sustainable supply chains, improving livelihoods and developing a comprehensive understanding of how research that underpins competitiveness in the Pacific can be applied to supply chains (objective 4);
- work with PICs communities to build their business and leadership skills (objective 5)

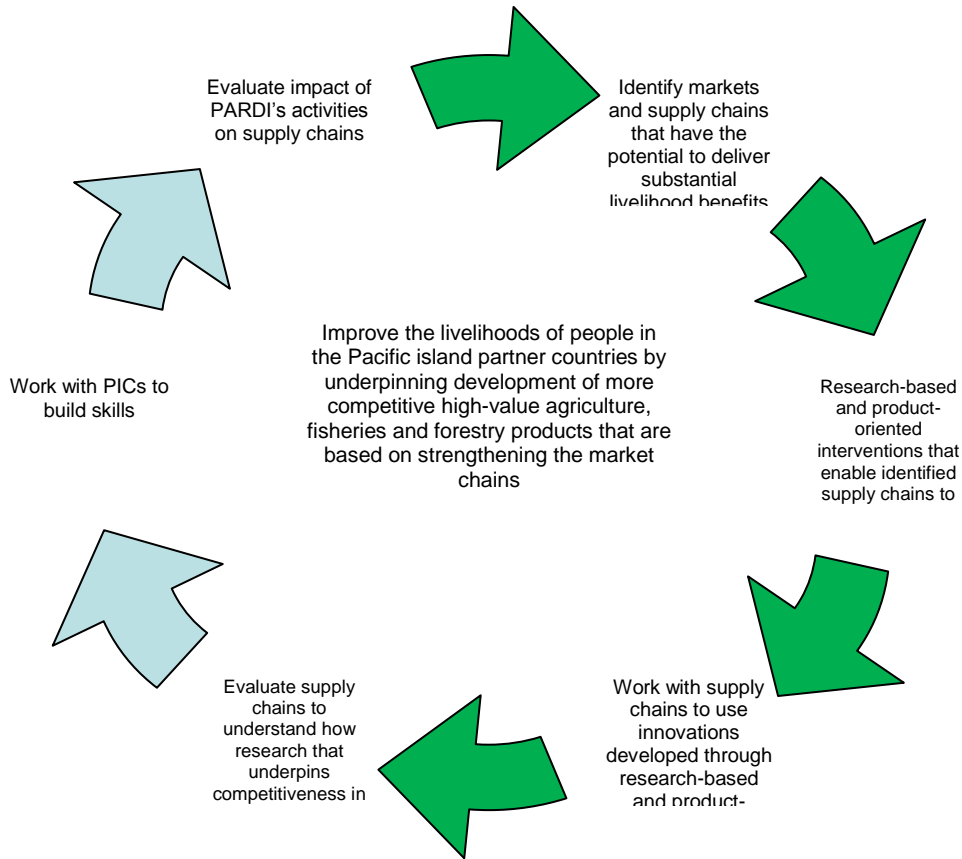


Figure 5: Strategic research methodology for PARDI

Rather than selecting a set of pre-determined methods, the project proposes a flexible research process guided by the Strategic Research Methodology (see Figure 5). This proposed research process allows researchers to adjust methods in an evolving and adaptable approach, tailoring carefully the analytical tools to the unique circumstances of each sector and product situation. The aim is to ensure high-quality data, information and analysis to meet the project's objectives.

Finally, PARDI recognises that opportunities exist to involve staff expertise from agencies and organisations in Australia and the PICs not yet named in this project document. The PARDI project leader and the lead RPM have the flexibility to involve additional agency staff to meet the project's requirements as they evolve.

The discussion of research methods presented here is organized according to the five objectives described in Section 3.

Objective 1: Identify markets and supply chains that have the potential to deliver substantial livelihood benefits to Pacific island peoples.

The project plans two approaches to rank, assess and choose supply chains with potential for delivering substantial livelihood benefits. The first approach is a hybrid 'Delphi' method. The project team plans to use the existing body of knowledge at ACIAR, its Pacific project leaders and their Pacific collaborators to judge and choose high potential products.

For example, based on project documents, trip reports and related evidence, root crops, Canarium nuts and pearls are three products that demonstrate high potential to deliver the benefits this project seeks. Choosing several of these high potential products based on years of sound experience and expert advice allows the project team to move those products quickly into the research activities outlined in objectives 2 and 3. The Delphi approach is relatively simple, yet effective: (1) review relevant project documents; (2) interview experts; and (3) reach a consensus (the project team and relevant partners).

The second approach to identify and select potential supply chains involves more traditional methods. Examples include: rapid market appraisals; participatory chain assessments; and qualitative assessments from the retail sectors.

The selection process involves several possible steps: (1) agree on objectives and target groups, (2) agree on selection criteria (3) perform the rapid market appraisal (or related method), and (4) apply selection criteria in a consultative process.

- (1) *Agree on objectives and target groups.* One overall aim of the project is to select value chains with opportunities to enhance livelihood outcomes. Markets are inherently dynamic. A range of supply and demand pressures impact directly and indirectly on a chain's performance. Each value chain is likely to deliver welfare benefits in very different ways.

Agreeing on a common understanding of the potential livelihood benefits in the context of a specific sector, and agreeing on who is likely to benefit is an important first step. The project strategy is to focus on research-based and product-oriented interventions to overcome constraints in ways that stimulate the value chain. Benefits from more competitive, higher expanding value chains might include additional employment, more affordable food for consumers, new capacities for businesses, higher real wages for workers, increased exports or greater farm incomes for producers, to name a few. On the other hand, if non-researchable interventions are already known as the binding constraint to the chain's performance, it makes little sense to pursue.

- (2) *Agree on selection criteria.* Carefully organizing sector selection criteria is important for a number of reasons. The criteria used for sector selection orients the value chain research, focusing it on key issues within the supply chain system. The selection criteria also become initial indicators for monitoring project progress. At this early stage, key questions include the relevance of the criteria to target groups (beneficiaries vary across sectors and criteria) and the intervention potential.

Among the selection criteria to be considered by the project are the product's growth potential, market potential, employment creation potential, potential to meet specific characteristics defined by the industry, retail sector, policy community (food safety, environment, fair trade, equity, gender, heritage); potential for rural income generation; potential for poverty reduction; potential for return on investment/effort impact ratio; synergies with other initiatives; and potential for upgrading and expanding.

- (3) *Perform the rapid market and chain appraisal.* Select the most appropriate method to assess the sector or product. Rapid appraisal techniques are conventional, well tested methods to assess specific sectors involving, for instance, structured interviews with major industry players, producing an industry map of product flow, identifying broad issues and opportunities along the chain, and assessing the best potential market (aligned with the project's 3 key strategies).
- (4) *Apply selection criteria in a consultative process.* Selection criteria assessments and decisions may involve a range of participants from government departments, extension services promoting specific sectors, business membership organizations (such as chambers of commerce, trade and industry), development organizations and the banking community.

The overall management and coordination of Objective 1 is the responsibility a component 1 coordinator, Randy Stringer.

Objective 2: Identify researchable constraints that are limiting the ability of these market chains to be competitive.

The project proposes market and value chain analysis to identify researchable constraints and to understand the reasons why those constraints are preventing chains from

achieving desired outcomes. The value chain concept is adopted as an analytical framework, allowing researchers to examine how enterprises interact when dealing with the same product in a particular market. Market analysis provides an understanding of how the interplay of policy (regulations, taxes, financial incentives, trade, etc), market structure, consumer demand and related incentives shape chain performance.

A range of diverse research methods are available for market and value chain analyses. As proposed above in objective one, the appropriate choice and mix of methods will vary by sector and product.

Among the research methods the project plans to use include:

- Rapid reconnaissance scoping involving interviews and informal discussions with specialists and chain participants;
- Structured key informant interviews (e.g., the industry, policy, banker, NGO, academic and donor community and chain participants);
- Review of existing data, literature, secondary sources, sector reports, industry studies, policy analysis, and statistical collections;
- Qualitative (e.g. focus groups) and representative quantitative surveys (consumers, producers, traders, wholesale markets, retailers, processors, and related chain partners for sector analysis);
- Ground-truthing workshops to verify sector and market analysis;
- Chain-specific, detailed interviews with specific value chain members (explore issues and opportunities across product flow, information flows and relationship flows); and
- Workshops with chain members to verify VCA analysis

The project proposes to limit the total number of chains to around 8, including the 3 'best bet' chains. In general, the research process may involve all or some of the following steps:

1. Build on sector and market analysis carried out in the chain selection process undertaken for objective 1, focusing on target markets and specific chains relevant to that market.

The initial research to select high potential chains provides an overall picture of the target sector and an understanding of the main opportunities and bottlenecks in the value chain. If necessary, building and expanding on this research is done through examining existing studies, informal discussions with market participants, public agencies, NGOs, sector specialists (e.g., inviting them to initial workshops) and the teams' observations.

2. Conduct more detailed market and consumer research to understand consumer drivers and market requirements.

Market analysis and consumer research is linked directly to the value chain analyses. Mapping of market channels and consumer demand analyses are important inputs into market research. Methods include focus groups, online surveys, retail surveys and consumer surveys.

3. Conduct a value chain analysis on the specific chains to that target market;

The core method for this step is value chain mapping (in most cases this is done for objective 1). The initial value chain map provides a basis for guiding the full value chain analysis. For instance, after the initial mapping exercise is complete, the team is able to determine important information gaps, the geographic locations for field work, the most appropriate chain entry point, and the additional dimensions required for mapping, and value chains with the highest potential to achieve livelihood benefits.

Over the past several years, researchers have produced a plethora of value chain toolkits and research method manuals (IDRC 2001, Schmitz 2005, Roduner 2007,

DIFID 2008, Fearne et al 2008, Stringer et al 2009). The team plans to draw on these manuals as appropriate.

Examples of the additional dimensions that may be necessary include mapping: knowledge and flows of information; the volume of products; numbers of actors and jobs; the geographical flow of the product or service; information flows along the chain; the value at different levels of the chain; relationships and linkages between value chain actors; services that feed into the value chain; constraints and potential solutions.

If and when appropriate, the team plans to use specific qualitative and quantitative methods and analytical tools from econometric analysis to best-worst and choice modelling to assess survey data on governance, contracts, coordination, regulations, relationships, trust, price satisfaction, costs and margins, income distribution and employment distribution.

4. In collaboration with all project partners, evaluate the results and evidence from the market analysis and value chain study, ranking the potential researchable to scope intervention projects.

Presenting, discussing and assessing the study evidence in workshops is one of the more appropriate methods for ranking the researchable opportunities for interventions.

5. Provide information into PHAMA project to help prioritise any market access issues, if appropriate.

The overall management and coordination of Objective 2 is the responsibility a component 1 coordinator, Randy Stringer.

Objective 3: Develop and undertake research-based and product-oriented interventions that enable identified supply chains to overcome these constraints

Based on the outputs of objective 1 & 2; a portfolio of PIC supply chain-derived commodity intervention projects will be developed and implemented. Targeted commodities may include yams, cassava and sweet potato, vegetables, vanilla, taro, seaweed, pepper, pearls, papaya, high value forestry products, freshwater aquaculture, floriculture, coconut, cocoa, Canarium nut, breadfruit and others.

Methodologies will be developed once the target commodities and specific researchable interventions are known.

