


Pacific island countries

 **A\$11.7** million
Budgeted funding

 **29**
Bilateral and regional
research projects

 **8**
Small projects and
research activities

Agriculture is an important sector for Pacific island countries, particularly for its contributions to the livelihoods of the population, GDP and food security. According to the FAO, three-quarters of the Pacific population live in rural areas and rely largely on agriculture and fishing for their livelihoods.

These populations are vulnerable to the long-term impact of climate change and the devastation caused by frequent natural disasters. Long-term declines in agricultural productivity are undermining the sustainability of livelihoods and contributing to the increased incidence of diet-related non-communicable diseases. Globally, 10 countries with the highest obesity rate are Pacific island nations. Populations suffer from the triple burden of malnutrition – a situation where undernutrition, micronutrient deficiencies and obesity coexist. Non-communicable diseases are the leading cause of death and morbidity, as islanders have mostly moved away from eating fresh seafood and traditional crops in favour of imported, processed foods that are high in energy, sugar, salt and fat.

According to the FAO, common challenges point to increasing vulnerability to economic shocks and natural disasters across the region. While many of the challenges are common throughout Pacific island countries, the impacts in each country and island may differ, depending on local context. Such constraints and uncertainties have limited the development of commercially oriented agriculture, fisheries and forestry sectors, and left many Pacific island countries heavily dependent on imports of food and other commodities.

COVID-19 has worsened these challenges, as structural impacts of the pandemic emanating from decisions and responses in other countries affect the Pacific region's food security and nutrition. Pacific island countries rely heavily on imported foods. Lockdowns, border closures and port closures have led to slowdowns in the shipping industry, disrupting the logistics of global and local supply chains. Food systems in the region have been disrupted and prices have risen for non-controlled foods such as fruits and vegetables.

Agriculture has been disrupted by the inability to import fertiliser and livestock feed. Revenue from the licensing of tuna fishing vessels has fallen. Measures including airport and port closures and quarantining of crews have delayed operations, costing fishing companies \$50,000 to \$60,000 per day per vessel, and island nations \$130,000 per day per vessel in lost revenue. Tourism-dependant economies have suffered a major shock, leading to increased rates of unemployment.

A widespread vulnerability of agriculture in Pacific island countries is invasive pests and diseases, such as coconut rhinoceros beetle (Guam biotype) and Bogia coconut syndrome. Island environments inherently have limited natural resilience in the face of aggressive invasive species, due to the limited local diversity of natural enemies. Climate change is a major contributor to the increased threats of transboundary plant and animal pests, diseases and invasive species. Recent years have been marked with rapidly spreading outbreaks of several devastating invasive pest species of crops. Emerging diseases of livestock (and potentially fisheries) might be equally destructive. Heightened interest across the region in stopping the spread of African swine fever shows that a regional approach to research is vital for improving agricultural and biosecurity approaches towards building a more resilient Pacific region.

Leaders of Pacific island nations have identified concerns about the uncertain impact of climate change. All these nations are concerned about the potential effects of rising sea levels, given that much of the population and most of the productive agriculture occurs in coastal areas and plains. Climate models suggest that, over the longer term, some Pacific islands will become drier, on average, and others wetter. In the meantime, stronger periods of drought and wet weather (in some cases causing destructive flooding) are expected, associated with El Niño cycles. Cyclones have become more severe in the region, and recent tropical cyclones Harold, Yasa and Ana caused widespread devastation in Fiji and Vanuatu.