The overall management and coordination of Objective 3 varies depending on the product or chain. Helen Wallace is the component 2 leader for all forestry related products and chains. Paul Southgate is the component 3 leader for all fishery products and chains. Kim Bryceson is the component 4 leader for all crop products and chains. In all cases, these component leaders are supported by Australian and PIC component 1 project staff.

Objective 4: Develop and apply appropriate methodologies to evaluate how PARDI activities and interventions contribute to sustainable and efficient supply chains, improve livelihoods and increase our understanding of the factors underpinning competitiveness in Pacific Island supply chains.

This objective will build on the analysis of the identified product supply chains and business related models and will use the Hybrid Whole-of-System approach highlighted by Altman (2001, 2007) as being of extreme importance in understanding how *state*, *customary* (cultural) and *market* activities along with the inter-linkages between them, are important in developing successful and sustainable new indigenous enterprises. The essential power of a whole-of-system market-based analysis will be retained but cast in the context of a hybrid economy in which overall “livelihood improvement” is seen from within the context of a sustainable supply chain”.

This approach will enable the building of an understanding of the multiplier effects of the products/industries involved at the following scales – whole-of-industry, community and individual person (Bryceson and Brown 2009).

Both macro and micro analysis for this component will be used. The input-output model developed in the Desert Knowledge CRC's DesertBiz™ Project will also be used as a basis and enhanced to determine output, income and employment multipliers and to analyse the whole-of-industry level impact of the industries

Participatory research methods will be used to develop an understanding of the individual, family and community impacts (both positive and negative).

A household, community and industry chain stocks and flow analysis (Bryceson and Brown 2009) will be used to track physical and monetary flows of resources including income from the specific product through the livelihood 'chain'. The information from the stocks and flows analysis will then be used to quantify and model the impacts of product on income, health, and self-esteem of individuals, family and community and the industry as a whole. This analysis will be used to identify critical success factors and principles that achieve stronger community and whole of industry outcomes.

Objective 5: Build agribusiness growth, change and leadership capabilities of PICs communities to ensure the viability and sustainability of PARDI driven activities

The paradigm shift from production for food security to market-oriented agribusiness will require extension service providers (whether public sector, NGO or private sector) to acquire new skill sets (relating for instance to quality standards, food safety and the use of market intelligence as a basis for decision-making) and new approaches (for instance, related to building transparent and effective relationships among market chain actors, increasing efficiency in supply chains, and ensuring positive community impacts from supply chain development). Capabilities are not unique they are very transferable between communities, industries, countries. There are three fundamental capabilities that are easily identifiable: Resource accumulation, resource integration and resource reconfiguration. What is unique is the context in which capabilities are employed. The situation specific variants in enacting resources will create widely varying outcomes. Different combinations of skills will be required in each country, for each commodity and for each group of supply chain actors. Understanding and managing relationships among supply chain actors in an equitable way, involving *participatory* extension skills and approaches will be of paramount importance.

Objective 5 seeks to build the capacity of all stakeholders in participatory research & extension in agri-business. The PARDI will do this by:

A thorough analysis of the contextual variables most likely to impact the outcomes of PARDI characterising the 'extension system' for supporting agribusiness and identify capacity-building needs will be carried out.

1. Identify actors (public sector, NGO and private sector) with actual or potential capability to support supply chain development.
2. Examine existing public-private partnership approaches supporting agribusiness to develop effective and ethical partnership models to guide development.
3. Analyse contextual variables that impact chain dynamics.
4. Conduct participatory assessment of needs for capability building.
5. Work with the Pacific Island Extension Network (PIEN) to develop a database of extension resources created and made available to partners, supported by interactive workshops at sites of chain participants.
6. Provide self-monitoring, and independent monitoring framework for regular diagnostic feedback on capability building at points on the value chain.

Developing the local capability to address these needs and gaps in support of the PARDI initiatives and case studies

1. Develop a 'toolbox' of participatory training materials and approaches to answer these needs
2. Identify and tap into services / or partners that can help in addressing capacity building needs Identified
3. To form and support local teams (project team members, extension staff, producer organisations, farmers and NGO representatives) to engage with the various actors in agribusiness systems through participatory processes.
4. Conduct targeted training of the stakeholders in participatory methods and specific technical, social and business skills to support agribusiness.

Strengthen partnership between stakeholders in supply chains and promote effective, competitive and ethical chains

1. Improve communication mechanisms among stakeholders and identify leverage points for partnerships
2. Facilitate formation of appropriate associations to support effective, competitive and ethical agribusiness supply chains
3. Identify opportunities for forging new partnerships to strengthen or grow chains
4. Identify opportunities for the use of ICTs in strengthening partnerships.

Monitoring, evaluation and learning to meet new contemporary challenges and opportunities in agribusiness development

1. Developing indicators and processes to benchmark, demonstrate and measure gains in capacity building relevant to project objectives
2. To learn from this, so that successful models and processes can be scaled out to other areas and products
3. To use a range of evaluation tools to monitor project progress and guide project management
4. To use learnings to promote systemic change through partnerships with training and education providers and professional support networks (including the Pacific Islands Extension Network).

5.3 Activities and outputs/milestones

Objective 1: Identify markets and supply chains that have the potential to deliver substantial livelihood benefits to Pacific island peoples

No.	Activity	Outputs/ milestones	Due date of output/ milestone	Risks / assumptions	Applications of outputs
1.1	Rank, assess and choose 'best bet' high potential supply chains: (i) review relevant project documents; (ii) interview experts; and (iii) reach a consensus (the project team and relevant partners). (A, PC)	'Best bet' high potential supply chains identified	May 2010	Activities will involve inputs from relevant commodity experts; access to unpublished data	Best bet project intervention identified
1.2	Establish the process for selecting additional supply chains, determine objectives and target groups, and select criteria; (A, PC)	Chain selection workshop organized and concluded.	August 2010	Activities will involve inputs from relevant commodity experts; PIC business participation	Identify targeted supply chains

1.3	Gather initial market intelligence to help determine domestic and export market potential for proposed chains.	Market assessment reports completed.	Four chains by September 2010; Four additional chains by December 2010.		
1.4	Impacts on indicators and related criteria emerging from selection workshop. Conduct the rapid market appraisal (or related method) to assess the sector or product to identify broad issues and opportunities along the chain, and assessing the best potential market (aligned with the project's 3 key strategies). (A, PC) (A, PC)	Outputs and milestones includes initial value chain and market assessments for up to 10 chains.	Chain 1 and 2: Sept 2010 Chains 3 and 4: Dec 2010 Chains 5 and 6: Mar 2011 Chains 7 and 8: Jun 2011 Chains 9 and 10: Sep 2011	Assumption of active PIC collaboration	Potential export market bets identified
1.5	Apply selection criteria in a consultative process (A, PC)	Workshops to present reports to PARDI Advisory Group	Workshop dates: Oct 2010; February 2011; June 2011; August 2011; Oct 2011.		Data essential for objective 3

PC = partner country, A = Australia

Objective 2: Identify researchable constraints that are limiting the ability of these market chains to be competitive

No.	Activity	Outputs/ milestones	Due date of output/ milestone	Risks / assumptions	Applications of outputs
2.1	A desk study highlighting past experiences with similar commodity focused projects in the PICs and reasons for their success or failures.	Report completed	March 30, 2010	Data and reports not readily available.	Guidance for Objectives 3.
2.2	<i>Perform the rapid market and chain appraisal on the best bet chains, selecting the most appropriate method to assess the sector or product. (A, PC)</i>	First round of rapid market and chain appraisal on the 3 best bet chains completed	August 2010	Activities will involve inputs from relevant commodity experts; PIC business participation	Best bets supply chains; methodology refinement in terms of target commodity
2.3	Build on sector and market analysis carried out in the chain selection process undertaken for objective 1, focusing on target markets and specific chains relevant to that market. (A, PC)	Chain selection process undertaken	Nov 2010	Completion of activities 1.2, 1.3 & 1.4	Part of the supply chain review methodology
2.4	Conduct more detailed market and consumer research to understand consumer drivers and market requirements. (A, PC)	Detailed market and consumer research completed	Nov 2010	Assumption of active PIC collaboration; full access to PIC supply chains	Data essential for Objective 3
2.5	Review international market access requirement and consider biosecurity challenges	Review of market access protocols in	Dec 2010	Assumption of active PIC collaboration	Potential market access challenges identified

	likely to be encountered by PICs (A, PC)	international target markets			
2.6	Conduct a value chain mapping and analysis on the chains emerging from the selection process. t. (A, PC)	Value chain mapping and analysis completed.	The Value chain studies will be ongoing, but limited to about 8 chains. In some cases, a second round of mapping may be needed after first round interventions are identified and addressed. First round chains 2 chains: Feb 2011; Second round: 2 chains Aug 2011, Third round: Feb 2012	Assumption of active PIC collaboration	Data essential for Objective 3
2.7	In collaboration with all project partners, evaluate the results and evidence from the market analysis and value chain study, ranking the potential researchable interventions. (A, PC)	Ranked potential researchable to scope intervention projects documented	Workshops following value chains assessments as per 2.4. First round chains June 2011; Second round: 2 chains Dec 2011, Third round: June 2012	Assumption of active PIC collaboration; researcher interventions require prioritisation due to number.	Provides prioritisation of researcher intervention based on comparative supply chain-derived evidence
2.8	Provide our findings and results to the PHAMA project (and other related development programs) when we identify potential interventions beyond PARDI's scope or capacity. (A)	Priority researchable projects to be implemented selected	First round chains June 2011; Second round: 2 chains Dec 2011, Third round: June 2012	Assumption of PHAMA participative linkages	Part of a series of initiatives to support collaborative linkages between PARDI and PHAMA

PC = partner country, A = Australia

Objective 3: Develop research-based and product-oriented interventions that enable identified supply chains to overcome these constraints; and

No.	Activity	Outputs/ milestones	Due date of output/ milestone	Risks / assumptions	Applications of outputs
3.1	Researchable activities resulting from best bets reviews in objective 1 have been commenced (A, PC)	Early intervention projects commenced	Jul 2010	Research priorities for the Canarium nut, root crops and pearls has been documented and achievable within available PARDI resources	Commencement of projects
3.2	Prioritise supply chain identified research inventions (A, PC)	PARDI Advisory Group formed and researchable issues reviewed and prioritised	Dec 2010	Assumption that the supply chain and market analysis will identify intervention opportunities in excess of project funds	Identified target research intervention to be actioned
3.3	Implementation of researchable projects	See below* Project specific outputs	June & Dec 2011, 2012, 2013	See below	Essential to project outputs

PC = partner country, A = Australia

*Activity 3.3 will encompass a series of up to 8-10 projects which will be developed as a result of the review and prioritisation of the researchable interventions identified within objective 2. The intent is manage this resulted activity through a portfolio of research projects each with a defined project leader, project specific-objectives, milestones and reporting obligations (with potential variable start dates)

These projects together with the three early win projects will be collated by the commissioned organisation and collectively reported every 6 months to ACIAR under milestone 3.3

Objective 4: Develop and apply appropriate methodologies to evaluate how PARDI activities and interventions contribute to sustainable and efficient supply chains, improve livelihoods and increase our understanding of the factors underpinning competitiveness in Pacific Island supply chains.

No.	Activity	Outputs/ milestones	Due date of output/ milestone	Risks / assumptions	Applications of outputs
4.1	Develop a framework for evaluating micro and macro impacts (A)	Evaluation framework developed	June 2010	Research networks are already in-place for interviews	Methodologies for determining impact
4.2	Develop livelihood multiplier effects for products & industries (A)	Multiplier effects calculated for whole-of-industry, community and individual person	Nov 2010 Best Bets products)	Assumption that Best Bet SC have been identified and can be accessed	Methodologies for determining impact

4.3	A household, community and industry chain stocks and flow analysis to track physical and monetary flows of resources through the livelihood 'chain'. (A,PC)	Stocks and flow analysis undertaken	Nov 2010 (Best Bet products)	Assumption that Best Bet SC have been identified and can be accessed	Methodologies for determining impact
4.4	Develop the model that will enable data from stocks & flows analysis be used to quantify the impacts of a product on income, health, and self-esteem of individuals, family and community and the industry as a whole (A,PC)	Impact analysis completed Model of livelihood chain developed	30 Nov 2010 (Best Bet products)	Assumption that Best Bet SC have been identified and can be accessed	Methodologies for determining impact
4.5	Establish framework for monitoring, comparison and evaluation (A,PC)	Performance framework designed	June 2010	PIC extension collaborator participation	Methodology to assess performance
4.6	Use a range of evaluation tools to monitor project progress & guide project management (A,PC)	Monitoring of project progress	Dec 2010 Dec 2011, 2012, 2013	Assumption the Dec 2010 will be limited to early start projects; and that assessment will be annually thereafter with reporting at the PARDI annual forum.	Data to support continuous improvement deliveries within PARDI
4.7	Identify opportunities for new partnerships to strengthen or grow chains (A,PC)	New supply chain partnership	June, Dec 2011, 2012, 2013	Assumption of strong PIC and Aust private participation	Strengthens potential private sector linkages between Aust and PIC

PC = partner country, A = Australia

Objective 5 Build agribusiness growth, change and leadership capabilities of PICs communities to ensure the viability and sustainability of PARDI driven activities

No.	Activity	Outputs/ Milestones	Due date of output/ milestone	Risks / assumptions	Applications of outputs
5.1	Establish a set of measurable indicators to assess capacity change.	A report with the list of indicators.	June 2010	Assume the most important indicators are measurable.	Used as baseline for impact assessment.
5.2	Develop communication group to enhance output sharing and linkage between programs	Established a communication team	June 2010	Assumption that pre-existing PIC networks will be used where appropriate;	Ensures relevant and effective communication networks are in place

No.	Activity	Outputs/ Milestones	Due date of output/ milestone	Risks / assumptions	Applications of outputs
5.3	Establish communication mechanism to share lessons learnt across countries and commodities	Communication strategy developed	Dec 2010	Assumption pre-existing PIC networks are functioning effectively; and of collaboration between PARDI and PHAMA communication strategies	Ensures project outputs and learning are disseminated
5.4	Postgraduate training in areas relevant to PARDI in Australia and at the University of the South Pacific (USP)	Postgraduate training commenced where appropriate	Dec 2010	Assumption of strong participative involvement from USP and Aust. universities; funding will be through existing scholarship programs supporting PIC;	Delivery of capacities building outputs
5.5	Technical (non-tertiary) capacity building initiatives	A series of capacity building initiatives developed	June & Dec 2010, 2011, 2012, 2013	Assumption that delivery will be inclusive of PIC Departments of Agriculture and the USP's Institute for Research, Extension and Training in Agriculture [IRETA]).	Delivery of capacities building outputs

PC = partner country, A = Australia

5.4 Project personnel

5.4.1 List of project personnel involved in the project

Australian commissioned and collaborating organisations (or IARC)

Name	Sex (m/f)	Agency and position	Discipline and role in project	Time input (%)	Funding
Dr Steven Underhill	M	UQ - QAAFI	Project leader	50%	PARDI
TBC	F/M	UQ-QAAFI	Project Officer, PARDI	20%	UQ
Prof Randy Stringer	M	Uni Adelaide	Leader - Component 1	20%	UA
Prof Helen Wallace	F	USC	Leader - Component 2	20%	USC
Prof Paul Southgate	M	JCU	Leader – Component 3	20%	JCU
Assoc Prof Kim Bryceson	F	UQ	Leader - Component 4	30%	UQ
Dr Damian Hine	M	UQ	Leader - Component 5	20%	UQ
Assoc Prof Wendy Umberger	F	UA		20%	UA
Dr Amos Gyau	M	UA		100%	PARDI
Domenico Dentoni	M	UA		25%	PARDI
Helen Oliver	F	UA		20%	PARDI
Carolin Plewa	F	UA		15%	PARDI
Mr. Theo Simos	M	Consultant		20%	PARDI
Mr. Craig Johns	M	RS		20%	PARDI

Abbreviations

UQ:	The University of Queensland
QAAFI:	Queensland Alliance for Agriculture and Food Innovation
USC:	University of the Sunshine Coast
UA:	The University of Adelaide
DEEDI:	Department of Employment, Economic Development and Innovation
JCU:	James Cook University
RS	Rural Solutions SA

Partner country institutions

Name	Sex (m/f)	Agency and position	Discipline and role in project	Time input (%) ⁷	Funding
Mr Aleki Sisifa	M	SPC, Director, Land Resources	Project Leader, Research	10	SPC
Professor Biman Chand Prasad	M	USP, Dean, Business and Economics	Project Leader, Agribusiness	10	USP
Mr Tim Martyn	M	SPC, Resource Economist	Project Coordinator, Market Analysis and Development	50	PARDI
Dr Siosuia Halavatau	M	SPC, Team leader, DSAP	Project Coordinator Research and Participation	50	PARDI

5.4.2 Description of the comparative advantage of the institutions involved

University of Queensland - QAAFI

PARDI would be managed and led by the Queensland Alliance for Agriculture and Food Innovation (QAAFI), a newly formed Institute within The University of Queensland. QAAFI is a strategic partnership between DEEDI and The University of Queensland under-pinned by DEEDI's extensive primary industries experience and resources.

The inclusion of UQ staff from the School of Integrative Systems and the UQ Business School provides both strong agribusiness and supply chain expertise as well business systems management. UQ is currently involved in several ACIAR projects including:

- ADP/2005/140: *Participatory needs assessment for capacity building in extension (Pacific Islands)*
- PC/2004/063: *Integrated pest management in a sustainable production system for brassica crops in Fiji and Samoa*
- PC/2007/039: *The control of basal stem rot of oil palm caused by Ganoderma in Solomon Islands*
- PC/2008/011 *Ornamental horticultural crop development for Fiji, PNG and northern Australia*

University of Adelaide and Rural Solutions

In 2006, the University of Adelaide began investing heavily in food and agriculture value chain research, hiring four new staff between 2006 and 2009. Rural Solutions SA and the University of Adelaide first initiated a formal research partnership in 2007 as part of the Adelaide Thinker in Residence Program on Food Value Chains. The University of Adelaide established a Global Food and Agricultural Business Program (GFAB). The first of its kind in Australia, and unique to the Asia Pacific region, GFAB includes a postgraduate training degree program, a global value chain focused research agenda and an outreach strategy oriented towards food producers, processors, retailers, consumers and rural communities.

GFAB and Rural Solutions work with domestic and global partners including ACIAR, International Food Policy Research Institute, UN Food and Agriculture Organization, United Nations Commission on Sustainable Development, World Bank. Food value chain analysis expertise includes mangos, mangoosteens, shrimp, beef, dairy, chillies, potatoes, shallots and wine.

⁷ Time inputs for each project participant needs to be finalised

Adelaide University and Rural solutions staff will lead the agribusiness and supply chain components of the project, as well as expertise in markets and trade, food and product innovation.

DEEDI

DEEDI (formerly DPI&F) undertakes broad ranging primary industries related RD&E with a strong focus on creating tangible economic gains consistent with social and environmental considerations. DEEDI has worked closely with ACIAR since its inception and has a long history of in-county R & D throughout the Pacific. DEEDI contribution to PARDI will include supply chain and postharvest expertise, trade and marketing, wood science and technology, extension and communication.

DEEDI is currently involved in numerous PIC ACIAR projects including:

- PC/2004/049: *Improved farming systems for managing soil-borne pathogens of ginger in Fiji and Australia*
- PC/2004/063: *Integrated pest management in a sustainable production system for brassica crops in Fiji and Samoa*
- PC/2008/003: *Strengthening the Fiji papaya industry through applied research and information dissemination*
- FST/2004/054: *Improving value and marketability of coconut wood*
- FST/2005/089: *Improved silvicultural management of *Endospermum medullosum* (whitewood) for enhanced plantation forestry outcomes in Vanuatu*

FST/2004/053: Establishing forest pest detection systems in South Pacific countries and Australia

University of the Sunshine Coast

USC has strong linkages with the University of the South Pacific as well as ongoing ACIAR activities in the region through:

- FST/2006/048 *Processing of *Canarium indicum* nuts: adapting and refining techniques to benefit farmers in the South Pacific*

USC participation in PARDI is based on its expertise in production forestry, horticultural nuts crops and aquaculture. USC has formed a strong forestry partnership with DEEDI (formerly DPI&F) as well as with the CRC for Forestry which has resulted in USC being recognised as national leader subtropical and tropical forestry R & D. USC is also seeking to expand its participation in Papua and the Pacific through new and expanded education-based partnerships.

James Cook University

JCU has an international reputation in aquaculture, marine biology, marine science, ecology and conservation. The School of Marine and Tropical Biology has 46 academic staff, 343 research staff, and around 25 Adjunct and Associate staff, including one Federation Fellow and one ARC Professorial Fellow. The School has 300 postgraduate students with approximately half from made up of international students from the Americas, Asia, Africa, Europe and the Pacific. Prof Paul Southgate (the key JCU PARDI team member) has primary research focus is the biology and culture of pearl oysters. Much of my research in this field has been conducted collaboratively with Pacific island nations (Kiribati, Fiji, Solomon Islands, and Tonga).

Currently JCU projects in the Pacific include:

- FIS/2006/138: *Developing aquaculture-based livelihoods in the Pacific islands region and tropical Australia*
- FIS/2006/172: *Winged oyster pearl industry development in Tonga*

JCU also has ongoing forestry project activities in the Pacific through:

- FST/2007/057: *Socioeconomic constraints to smallholder sandalwood in Vanuatu*

Secretariat of the Pacific Communities

SPC is an international organisation that provides technical assistance, policy advice, training and research services to 22 Pacific Island countries and territories in areas such as health, human development, agriculture, forestry and fisheries. SPC has served the people of the Pacific for more than six decades and is the largest developmental organisation in the Pacific with around 350 staff and offices in Noumea, New Caledonia, Suva, Fiji Islands, Pohnpei and Federated States of Micronesia.

University of the South Pacific

The University of the South Pacific (USP) is the premier provider of tertiary education in the Pacific region and an international centre of excellence for teaching, research consulting and training on all aspects of Pacific culture, environment and human resource development needs. The Faculty of Business and Economics seeks distinction in the creation and distribution of knowledge in research, teaching, and consultancy. Specifically, we are committed to becoming the intellectual centre of excellence in Pacific-based public and private sector management education and scholarship.

The School of Agriculture and Food Technology (SAFT) is situated at the Alafua Campus of the University of the South Pacific in Samoa. The primary focus of the Alafua Campus when it was initially acquired from the Government of Samoa in 1977 was Agriculture. Alafua Campus was originally the South Pacific Regional College of Tropical Agriculture, (SPRCTA) which was established with New Zealand Assistance in the early 1960s under the Colombo Plan. In 1977, the Government of Samoa leased the campus to the University of the South Pacific and SPRCTA became the School of Agriculture (SOA) for USP.