Enterprises based on beekeeping offer many opportunities for smallholder farmers. In Fiji there is strong domestic demand for honey with potential for the export of honey and beeswax. In Nasinu, tilapia farmer, Ms Katalina Baleisuva, has ventured into beekeeping and says this has improved her finances. Photo: Lorima Vueti. ACIAR project LS/2014/042

Country priorities

Australia's Pacific Step-up, foreshadowed in the 2017 *Foreign Policy White Paper*, committed Australia to an intensified engagement in the Pacific region to support a more resilient region. The Pacific Step-up emphasises the importance of our ongoing and diverse program with the region, involving all research programs. Protecting the fragile natural resource base of the Pacific islands is closely linked to the priority of ensuring the resilience of agrifood systems. Our regional partner SPC emphasises integrated approaches to increasing resilience, including:

- » deploying a diversity of species and products in trees, crops, livestock and aquaculture to increasing resilience in the face of uncertainty
- » growing a greater number and diversity of trees in forestry, agroforestry and horticulture systems to contribute to more sustainable and resilient agricultural landscapes
- » diversifying crops to contribute to greater food security, nutrition and health
- » better managing coastal fisheries and aquaculture to underpin healthier nutrition and more resilient livelihoods
- » strengthening market chains for greater equity and inclusion to contribute to improved and more resilient livelihoods.

Across the board, trans-disciplinary approaches are needed to reduce the vulnerability of the natural resource base, and to create climate-smart agricultural landscapes. Using national policy, land-use planning and community engagement to manage water, soils, livestock, crops, forests, natural vegetation and coastal marine resources, from 'ridge to reef', in an integrated manner can increase resilience and sustainably improve livelihoods. But achieving this will require numerous and well-coordinated innovations in technology and ways of working.

The COVID-19 pandemic has highlighted the opportunity to rebuild and improve food systems and livelihoods in a sustainable way. The importance of land and ocean resources has never been clearer. ACIAR will continue supporting the Pacific islands countries to strengthen their food systems by:

- » supporting local food production
- » linking coastal communities with livelihood opportunities
- » understanding and addressing the impacts of climate change on food systems resilience and livelihood security
- » strengthening regional biosecurity
- » enabling intercountry collaboration through regional projects, capacity building and supporting a stronger forum for exchange of ideas and experiences.

2021–22 research program

- » **37 ACIAR-supported projects in Pacific island countries**
- » **28 projects are specific to one or more of these countries**
- » **9 projects are part of regional projects**

The research program addresses our high-level objectives, as outlined in the ACIAR 10-Year Strategy 2018–2027, as well as specific issues and opportunities identified by ACIAR and our partner organisations. The following sections briefly describe individual ACIAR-supported projects and anticipated outputs in Pacific island countries. The projects are grouped according to research program. Each project description is referenced in a list at the end of this section, which provides the project title and code.

Agribusiness

The Pacific Agribusiness Research and Development Initiative (PARDI) has been a significant program of work supported by ACIAR and DFAT. Starting in 2010, it promoted sustainable livelihood outcomes for Pacific islands households through research and innovation, with the regional goal of catalysing and informing a more vibrant, diverse and viable agribusiness sector. Phase 2, led by Professor Steven Underhill of the University of the Sunshine Coast, studied benefits to community livelihoods from successful agribusiness developments and ways to make economic benefits more inclusive and sustainable. During 2021–22, the program will identify opportunities and barriers in value and supply chains for primary products in Pacific island countries. There will be a new and particular focus on the development of capacity and networks, supporting agritourism in Fiji and Vanuatu, smallholder honey production and inland aquaculture supply chains in Fiji, and, more broadly across the region, development of agribusiness capacity.¹

Climate Change

The impacts of climate change and population growth are projected to lead to the collapse of coastal livelihoods currently dependent on coral-reef-based fish and nearshore fish throughout Pacific island countries. These impacts on fisheries will exacerbate existing nutritional and health problems in the region. A small research activity, led by Dr James Butler of CSIRO, will apply a systems approach to identify where these declines will be significant enough that new, transformational approaches to food production and livelihoods will be needed soon. The project is scoping options for transformational change and designing a locally led approach for communities to combine their own knowledge with scientific feasibility assessments to design and implement transformational climate adaptation action on the ground.²

In order to protect fish-based livelihoods throughout Pacific island countries, very different food and livelihood options need to be progressed in ways that are owned by communities, facilitated by provincial governments and civil society groups, and supported by national governments. A project led by Dr James Butler of CSIRO will tailor adaptation pathways methods to this context – combining scientific analysis and local knowledge, and designing and beginning to scale the collaborative planning processes needed across these different actors to create actionable pathways towards new climate-adapted food and livelihood systems.³