The School of Agriculture (SOA) changed its name in 2005 to include Food Technology (FT). The School of Agriculture and Food Technology (SAFT) has four (4) academic disciplines, namely:

- Agricultural Economics, Extension and Education
- Animal Science
- Crop Science, and
- Soil Science and Agricultural Engineering.

5.4.3 Summary details of the role of each participant involved

Steven Underhill

Dr Underhill is the Project Leader responsible for the coordination and effective delivery of PARDI.

Dr Underhill has over 20 years experience in agricultural R & D with a PhD in subtropical and tropical postharvest horticulture. Dr Underhill has spent the last 10 years leading Queensland Primary Industries and Fisheries' (QPIF) research units in forestry, amenity horticulture, market access, and innovative food technology programs. Dr Underhill has excellent current linkages with UQ and USC (Adjunct Professor: Horticulture) and has worked closely with JCU on the emerging tropical science partnership initiative.

Randy Stringer

Prof Stringer will lead component 1: Agribusiness and Supply chains

Over the past thirty years, Prof Stringer has taught, published and conducted research and policy analysis on agricultural development, natural resource management, food security, land tenure, rural development, poverty and environmental issues in Australia,

Asia, Africa, Europe, and Latin America. Before joining the University of Adelaide, Prof Stringer was Chief of the Comparative Studies Service at the United Nations Food and Agriculture Organization. At FAO, Prof Stringer's produced FAO's flagship publication, the State of Food and Agriculture, focusing on biotechnology, trade and poverty and environmental services.

Helen Wallace

Prof Wallace will lead component 2: Forestry

Prof Wallace leads a portfolio of projects in Forestry and Horticulture worth around \$3 million. Assoc Prof Wallace has led many projects with a strong emphasis on hybrid forestry, breeding, and quality in forestry trees. She has also been a researcher in horticulture, in particular macadamia nut production and processing for over 20 years.

Relevant projects to PARDI include:

- Processing of *Canarium indicum* nuts in the South Pacific, to develop techniques for an industry based on value adding to *Canarium* nuts (funded by ACIAR). Partners include NARI (PNG), Dept of Forests (Vanuatu) and the Australian Macadamia Industry
- The Smart Forests Alliance Qld, a consortium of 20 researchers using biotechnology to speed up production of tropical trees for timber production
- Forest vulnerability assessment for the National Climate Change Adaptation Research Facility (NCCARF)
- Development of *Eucalyptus argophloia* for hardwood forestry in low rainfall areas

Paul Southgate

Prof Southgate will lead component 3: Fisheries

Prof Southgate's research focuses on tropical aquaculture with particular emphasis on the biology and culture of pearl oysters. Much of his research has been conducted collaboratively with Pacific island nations (Kiribati, Fiji, Solomon Islands, and Tonga) as part of ACIAR funded projects but also includes pearl oyster resource development projects in Mexico, China and Tanzania. Prof Southgate has coordinated a number of ACIAR funded research projects in the Pacific islands since 1993 including:

- FIS/1997/031: *Pearl oyster resource development in the Pacific islands*
- FIS/2006/002: *Aceh aquaculture rehabilitation project*
- FIS/2006/138: *Developing aquaculture-based livelihoods in the Pacific islands region and tropical Australia*
- FIS/2006/172: *Winged oyster pearl industry development in Tonga*

Kim Bryceson

Assoc Prof. Bryceson will lead component 4: Crops and Horticulture

Assoc Prof Bryceson has had senior R&D management experience in both Commonwealth and State Governments (DPI) and in private industry, as well as consultancy-based project management.

Recent, extensive research project experience has been in value chain analysis and the role of ICTs for facilitating business information flows, decision making and knowledge dissemination within and across industry and product supply chains both domestically and internationally. Relevant Projects to PARDI Include: the Desert Knowledge CRC Projects Market Analysis of Bush Tomato and Wattle Seed, and associated "Walking the Chain" capability development, and the current ACIAR Project on The role of floricultural activities for improving indigenous livelihoods

Damian Hine

Dr Hine will lead component 5: Capacity building, communications and training

Dr Damian Hine appointment spans UQ Business School and the Science Faculty. Damian's expertise builds on his perspectives as an evolutionary economist and centres upon building intellectual assets in organisations and economic systems, including knowledge exchange, intellectual capital and entrepreneurship, all aimed at enhancing growth through innovation. In Damian's applied industry work, he has particular expertise in designing business cases and strategies for both public and private organizations, assisting them in winning over \$70M in funding to date. Damian is taking an active role in University-wide internationalisation efforts. Damian has been appointed to the Latin America Reference Group for the University, based upon his successful efforts in winning projects in Chile and Brazil.

Wendy Umberger

Wendy Umberger is part of the value chain analysis team responsible for component 1 and objectives 1 and 2. She will also be supporting components 2, 3, 4 and 5. Wendy is the principal investigator for the University of Adelaide's Global Food and Agricultural Business research program responsible for guiding the team's approach to value chain methods. Her expertise includes: determining economic values of credence attributes versus other quality attributes in food value chains and the implications for agribusinesses, industry and policy makers; the economics of traceability and quality assurance systems in food value chains; consumer, producer and supplier behaviour and decision-making using unique valuation methods to determine relative value and factors/attributes driving food purchase and production decisions; and experience in the development of market and consumer-focused value chains. Wendy has experience in food value chains in S.E. Asia, S. Korea, Papua New Guinea Europe, the U.S. and Australia.

Amos Gyau

Amos Gyau is part of the value chain analysis team responsible for component 1 and objectives 1 and 2. He will also be supporting components 2, 3, 4 and 5. Amos will be based in Fiji for more than half the time during the first two years of the project. Amos' plays a facilitating and coordinating role between all the value chain and market analysis going on for the University of Adelaide. A native of Ghana, Amos' research background focuses on the role of organizational culture in buyer-seller relationships; the determinants of trust in the international fresh produce business between; comparison of relationship quality of buyers in international agribusinesses; and the impacts of supply chain governance structures on inter-firm relationship and value chain performance in agribusinesses.

Domenico Dentoni

Domenico Dentoni is part of the value chain analysis team responsible for component 1 and objectives 1 and 2. He will also be supporting components 2 and 3 and 5. Domenico Dentoni is the newest member of the Global Food and Agricultural Business program. Domenico specializes in consumer behavior related to food with credence attributes and linking small and medium enterprises to global value chains through alliances, social networks and policy initiative. Domenico's work in South Australia is centered on seafood and aquaculture value chains. He has additional experience in global value chains and firms' horizontal coordination (Africa, South-East Asia, Middle East and Latin America) and research on food product development, marketing strategy and managerial implications for small and medium sized companies.

Prof Christopher Findlay

Christopher Findlay's role in the project is to advise and research on non tariff impediments of linking food value chains to Australia, Asia, Europe and North America

and links with PHAMA. Christopher is Head of the School of Economics at the University of Adelaide. Christopher's research interests focus on trade and economic relations between high income countries and Asia. Professor Findlay was a principal researcher in a major research program on impediments to services trade and investment. In the first three years of the program, innovative methods were established to assess and measure the impact of the impediments. The methodology provided estimates of tariff equivalents of barriers to forms of services sector transactions.

Theo Simos

Craig Johns is part of the value chain analysis team responsible for component 1 and objectives 1 and 2. Theo's background is in value chain diagnostic and improvements and change management. He is a leader in the development of retail and foodservice demand chain platforms giving food and beverage companies access to international consumer markets. Theo has experience as an export market developer, including channel identification and distribution development and profit management. His public service experience is with industry and regional development programs.

Craig Johns

Craig Johns is part of the value chain analysis team responsible for component 1 and objectives 1 and 2. Craig has extensive commercial management experience, an ability to understand business links from the producer to the end consumer, an appreciation of the roles of both industry and government and the ability to facilitate productive partnerships, proven value chain analysis skills across diverse product ranges in domestic and international markets and a background in food technology enabling a better understanding of product issues and opportunities.

Helen Oliver

Helen Oliver is the program coordinator and executive assistant for the University of Adelaide's Global Food and Agricultural Business program. Helen's role is to facilitate all the logistics, travel, workshop organizations, expense reporting and financial accounting from the University of Adelaide's team.

Aleki Sisifa

Aleki Sisifa will be the key liaison point for the Secretariat of Pacific Island Communities (SPC) and focus on the decision making regarding technical interventions within the scope of PARDI. He will be responsible for SPC delivering on project requirements, including the submission of annual/final reports. He will also be responsible for financial management with SPC for PARDI.

Biman Chand Prasad

Professor Prasad will be the key liaison point for the University of the South Pacific (USP) and focus on the decision making regarding agribusiness impacts within the scope of PARDI. He will be responsible for USP delivering on project requirements, including the submission of annual/final reports. He will also be responsible for financial management with USP for PARDI.

Tim Martyn

Tim will be one of 2 coordinators based in SPC for the delivery of PARDI. He will be focussed on market analysis and development and play a supporting role to the activities related to the deliveries of Objectives 1 – 2. He will also need to liaise with the other coordinator for effective overall delivery of PARDI.

Siosuia Halavatau

Siosuia will be one of 2 coordinators based in SPC for the delivery of PARDI. He will be focussed on research and technical interventions and play a supporting role to the

activities related to the deliveries of Objectives 3 - 5. He will also need to liaise with the other coordinator for effective overall delivery of PARDI.

5.5 Intellectual property and other regulatory compliance

There is no anticipated need to exchange plant or animal germplasm to achieve project outcomes.

Biological material may need to be transferred to Australia to undertake appropriate chemical analysis based on alternatives not available in-country. Such material will be subject to current AQIS importation protocols pertaining to biological material for research purposes.

Project partners have not identified any proprietary material, techniques or information necessary to achieve project outcomes.

PARDI will undertake detailed supply chain analyses of private and government-owned commercial enterprises (third party participants), which may include reviewing operations and protocols subject to proprietary or commercial-in-confidence considerations. Prior to undertaking supply chain reviews, the relevant PARDI component leader will identify whether proprietary and/or commercial-in-confidence expectations exist, document third party collaborator terms and conditions, and ensure all relevant PARDI project team members are aware and act in accordance.

PARDI is not expected to result in research-derived IP outcomes, with project output anticipated to be placed on the public domain through published research methodologies, papers and reports; with associated copyright considerations.

Where unforeseen forward IP is generated; ownership will be subject to the terms and conditions defined in the project contract.

The project partners have not identified any background IP necessary in meeting project outputs.

Project outcomes are likely to necessitate access to unpublished research findings, methodologies and protocols held by the Australian and Pacific Island Countries project partners. The intent is for such information will be made freely available between project partners for the delivery of project outputs, within the context of copyright and citation considerations.

In the unlikely situation that unforeseen background IP is required for the delivery of project outputs; the commissioned organisation will assist with the timely and appropriate development of contractual agreements consistent with the project objectives.

No third party IP has been identified as being essential to meet project outcomes.

A need to access third party background IP may arise, where access to additional expertise becomes necessary to meet unforeseen project issues, challenges or opportunities. Unforeseen third party background IP will be addressed through sub-contractual agreement developed by or in consultation with the commissioned organisation.

5.6 Travel table

PART A Commissioned Organisation - project management and coordination

Trip no.	Person or position	Estimated date of travel	From / to	Purpose	Duration (days)
1	Project leader (A)	Jan/Feb 2010	Brisbane – Fiji	SPC initial meetings & organise in-country coordinators	5 days
2	In-country coordinator (PC)	2010, 2011, 2012, 2013	Fiji – to Qld & Adelaide	Meetings with Aust PARDI project team	7 days
3	Project leader (A)	1 per year 2010, 2011, 2012, 2013	Brisbane to Canberra	Meetings with ACIAR	2 days per trip
4	Project leader (A)	1 per year 2010, 2011, 2012, 2013	Brisbane to Adelaide	Meeting with project staff	3 days per trip
5	Project leader (A) & In-country coordinator (PC)	2 per year 2010, 2011, 2012, 2013	Brisbane - Fiji, Vanuatu and Solomon Isl.	Meeting with project staff & project review	10 days
6	Project leader (A) & In-country coordinator (PC)	2011, 2012, 2013	Brisbane – Tonga & Samoa	Meeting with country partners and attend in-country workshop (mid 2012)	7 days
7	Project leader (A) & In-country coordinator (PC)	2010, 2013	Brisbane to Kiribati	Meeting with country partners	7 days

PC = partner country, A = Australia

PART B Australian Collaborating Organisations

Trip no.	Person or position	Estimated date of travel	From / to	Purpose	Duration (days)
8	Adelaide uni	2010 (x4), 2012	Adelaide, Fiji, Vanuatu	Project planning fieldwork	14
9	Adelaide uni	4 per year 2011, 2013 3 per year 2012	Adelaide – Fiji, Vanuatu, Solomon Is.	Project planning fieldwork	14
10	Adelaide uni (Amos Gyau)	4 per year 2010, 2011, 2012, 2013	Adelaide – Fiji, Vanuatu, Solomon Is.	Project planning fieldwork	25
11	Adelaide uni	3 per year 2010, 2011 2 per year 2012, 2013	Adelaide to Qld	Project planning	4
12	Adelaide uni	2 per year 2010, 2011, 2012, 2013	Adelaide to Canberra	Project planning	2
13	JCU USC	2010, 2011, 2012, 2013	Brisbane - Fiji, Vanuatu and Solomon Is	Support forestry supply chain analysis Project activities	7 days
14	USC JCU	2010, 2011, 2012, 2013	Brisbane - Fiji, Vanuatu and Solomon Is	Support fisheries supply chain analysis Project activities	7 days
15	DEEDI (trade) (1 team member)	2010, 2013 1 trip per year	Brisbane - Fiji, Vanuatu and Solomon Isl.	Project planning and evaluation	8 days per trip

Trip no.	Person or position	Estimated date of travel	From / to	Purpose	Duration (days)
16	DEEDI (1: H&FS & 1 MDT) UQ team members (x2)	(2 per year) 2010, 2011, 2012, 2013	Brisbane - Fiji, Vanuatu and Solomon Isl.	Hort/cropping supply chain analysis and review	8 days
17	DEEDI (trade) (1 team member)	2010, 2013 2 trip per year	Brisbane Tonga & Samoa	Project planning and evaluation	6 days per trip
18	DEEDI (H&FS) DEEDI (MDT) UQ team member (x2)	2011, 2012, 2013	Brisbane Tonga & Samoa	Hort./cropping supply chain analysis & review Trade - supply chain analysis and market research	6 days
19	DEEDI (trade) x 2 team members	2010, 2011, 2012, 2013 2 trips x year	Brisbane - Adelaide	Project planning	2 days per trip
20	DEEDI (hort science)	2010, 2011, 2012, 2013	Brisbane - Adelaide	Project planning	2 days per trip
21	Rural solutions	2010 (x4) 2011 (x4) 2012 (2) 2013 (x3)	Adelaide- Fiji, Vanuatu, Solomon Is.	Project planning fieldwork	14
22	DEEDI	2010, 2011, 2012, 2013	Brisbane - Adelaide	Project planning	5 days
23	Rural solutions	2010, 2011, 2012, 2013	Adelaide to Qld	Project planning workshops	4
24	Theo Simos	2010 (x4) 2011 (x4) 2012 (x2) 2013 (x2)	Adelaide- Fiji, Vanuatu, Solomon Is.	Project planning fieldwork	14
25	Theo Simos	2010, 2011, 2012, 2013	Adelaide to Qld	Project planning workshops	4
26	Domenico Dentoni	2010	Adelaide- Fiji, Vanuatu, Solomon Is.	Project planning fieldwork	14
27	Domenico Dentoni	2010, 2011 (x2), 2012 (x2), 2013 (x2)	Adelaide –Fiji & Vanuatu	Project planning fieldwork	14
28	Domenico Dentoni	Nov/Dec 2013	Adelaide to Qld	Project planning/final workshop	4
29	Carolin Pewea	2010 (x2) 2011 (x2) 2012 (x2) 2-13 (x2)	Adelaide –Fiji & Vanuatu	Project planning/final workshop	14

PC = partner country, A = Australia,

PART C Overseas Partner Organisation/s

Trip no.	Person or position	Estimated date of travel	From / to	Purpose	Duration (days)
30	SPC team member USP team member PIC collaborator s	2010, 2011	PIC to Brisbane	PARDI Advisory Group meetings	5 days

Trip no.	Person or position	Estimated date of travel	From / to	Purpose	Duration (days)
31	SPC team member USP team member PIC collaborators	2011	Vanuatu Solomon Is; Samoa, Tonga, Kiribati to Fiji	Attend mid project review	7 day
32	SPC team member USP team member PIC collaborators	2013	Vanuatu Solomon Is; Samoa, Tonga, Kiribati to Fiji	Attend PIC final workshop	5 day
33	PIC collaborators	2011, 2012, 2013	PIC to Aust	Project activities	5 days

PC = partner country, A = Australia

6 Appendix A: Intellectual property register

Inquiries concerning completion of this form should be directed to contracts@aci.gov.au

6.1 Administrative details

Project ID	PC/2008/044
Project title	Pacific Agribusiness Research for Development Initiative (PARDI)
Assessment provider	Dr Steven Underhill
If not Australian project leader, provide title	Australian Project leader
Date of assessment	21 November 2009

6.2 Categories of intellectual property and brief description

Plant or animal germplasm exchange

Project statement

There is no anticipated need to exchange plant or animal germplasm to achieve project outcomes.

Biological material may need to be transferred to Australia to undertake appropriate chemical analysis based on alternatives not available in-country. Such material will be subject to current AQIS importation protocols pertaining to biological material for research purposes.

Does the project involve:	Yes	No
provision of germplasm by Australia to a partner country?		No
provision of germplasm from a partner country to Australia?		No
provision of germplasm from or to an IARC or another organisation and a project participant?		No
use of germplasm from a third party		No
material subject to plant breeders/variety rights in Australia or another country?		No

If “yes” to any of the above, for each applicable country provide brief details of the material to be exchanged:

- If the germplasm exchange can be finalised before the project commencement, provide a Materials Transfer Agreement.
- If the specific germplasm to be exchanged cannot be identified until after project commencement, indicate the type of material likely to be exchanged.

Country	Details of plant or animal germplasm exchange
N/A	
N/A	

Proprietary materials, techniques and information

Project statement

Project partners have not identified any proprietary material, techniques or information necessary to achieve project outcomes.

PARDI will undertake detailed supply chain analyses of private and government-owned commercial enterprises (third party participants), which may include reviewing operations and protocols subject to proprietary or commercial-in-confidence considerations. Prior to undertaking supply chain reviews, the relevant PARDI component leader will identify whether proprietary and/or commercial-in-confidence expectations exist, document third party collaborator terms and conditions, and ensure all relevant PARDI project team members are aware and act in accordance.

Does the project involve provision (from one party to another) of:	Yes	No
research materials or reagents (e.g. enzymes, molecular markers, promoters)?		No
proprietary techniques or procedures?		No
proprietary computer software?		No

If "yes" to any of the above, for each applicable country provide:

- brief details of the materials or information, the organisation providing, and the organisation receiving the materials
- a copy of any formal contract between the parties.

Country	Details of proprietary materials, techniques and information
N/A	

Other agreements

Is any aspect of the project work subject to, or dependent upon:	Yes	No
other materials-transfer agreements entered into by any project participant?		No
confidentiality agreements entered into by any project participant?		No

If "yes" to any of the above, for each applicable country provide:

- brief details of the agreements and conditions
- a copy of any such agreement before project commencement.

Country	Details of other agreements
N/A	

6.3 Foreground, background and third party Intellectual Property

This includes, but is not limited to patents held or applied for in Australia and/or in partner countries and/or in third countries. For example, Foreground IP includes any new germplasm, reagents (such as vectors, probes, antibodies, vaccines) or software that will be developed by the project.

Foreground IP (IP that is expected to be developed during the project)

Ownership of or rights to Foreground IP other than as detailed in the ACIAR Standard Conditions must be approved by ACIAR.

Project statement

PARDI is not expected to result in research-derived IP outcomes, with project output anticipated to be placed on the public domain through published research methodologies, papers and reports; with associated copyright considerations.

Where unforeseen forward IP is generated; ownership will be subject to the terms and conditions defined in the project contract.

	Yes	No
Is it expected that there will be Foreground IP?		No

If "yes",

- for each applicable country provide brief details of the IP and who will have rights to use the IP (e.g. Commissioned Organisation, Australian collaborating organisation/s partner countries).
- If a patent, give details of patent status (provisional, application, granted), priority date and designated countries.

Country	Details of foreground IP
N/A	

Background IP (IP that is necessary for the success of the project but that has already been created and is owned by parties to the project)

Any agreements in place regarding Background IP should be provided to ACIAR prior to project commencement.

Project statement

The project partners have not identified any background IP necessary in meeting project outputs.

Project outcomes are likely to necessitate access to unpublished research findings, methodologies and protocols held by the Australian and Pacific Island Countries project partners. The intent is for such information will be made freely available between project partners for the delivery of project outputs, within the context of copyright and citation considerations.

In the unlikely situation that unforeseen background IP is required for the delivery of project outputs; the commissioned organisation will assist with the timely and appropriate development of contractual agreements consistent with the project objectives.

	Yes	No
Is it there Background IP?	Yes	
If "yes", are there any restrictions on the project's ability to use the Background IP?		No
would there be any restriction on ACIAR or the overseas collaborator claiming their rights to IP for the project based on the Background IP (refer ACIAR Standard Conditions)?		No

If "yes", for each applicable country provide brief details of:

- the source of the Background IP.
 - Unpublished research findings, methodologies and protocols held by the Australian and Pacific Island Countries project partners
 - Unforeseen background IP that may be required due to the uncertainty of the resultant researchable priorities identified by the supply chain analysis
- whether the Commissioned Organisation and/or Australian collaborators and/or developing country collaborators own it.
- any conditions or restrictions on its use.

- Access to unforeseen background IP will be available between the project partners for the delivery of project outcomes.
- Background IP will not be used without prior approval or in a manner that may diminish its potential academic or commercial value.
- Due and appropriate recognition will be afforded to the relevant organisation and individual.

Country	Details of background IP
N/a	

Third Party IP (IP that is owned by or licensed from other parties)

Agreements governing the use of third party IP can be related to research materials, research equipment or machinery, techniques or processes, software, information and databases.

Project statement

No third party IP has been identified as being essential to meet project outcomes.

A need to access third party background IP may arise, where access to additional expertise becomes necessary to meet unforeseen project issues, challenges or opportunities. Unforeseen third party background IP will be addressed through sub-contractual agreement developed by or in consultation with the commissioned organisation.