Smallholder farmers in Pacific island countries are vulnerable to reductions in availability of fresh water under climate change, as well as increasing demands from growing populations. Co-led by Professor Timothy Reeves and Dr Dorin Gupta of the University of Melbourne, a project will explore opportunities for the implementation of conservation agriculture and sustainable intensification (CASI) in smallholder farming systems in Samoa and Tonga. In other parts of the world, by integrating multiple management changes in a farming systems approach, CASI has been successful in intensifying agricultural production while providing climate adaptation and mitigation benefits. This project will experiment with integrated management changes that may help Pacific island countries to improve productivity, profitability, efficiency, management of greenhouse gas emissions, and resilience to climatic and economic risks.⁴

Australia is a world leader in greenhouse gas mitigation research in agriculture. This project provides the opportunity to assist partner countries to strengthen their national greenhouse gas accounting systems toward the same high standard used by Australia, and to use these systems to identify, quantify and implement on-farm management options that reduce emissions. Led by Professor Peter Grace of Queensland University of Technology, the project team will work with government institutions in Fiji and Vietnam, and will help grow capability in the data management, analyses and reporting needed to support current and future emissions reduction commitments under the Paris Agreement. The team will also collaborate with a sister project, led by the New Zealand Agricultural Greenhouse Gas Research Centre, which is pursuing the same approach in Kenya and Indonesia.⁵

Crops

Oil palm is a long-term and economically important perennial crop that is grown in large plantations and on smallholder farms in South-East Asia and Pacific island countries. The industry is threatened by basal stem rot, a disease caused by the fungus *Ganoderma boninense*, the incidence of which increases with each successive planting of the crop. A long-term trial led by Professor Ian Godwin of the University of Queensland is starting to show differences in susceptibility to the disease between lines from 81 breeding families that have been genotyped. The 2021–22 activities will explore the genetic basis of resistance and select candidate germplasm for resistant planting material.⁶

Fisheries

Unique among Pacific island countries is the production of half-pearls, or mabé, in Tonga from the winged pearl oyster. Although half-pearls are generally less valuable than round pearls, an individual oyster can produce multiple half-pearls (unlike round pearls). With appropriate training, pearl production can be accomplished by community members over a 10-month culture period, compared to approximately 2 years for round pearls. Professor Paul Southgate of the University of the Sunshine Coast completes a project in 2021 that is supporting further expansion of community-based pearl farming and handicraft production in Tonga and demonstrating the feasibility of similar development in Vietnam.⁷

Mabé (half-pearl) jewellery and shell handicraft industries provide income opportunities for both coastal communities and women's social enterprises in the western Pacific. Past project activities have increased the technical skills of communities in the production of juvenile oysters and the farming of mabé shell in Fiji and Tonga, and in the production of shell-based jewellery in Papua New Guinea. The development of greater technical capacity and a better understanding of gendered preferences and aspirations sets the basis for a new project in Fiji, Tonga, Papua New Guinea and Samoa, led by Professor Paul Southgate of the University of the Sunshine Coast. Country-specific interventions are required to ensure uniform mabé pearl jewellery/shellcraft production protocols and standards, improve capacity for sector governance within partner institutions and stakeholders, develop marketing strategies and ensure optimal benefits flow to both women and men across the value chains.⁸

A 4-year project working with SPC supports implementation of the 2015 regional framework, 'A new song for coastal fisheries - pathways to change'. The project aims to improve institutional capacity for scaling out community-based fisheries management. It is undertaking research to support policy reform, strengthen fisheries research and management capacity of institutions, and build community capacity to manage their fisheries resources. Led by Professor Neil Andrew of the University of Wollongong, the project will complete its work in 2021, bringing together communities and fisheries agencies to develop culturally suitable co-management practices that support sustainable coastal fisheries, and associated food security and wellbeing.⁹

In Pacific island countries, the paradox of apparently abundant fish, vegetables and root crops but poor public health outcomes presents a significant challenge for policymakers. Professor Neil Andrew of the University of Wollongong leads a project that has analysed agrifood systems in the region using newly integrated data sources that allow mapping and analysis of what food is being produced, distributed, traded and sold. During 2021-22, the results of the analysis will inform regional and national policy.