	Yes	No
Is there any relevant Third Party IP that is essential to the project?		No
If "yes", would there be any restriction on ACIAR claiming its rights to IP for the project (refer ACIAR Standard Conditions)?		n/a

If "yes", for each applicable country provide brief details of:

- the source of the Third Party IP.
- the applicable country/ies, the circumstances/agreement/arrangement under which the IP is to be obtained or used by the project partners (for example, material transfer agreement, germplasm acquisition agreement, confidentiality agreement, research agreement or other arrangements).
- any conditions or restrictions on its use.

Country	Details of third party IP
	N/a

Other contracts, licences or legal arrangements

	Yes	No
Are there any other contracts, licences or other legal arrangements that relate to the project?		n/a

If "yes", for each applicable country provide brief details.

Country	Details of other contracts, licences or legal arrangements

7 Appendix: Supporting documentation

7.1 Letters of support

Dr Steven Underhill
QAAFI - Project leader
QAAFI c/o Horticulture and Forestry Science
80 Meier Road, Indooroopilly, Q 4068 Australia

Fax: +61 7 3896 9444

Dear Mr Shearer

Project Proposal – Pacific Agribusiness Research for Development Initiative

The University of the South Pacific is willing and able to participate in the project and look forward to working with you on this.

Kind Regards
Dr Esther Williams

Dr Esther Batiri Williams
Deputy Vice Chancellor
The University of the South Pacific
Laucala Campus
Suva Fiji
Ph: 679 3232269
Fax: 679 323 1550
email: williams_e@usp.ac.fj

7.2 Curricula vitae

Assoc Prof Kim Bryceson

(The University of Queensland)

Assoc Prof Bryceson has much senior R&D management in both Commonwealth and State Governments (DPI) and in private industry, as well as consultancy-based project management.

- Recent, extensive research project experience has been in value chain analysis and the role of ICTs for facilitating business information flows, decision making and knowledge dissemination within and across industry and product supply chains both domestically and internationally
- Current research focuses on: ABM and BBN modelling whole of supply/value chains for risk assessment and performance management, the role of the Hybrid economy in Livelihood development and the sustainability of industry chains in relation to 'Carbon Footprint' and Lean (waste management)
- Relevant Projects to PARDI Include: the Desert Knowledge CRC Projects Market Analysis of Bush Tomato and Wattle Seed, and associated "Walking the Chain" capability development, and the current ACIAR Project on The role of floricultural activities for improving indigenous livelihoods

Domenico Dentoni

(Global Food and Agricultural Business – Adelaide University)

PhD in Agricultural, Food, and Resource Economics, Michigan State University
 M.Sc. Development Economics, University of Bologna, Italy
 B.Sc. Economic Policy, University of Roma Tre, Italy

Professional Experience: Two strands of research:

- Consumer Behaviour related to Food with Credence Attributes (e.g., Place-of-Origin, Eco-Friendly, Animal Welfare): the Role of Product and Brand Information.
- Linking Small and Medium Enterprises to Global Value Chains: how to leverage resources through Alliances, Social Networks and Policy Initiatives?

2009-	Seafood CRC
2006-09	Department of Agricultural, Food and Resource Economics, MSU
2006	Agorà 2000 Consulting, Roma, Italy. Consultant
2006	Oxfam Australia, Sydney, Australia Campaigns & Advocacy Team Assistant
2005-06	Agri-Food Consulting International, Maputo, Mozambique Consultant
2005	Agri-Food Consulting International, US Headquarters, Washington, USA Consultant
2004	Ray Foundation NGO, Jirapa, Upper-West Region, Ghana Project Manager Assistant
2003	Italian Embassy in Accra, Ghana Intern
2002	European Parliament, Bruxelles, Belgium Intern

<u>LANGUAGES</u>	<u>Written</u>	<u>Spoken</u>	<u>Read</u>
English	Fluent	Fluent	Fluent
French	Fluent	Fluent	Fluent
Spanish	Fluent	Fluent	Fluent
Italian	Native	Native	Native
Portuguese	Good	Good	Good

Rob Douglas

BMS (Hons), MBA (Exec)

(The University of Queensland)

Rob Douglas is the Director of UQ Business School Commercial – the commercial consulting, research, and commercialisation partnership between the University of Queensland Business School and UniQuestPty Ltd (UQ's main commercialisation company).

Rob has significant experience working as a commercial interface between academia and the business community. Prior to joining UQ, Rob was the Associate Director of Executive Education responsible for corporate programmes at Waikato Management School in New Zealand. In this role he led some of New Zealand's largest management and leadership development programmes for companies such as Telecom NZ Ltd, AAPT Australia, Westpac Banking Corporation, ZESPRI International Ltd, the Bank of Zealand, and the Local government consortium.

Rob was also the manager and then strategic advisor to the Management Research Centre, a self funded commercial research centre attached to Waikato Management School. Rob has an Executive MBA and Bachelor of Management Studies with Honours from Waikato Management School (New Zealand's top ranked business school). Prior to completing his Executive MBA he helped establish a multimedia computer based training company both in New Zealand and Canada. After establishing the company he worked as the marketing and operations manager for a number of years before selling his equity to private investors.

Dr. Damian Hine

(The University of Queensland)

Dr Damian Hine is Director of the Doctor of Biotechnology Program at UQ. His appointment spans UQ Business School and the Science Faculty. Damian's expertise builds on his perspectives as an evolutionary economist and centres upon building intellectual assets in organisations and economic systems, including knowledge exchange, intellectual capital and entrepreneurship, all aimed at enhancing growth through innovation.

Damian currently leads two Australian Research Council funded projects on knowledge exchange systems. He is also leading a project won under the Advanced Technology Program/National Institute for Standards and Technology Data Enclave on Innovation program in the US with a focus on innovation and technology trajectories. Damian has published widely including two books, and over 25 journal articles and book chapters. He recently completed a major commissioned paper for the OECD on the future of the global Biotechnology industry over the next twenty years.

In Damian's applied industry work, he has particular expertise in designing business cases and strategies for both public and private organizations, assisting them in winning over \$70M in funding to date. Damian is taking an active role in University-wide internationalisation efforts. Damian has been appointed to the Latin America Reference Group for the University, based upon his successful efforts in winning projects in Chile and Brazil.

Craig Johns

Senior Consultant

Agricultural Development, Food Chain Innovations
Rural Solutions SA

Expertise

- Thorough understanding and practical knowledge of how to undergo a comprehensive value chain analysis including the instigation of subsequent improvement projects.
- Ability to apply value chain thinking at a company and chain level as well as providing industry wide benefits.
- Extensive commercial management experience in the areas of customer/supplier relationships, supply chain development, continuous improvement and cost reduction.
- Thorough working knowledge of the implementation of ISO Quality Systems and their integration with existing Enterprise Resource Planning (ERP) systems.
- Proven ability to work as an integral member of a senior management team or autonomously to achieve stated business objectives.
- Ability to provide operational management within a constantly changing, project based environment.
- Outstanding ability to understand the supply chain and customer/consumer requirements through the development of strong relationships.
- Demonstrated negotiation skills resulting in achieving "win-win" results for the company, clients and suppliers, focusing on value added opportunities.
- Ability to provide advice at a senior level on a wide variety of business and strategic issues.

- Proven commercial acumen in developing management strategies to achieve business objectives within budgetary and timeframe constraints.

Experience

- Senior Business consultant – Food Chain Innovations, Rural Solutions SA
- National Program manager, Value Chains Program, National Food Industry Strategy Ltd
- General Manager, Australian Pure Fruits (SA) Pty Ltd
- Quality Manager, Australian Pure Fruits (SA) Pty Ltd
- Food Technologist, Berri Pty Ltd

Achievements

- Currently engaged as the leading consultant for a number of national and international value chain projects.
- Nominated member of the Value Chain Project Development Team for the SA Dept. of Premier & Cabinet
- Managed successful commercially driven national projects in the food industry that included companies, industry associations and state & federal governments.
- During my tenure as General Manager of a small to medium sized food company, APF increased their customer base and overall turnover by 300% in a four-year period.
- Successfully negotiated an AWA, which resulted in a “win-win” outcome for both the company and the employees.
- As Quality manager, I implemented and maintained a HACCP9000 Quality assurance system, which made APF one of the first companies in Australia to achieve this type of accreditation, which led me to consulting other companies about the implementation of their quality and ERP systems.

Dr Christine King

(The University of Queensland)

Dr Christine King has 15 years experience (as a practitioner, leader and trainer) and 10 years of study (including PhD in Rural Community Development) in participatory RD & E methodology. She has introduced and implemented a range of capacity building principles and methods into remote rural communities, project teams and science based-organisations. Dr King is currently a Senior Lecturer at The University of Queensland where she lectures in RD & E Methodologies; Extension and Change Management; and Group Dynamics, Negotiation and Adult Learning. Research areas include multi-stakeholder learning and action, participatory research and extension, and strategic learning and capacity building processes for systemic change. Prior to her position at UQ, Dr King was one of three Extension Specialists for the Department of Primary Industries, responsible for initiating, leading, facilitating and evaluating major RD&E capability and capacity building projects for Queensland’s agricultural industries throughout the State of Queensland. Previous ACIAR projects include (i) Tools and indicators for planning sustainable soil management on semi-arid farms and watersheds in India and Australia (Sub-project Leader, 1 of 3 sub-projects), (ii) FARMERS (Farmers Adaptive Rodent Management – Extension and Research Systems) in Cambodia (Methodology Specialist) (iii) Participatory Needs Assessment for Capacity Building in Extension, Pacific Islands (Project Leader). She has also worked on projects in Indonesia, Chile, Kenya and Sweden. Other: Australian Representative, Board of the International Farming Systems Association; Editorial Board for the International Journal of Agricultural Sustainability, International Journal of Experimental Agriculture. Conference Keynote Addresses: International Environment and Communication Conference, Sweden, 2009; International Farming Systems Conference, Rome; Pacific Extension Summit, Tonga, 2005; PNG National Extension Summit in Lae, 2004. Other: Australian Farming Systems

Prof Paul Southgate

(James Cook University)

Paul Southgate completed his PhD at James Cook University in 1991. It focused on culture and nutrition of giant clams as part of an ACIAR-funded project to develop giant clam aquaculture in the Pacific islands and SE Asia. Since then his research has focused on

tropical aquaculture with particular emphasis on pearl oysters. Much of this has been conducted collaboratively with Pacific island nations (Kiribati, Fiji, Solomon Islands, and Tonga) in projects funded by ACIAR. Significant research outputs include the development of hatchery, nursery and grow-out culture methods for pearl oysters and novel procedures for pearl 'seeding', improvement of round and half pearl quality through better understanding of husbandry issues, establishment of demonstration farms, regional capacity building and extension activities, and development of pearl and pearl shell products through handicraft workshops. Southgate's research also includes pearl oyster resource development projects in Mexico, China and Tanzania which focus on the potential for income generation for coastal communities from pearl oyster culture.

Prof Southgate has published more than 100 papers in international journals with more than 50 of these dealing with aspects of the biology and culture of pearl oysters. He has edited a major undergraduate text book on Aquaculture (second edition now in prep), a monograph on pearl oysters published in 2008, and is editor for the Secretariat of the Pacific Community (SPC) Pearl Oyster Information Bulletin. He has supervised 12 PhD, 11 MSc and 21 Honours students to completion. A number of these students were from Pacific island countries that were partners in his ACIAR-funded research projects. He currently co-supervises 3 MSc students from University of the South Pacific (USP) conducting pearl oyster culture research projects in Fiji and Tonga.

Paul Southgate has extensive experience in coordination of ACIAR-funded research projects in the Pacific islands since 1993. Current projects included FIS/2006/138 '*Developing aquaculture-based livelihoods in the Pacific islands region and tropical Australia*' and FIS/2006/172 '*Winged oyster pearl industry development in Tonga*'. Through these projects he has developed strong links with regional institutions and organisations such as SPC, USP and Worldfish Centre.

Award (Global); Finalist, Sir Edward Dunlop Memorial Award; National Queen's Trust Award.

Prof. Randy Stringer

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Ph.D. May 1984 University of Wisconsin
M.A. May 1981 Department of Agricultural Economics
Major: Development Economics
Minor: International Law
B.A. June 1973 Economics
Southern Methodist University

Randy Stringer is Professor, School of Agriculture, Food and Wine at the University of Adelaide, where he teaches and conducts research on food, agriculture and natural resource policy. From 2020 to 2006, Randy was the Director of the Comparative Studies Service, Agricultural and Development Economics Division, United Nations Food and Agricultural Organization. He was the Deputy Director of the Centre for International Economic Studies from 1996 to 2001, where he managed research programs and lectured in the School of Economics, University of Adelaide. Over the past thirty years, he has taught, published and conducted research on agricultural development, food security, water resource use, climate change, poverty and environmental services in Australia, the Asia/Pacific, Africa, Europe, the Near East and Latin America

July 2006 - Professor, Agriculture and Food Policy, School of Agriculture, Food and Wine. Responsibilities include managing postgraduate degrees in agricultural economics and agribusiness. Research areas food and wine value chains, food security, and resource management, focusing on incentives and related market-based instruments to improve environmental outcomes from agricultural landscapes, including carbon sequestration, biodiversity, water benefits and landscape amenities.

Nov 2002 to July 2006

Chief, Comparative Agricultural Development Service, Agricultural and Development Economics Division, United Nations Food and Agricultural Organization. The Division is the focal point for FAO's economic research and policy analysis for food security and sustainable development. The major responsibility is to provide leadership and research supervision. Research projects include fifteen country comparative study on environmental service incentives for agro-ecosystems; the roles of agriculture in development; the impact of trade and domestic policy reforms on rural households; and focal point for the Agricultural Policy Indicator project with the OECD and the World Bank. The Service also produces The State of Food and Agriculture, FAO's major annual flagship publications.

1996 to 2002

Deputy Director, Centre for International Economic Studies and School of Economics, University of Adelaide. Duties included: managing research projects on natural resource use, environmental issues, sustainable development and agricultural policy; lecturing in development economics, environmental and resource economics and microeconomics; and Post Graduate Studies Coordinator.

1989 – 1996 Economist, Policy Analysis Division, FAO, responsible for applied policy analysis of agricultural, natural resource and sustainable development issues and the preparation of FAO's annual report, The state of Food and Agriculture. Duties include: research, writing, editing and supervising the Asia/Pacific Regional chapter and the special feature chapter for the annual report; and policy analysis of agricultural, water, land and sustainable agriculture issues. FAO's focal point to the IPCC.

1983 - 1990 Lecturer and Associate Research Scientist, Land Tenure Center, University of Wisconsin. Lecturer in development economics and agricultural economics. Principal investigator for research projects focused on land tenure, land markets and environmental policy issues in Latin America and the Caribbean. Supervision of Ph.D. and Masters students in development and agricultural economics.

Professional Memberships

- Federal Councillor, Australian Agriculture and Resource Economics Society 2008 - ongoing.
- President, SA Branch, Australian Agriculture and Resource Economics Society 1999-2001
- International Association of Agricultural Economists
- American Agricultural Economics Association;
- Association of Environmental and Resource Economists;
- Common Property Research Network;
- Australian Agricultural and Resource Economics Society
- Associate Editor, electronic Journal of Agricultural and Development Economics

Dr Wendy J. Umberger

Ph.D. Agricultural Economics, University of Nebraska-Lincoln, May 2001

M.S. Economics, South Dakota State University, December 1998

B.S. Animal Science, South Dakota State University, May 1996

Dr. Umberger joined the University of Adelaide in August 2006. Her current research focuses on the economics of global food value chains and measuring economic values for quality and credence attributes in food and food value chains. She has conducted substantial research on the economics of food traceability and quality assurance systems and credence attributes. In 2008, she was appointed by the South Australian (SA) Agriculture, Food and Fisheries Minister to serve on SA Beef Industry Development Board and the Value Chain Project Development Team. She is also currently involved in food value chain projects involving high-valued agricultural products including produce, meat and wine. These projects are funded by agencies such as the Australian Centre for International Agricultural Research (ACIAR), Meat and Livestock Australia (MLA), the Beef CRC and the Winemakers Federation of Australia. Prior to joining the University of Adelaide, she was an

Associate Professor in the Department of Agricultural and Resource Economics at Colorado State University (CSU) located in Fort Collins, CO USA. While at CSU she conducted research on value-chain issues related to red meat country-of-origin labelling and livestock trace back systems and worked closely with the U.S. beef industry to develop consumer-focused beef value chains. In 2007, Wendy was awarded with the American Agricultural Economics Association's highest honour for a group outreach and research project she led titled "Livestock Traceability Systems: Risk Management and Market Opportunities." She has presented her work at numerous conferences and conducted workshops internationally to professionals involved in agricultural and food industry, government and policy-making. Wendy was raised on a cattle and grain farm in South Dakota USA and holds a B.S. in Animal Science, M.S. in Economics and Ph.D. in Agricultural Economics

- (2009-present) **Senior Lecturer**, Agri-food and Wine Business, *School of Agriculture, Food and Wine*, University of Adelaide; Adelaide, South Australia, Australia
- (2008-present) **Adjunct Professor**, Agricultural Economics, *Department of Agricultural and Resource Economics*, Colorado State University
- (2006-2008) **Lecturer**, Agri-food and Wine Business, *School of Agriculture, Food and Wine*, University of Adelaide; Adelaide, South Australia, Australia
- (2007) **Associate Professor (with tenure)**, Agricultural Economics, *Department of Agricultural and Resource Economics*, Colorado State University.
- (2001- 2006) **Assistant Professor**, Agricultural Economics, *Department of Agricultural and Resource Economics*, Colorado State University
- (1/2006-6/2006) **Special Appointment, Faculty-in-Residence**, *Colorado State University Study Abroad Program*, Lincoln University, Christchurch, Canterbury, New Zealand
- (2000-2001) **Instructor**, Agribusiness Management, *Department of Agricultural Economics*, University of Nebraska-Lincoln; Lincoln, Nebraska
- (1997- 2001) **USDA National Needs Agribusiness Fellow**, *Department of Agricultural Economics*, University of Nebraska-Lincoln; Lincoln, Nebraska
- (1996-1997) **Graduate Research Assistant**, *Department of Economics*, South Dakota State University; Brookings, South Dakota

Dr Steven Underhill

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PhD 1993; The University of Queensland
BSc (Hons) 1988; The University of Queensland
Australia Day Medal for services to the Primary Industries 2009

- 2009- Adjunct Professor (Horticulture) University of the Sunshine Coast.
Dr Underhill currently leads the emerging Queensland Primary Industries and Fisheries (QPIF) and University of the Sunshine Coast's new subtropical and tropical forestry partnership.
- 2007-2009 (Acting) Manager – Fresh Approach Strategy
(Acting) Manager – R & D Portfolio Management
Dr Underhill was seconded to the DPI&F's *Fresh Approach* initiative, reporting directly to the Deputy Director General. In this position he was responsible for designing key reform initiatives, program coordination and management, complex reform negotiations with the lead industry peak bodies across a broad range of QPIF business (beef, gains and sheep & wool), as well as having a key input in re-designing QPIF's new services and skills agendum.
- 2005 -2007 Science Leader Forest Technology
Underhill led DPI&F's production forestry science unit, including leadership of 42 scientists located through Queensland and managing a

- \$4.2M annual research project portfolio covering genetics and tree breeding, forest health, tree physiology, environmental impacts and sustainability, urban forestry and nursery management.
- 2005 (Acting) Science Leader Innovative Food Technology
Dr Underhill led DPI&F's Innovative Food Technologies (IFT) unit, including leadership of 52 scientists and R & D programs in functional foods and food quality and safety focus teams.
- 2004 -2005 SeniorPrincipal Research Scientist – R & D Strategic Partnerships, (DPI&F). Dr Underhill was responsible for strategic agricultural science policy on new emerging opportunities and initiatives associated with transformational science, biotechnology and functional foods. During this period he was also the program coordinator for DPIF's agricultural transformational technologies and value added food programs. This involves defining research directions, establishing appropriate research investment intensities, establishing and maintaining inter-agency communications, reviewing project performance and assessing return-on-investment.
- 2003 Program Leader - Horticulture Market Access Department of Primary Industries and Fisheries (DPI&F). Dr Underhill led the Department's horticulture market access team (22 scientists and \$2.1 M annual R & D budget), which undertook R & D activities to assist in the expansion of Queensland's fruit and vegetable export industries. This involved identifying and undertaking strategic and applied research to develop appropriate new disinfestation protocols, identify pest tolerance to various chemical and non-chemical strategies and in-field risk minimisation strategies. In this capacity he managed 22 staff located at throughout Queensland.
- 1998 - 2003 Program Leader - Amenity and Environmental Horticulture, Department of Primary Industries and Fisheries (DPI&F). Dr Underhill led the DPI&F's state-wide R & D supporting Queensland's cut flower, nursery, turf, landscape horticulture, recreational horticulture and allied amenity industries. He directly supervised 28 staff, located throughout Queensland (Cleveland, Maroochy and Mareeba) and managed an annual budget of \$1.9M. My research and extension team undertook a wide range of activities including nursery engineering, plant physiology, breeding, export facilitation, industry development, new products development, tissue culture, information and extension delivery, pathology and the management of two fee-for-service units.
- 1988 – 1998 Plant Physiologist (Research Scientist - Postharvest), QDPI
Dr Underhill undertook laboratory and field-based research and extension activities on aspects of horticultural postharvest product quality and innovation. Much of his research was undertaken in conjunction with large international projects funded by the Australian Centre for International Agricultural Research (ACIAR) involving extensive international project collaboration. Dr Underhill has published extensively on a variety of postharvest issues associated with subtropical and tropical fruits. His research expertise is associated with biochemical and physiological factors associated with fruit quality, primarily associated with enzymatic degradation systems and fruit stress responses.

8 Appendix: Options for initial actions on ‘adding value to traditional Pacific starchy staple crops’

A preliminary desk study of market-focused R&D opportunities, as well as consultations with stakeholders in the Pacific partner countries, underline the value of focusing attention on crops that are already familiar to growers, predominantly smallholders, and for which supply chains and marketing arrangements are more developed. This approach capitalises on the comparative advantage of the Pacific islands in terms of crop genetic resources held in the islands, traditional knowledge of the crops and products derived from them, and the adaptation of these crops and varieties to the prevalent growing conditions (climate, soils and production systems). The approach also minimises the constraints imposed by the general weakness of innovation systems, extension services and input supplies in Pacific partner countries.

Two traditionally important starchy staple crops are : (true) taro (*Colocasia esculenta*) and breadfruit (*Artocarpus altilis*). In addition, two root crops of South American origin, cassava (*Manihot esculenta*) and sweetpotato (*Ipomoea batatas*), are widely adopted and continue to increase in importance, especially for their resilience in the face of adverse growing conditions (drought, disease and poor soil fertility) and for their lower labour demand. Existing production of taro, cassava and sweetpotato in the Pacific islands is in excess of 100,000t each. Production of breadfruit is more difficult to assess because the production is dispersed among home garden and mixed agroforestry systems. However, for all four crops, there are nascent market chains for relatively-high-value fresh product, supplying increasingly urbanised consumers; in addition for breadfruit and taro, there are substantial exports to supply communities of Pacific islanders resident in Pacific Rim countries, especially Australia, Canada, NZ and USA.

Preliminary market studies suggest opportunities for major increases in volumes and value of exports of fresh taro and breadfruit—with expected positive impacts on smallholder livelihoods—if key supply chain constraints can be resolved. Some constraints relate to biosecurity and market access issues (e.g. fruit flies in breadfruit, nematodes and pests in taro). Some of these issues are addressed by other projects and programs.

Priority issues for breadfruit relate to assuring a consistent, year-round supply of product that is acceptable in the marketplace, at competitive cost. Seedless triploid varieties are preferred in the market, yet most of the genetic diversity resides in seedy traditional varieties dispersed across the region. New materials need to be assembled, evaluated and disseminated and the cost of harvesting reduced by pruning of existing trees and establishment of new plantations. Some methods for rapid multiplication of breadfruit, to disseminate new materials to growers, have been tested but may not be effective for all genotypes.

For fresh taro, the main issues relate to assuring that clean, high quality planting material of market-acceptable varieties is available in the recovery phase after an earlier taro blight epidemic. Building on previous investment of Australia and the EU in assembling taro germplasm, in identifying virus threats, and in a successful breeding program to develop new blight-resistant varieties, the priority now is to evaluate the new varieties for their acceptability to farmers and in the marketplace, followed by dissemination of the best planting materials.

Partial processing of all four major starch-staple species—especially through peeling and flash-freezing near the point of production—offers multiple benefits, especially by alleviating biosecurity concerns, adding value at community level and retaining organic matter on farm. However, not all cultivars are suitable for such processing. Screening of farmer-preferred varieties is required to identify those suitable for processing in this way.

Finally, these four principal species and a range of lower-volume root crops, such as yams (*Dioscorea* sp.), tannia (*Xanthosoma* sp.), giant taro (*Alocasia* sp.) and giant swamp taro (*Cyrtosperma* sp.), can be of great importance locally due to cultural preference or adaptability to specific conditions, and offer opportunities for local processing into higher-value and more durable products. Some are already being commercially processed into products such as chips or flours but in many cases, the markets for such products are ill-defined, the suitability of local cultivars for such added-value processing has not been determined, and market chain constraints and opportunities have not been determined. Exploratory studies in these areas are needed to guide further investment.

8.1.1 Priority research options

To establish more competitive supply chains for breadfruit in selected Pacific islands

- Survey, characterise and disseminate (among countries) germplasm of seedless triploid breadfruit varieties offering a range of fruiting periods (towards building a year-round supply).
- Evaluate methods for rapid multiplication of preferred breadfruit genotypes.
- Establish pilot supply chains for breadfruit, combining new plantations of small-stature trees of preferred varieties with improved management of existing plantations of mature trees.
- Assess viability of entire market chain for breadfruit, including access to high temperature forced air (HTFA) facilities and other measures for managing fruit-fly risk, market access and costs.

To restore taro supply chains in island countries recovering from (or at risk from) taro blight

- Continue breeding for new blight-resistant taro varieties with emphasis on market acceptability.
- Screen blight-resistant lines (existing and new selections) for market-acceptable traits.
- Evaluate blight-resistant lines for farmer and consumer acceptability.
- Multiply and disseminate virus-free material of preferred (new) varieties.

To identify varieties and species of starchy staple crops suitable for added-value processing

- Screen available varieties of breadfruit, taro, cassava and sweetpotato with commercial production potential (i.e. productive, acceptable to growers) to identify those suitable for partial processing (especially peeling and freezing or drying).
- Screen available varieties of diverse starchy crops (breadfruit, taro, cassava, sweetpotato, yams, tannia, giant taro and giant swamp taro) suitable for defined processing opportunities, as identified in objective 4.

Identify opportunities for processing starchy crops into added-value products

- Conduct market studies to estimate market size and viability for local processing of starchy crops into higher-value or more durable products, such as chips and other snack foods, flour, noodles, in context of other demands and opportunities (fresh food, biofuels etc).
- Identify potential supply chains, opportunities and constraints.

9 Appendix: Opportunities in research for development of freshwater aquaculture in Pacific island countries

Asia and the Pacific region produce 46.3 million t of aquaculture, 90% of global production. Aquaculture production has continued to be the fastest growing food production sector globally with average annual growth of 8.9% p.a. since 1970. However, aquaculture production within the Pacific islands is relatively limited (about 3–4,000 t in 2006).

The Pacific's fisheries sector, although relatively small in a global context, is critically important at a national level. In some PICs, capture fisheries make a massive contribution to the GDP. As an example, Kiribati and Vanuatu derive 57.7% and 37.6%, respectively, of their GDP from capture fisheries, whilst larger and more diverse economies in the region derive a smaller contribution from fisheries to GDP, e.g. Cook Islands (3.9%) and Fiji (2.5%). However, the contribution to GDP from both seawater and freshwater aquaculture systems is still relatively small, with the largest contribution coming from Vanuatu (0.3%) and Kiribati (0.3%).

The Pacific currently plays only a minor role in the growing aquaculture sector, and this minor role is focused on seawater-based systems. However, interest in inland freshwater aquaculture is increasing, particularly among the larger states, such as Fiji.

In almost all PICs, fish consumption is very high and provides the majority of protein consumed. Annual per capita consumption is highest in Tuvalu (110.7 kg) with an average of 22.5 kg, 55.2 kg, and 68.2 kg for Melanesia, Micronesia and Polynesia, respectively (SPC survey 2004–2007). Rural communities consume more fish than urban communities and the majority of fish is derived from subsistence fishing rather than market purchases in most countries. In the survey, SPC estimates that coastal fisheries will not supply demand in 16 out of 22 PICs and the likely annual shortfall (based on optimistic estimates of estimated production) is over 7,500 t for Fiji, 16,100 t for Solomon Islands, 9,850 t for Vanuatu and 14,200 t for Samoa.

The ACIAR fisheries program has been highly active in the Pacific providing a range of technical-based projects to underpin the development of sustainable aquaculture systems. In Fiji, projects focus on freshwater aquaculture, particularly to overcome constraints to reliable fingerling supply and cost-effective feed management strategies, e.g. FIS/2008/031 'An assessment of the extent of genetic introgression in exotic culture stocks of tilapia in the Pacific'. In other PICs, projects have focused on high value, low-input aquaculture species, such as pearl oysters and sea cucumber. The fisheries program collaborates with SPC, the World Fish Centre, USP and other relevant agencies. The project, FIS/2006/138 'Developing aquaculture based livelihoods in the Pacific islands region and tropical Australia', seeks to capture opportunities from aquaculture systems to improve livelihoods in the Pacific.

The World Fish Centre is focusing efforts to 'support the adoption of sustainable aquaculture that benefits the poor' and 'makes small-scale fisheries more resilient and productive.' The goal of SPC's aquaculture plan is 'sustainable aquaculture development in the Pacific Region that will simultaneously take into account social, economic and environmental factors' and recognises that the majority of export opportunities are from pearls and seaweeds, while the contribution to food security is sourced from carp, tilapia and giant clams.

Massive growth in demand for fish in Asia is driven by increasing population and increasing per capita fish consumption. As demand outstrips supply, the price of fish is increasing worldwide and fish is becoming a 'cash crop'. With capture fisheries production

static or declining, this has led to an explosion in aquaculture production. The growing markets in Asia present an opportunity for a limited number of high-value commodities that can be produced economically in PICs. To gain advantage in the growth of the Asia sector, supply chains will have to link with existing mechanisms and overcome significant logistical constraints dominated by transport challenges. It is likely that these constraints will limit the ability to competitively enter the global marketplace for most species and industry development should be focused on the domestic market.

Population growth is very rapid in most PICs with an average annual growth rate of 1.9%. As fish is the preferred protein source in PICs, supplying domestic demand represents a major challenge and a significant opportunity. Development of fish aquaculture systems in the Pacific is needed to take advantage of this growing demand. However, even for domestic markets, a number of systems and geographical limitations need to be resolved for successful aquaculture development.

Freshwater fish aquaculture has the potential to contribute to domestic demand. In some countries, such as Fiji, there has been considerable investment in importing suitable species, including carp, trout and tilapia. However, availability of high quality fingerlings from well managed breeding populations remains a major constraint. Hatchery technology for most species is poorly understood, and low-cost, practical approaches to fingerling production are not well understood and have not been well adopted.

Popular freshwater aquaculture species, such as carp and tilapia, are relatively easy and cheap to feed. Although nutrients can be provided through natural productivity in ponds or water bodies, organic or inorganic fertilisers, supplementary feed ingredients or nutritionally complete feeds; the availability of sufficient feeds is limiting in some PICs.

Quantity and quality of water will limit freshwater fish aquaculture as will the availability and location of suitable soils for pond construction. There are problems with sodic and acid soils in Fiji and suitable areas must be determined for aquaculture through appropriate and sound land use planning. It is particularly important that construction of aquaculture ponds is considered in the context of other farming systems, as disturbing some soils for pond construction can reduce their future value for other farming activities.

Although adding value to caught fish through processing has proven to have the potential to create substantial additional income for fishing households and communities, these activities require significant investment and supply to maintain efficiencies within the processing system. These processing and value-adding opportunities, as well as resolving some logistical constraints in the supply chain, are often seen as an opportunity for women to generate income and are highly complementary to management approaches that focus on males involved in the fisheries sector. The development of freshwater fish aquaculture industry within the Pacific would be unlikely to support this value-adding process.

Aquaculture production presents additional challenges that are not found in the capture fishery sector, since production is controlled by the farmer, influencing the quality and safety of the product. New requirements, including food safety and traceability, prove too difficult for the majority of smallholders when engaging in international trade, but it will be possible for smallholders to target the domestic market due to less stringent requirements.

9.1.1 Possible areas of research focus

Development and establishment of profitable, low-to medium-technology aquaculture with appropriate smallholder systems in place to meet changing consumer demand in the domestic markets could be an initial focus. These systems need to be integrated with more diverse farming systems. It will be critical to understand changes that influence consumers in the domestic market in the short to medium terms, and to consider the international market in the long term. More specifically, research focus could apply to:

- ensuring hatchery and nursery technologies are compatible with existing infrastructure and capacity of smallholder farmers while still being suitable for maintaining genetic and health quality of fingerlings
- developing cost-effective feeds and feeding that take into account the availability of fertilisers and feed ingredients, and training farmers in suitable formulation of farm-made feeds
- determining suitable areas for aquaculture through land use planning in order to address potential ecological implications if introduced species are considered (including genetics, disease and environmental implications)
- developing an understanding of aquatic disease diagnosis and management in PICs as this is a high priority for future aquaculture capacity development.

Modernisation and growth in the sector is currently hindered by the fact that many farms are still family-scale businesses with limited economic and technical sophistication. Intervention will occur by targeting community groups to supply particular market channels, as creating change within smallholder systems will be difficult and ultimately less effective.

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11 Appendix: Budget