Diagnostic tools developed by the project will be linked to methods that pertain to different nodes of the agrifood system to form an overarching 'agrifood system diagnostic' that can highlight the key challenges and opportunities in the Pacific agrifood system.¹⁰

In the Pacific region, there is an opportunity to transform seaweed fisheries into nutritionally sensitive food systems comprised of short supply chains, village-based processing, sustainable use of natural resources and marketing for families. Nutrition-sensitive agriculture ensures the sustainable production of nutritious, affordable and safe foods to meet the dietary requirements of local communities. Dr Libby Swanepoel of the University of the Sunshine Coast completes a small research activity in 2022 that is designing a framework for equitable empowerment of women and men within seaweed harvester families. This will be achieved by developing and evaluating gender-inclusive activities in Kiribati and Samoa that broaden the focus of seaweed production from an export commodity to one that provides direct benefits to the health and wellbeing of communities.¹¹

Fish-based livelihoods play a critical role in the economies of coastal communities in Solomon Islands and Timor-Leste, and participation in catching, processing or trading of fish is an important pathway to poverty reduction. A new project led by Dr Hampus Eriksson of the University of Wollongong will identify and support community-identified opportunities for innovation within the coastal fisheries post-harvest sector, with a focus on income benefits for both women and men. This new approach addresses the historic lack of success at the community level of large state-led investments in fisheries sector infrastructure and advanced technologies. It seeks to influence policy on how fisheries institutions can support remote communities through more appropriate community-led infrastructure and skill development investments.¹²

Livelihood improvement projects for small-scale fishing communities are increasingly promoted in the Pacific region to build resilience to global change and dwindling fisheries resources. Often these projects focus on a single sector and focus on individual communities and households, failing to acknowledge the complexity of people's livelihoods. Such projects also risk obscuring broader-scale economic development trends, such as the establishment of extractive industries or technological innovations. Dr Amy Diedrich of James Cook University leads a small research activity to establish an integrated livelihoods approach to guide scientists, practitioners and decision-makers engaged in livelihood improvement project planning and assessment. The improved approach aims to achieve 3 desired outcomes in Pacific coastal communities: a fair and just society, sustainable natural resource use and resilient livelihoods.¹³

Securing the sustainable supply of coastal fish is a development priority for Pacific countries and regional organisations, as coastal fisheries are important for food and nutrition security and economic development. A new project in 2021 aims to scale up the proven approach of community-based fisheries management in Kiribati, Solomon Islands and Vanuatu to self-sustaining national programs that support resilient coastal communities. The project also aims to drive the spread of community-based fisheries management throughout in the Pacific region. The project contributes to Australia's Pacific Regional development program and the Pacific Step Up, and is an important component of Australia's COVID-19 response to build more resilient communities in our region. Professor Neil Andrew of the University of Wollongong leads the project, which starts with developing and disseminating information about inclusive community-based fisheries management principles and implementing an awareness raising strategy for delivery to 100% of coastal communities. Early project activity will strengthen national communication to accelerate uptake of management principles.¹⁴

Forestry

Renewal of the coconut estate is a priority for governments, development agencies and researchers throughout the Pacific. A new project in Fiji, led by Dr Rob McGavin of the Queensland Department of Agriculture and Fisheries, strives to create market pull for senile coconut stems by converting them to high-value engineered wood products. A market for old palms will encourage coconut growers to remove them, reducing phytosanitary risk and incentivising new, more productive planting. The project will deliver and validate wood-processing technologies to transform coconut and other low-value forest resources into high-value products suitable for local and international markets. Project benefits will extend along the value chain, contributing to smallholder livelihoods and regional economic growth.¹⁵

Agroforestry is the key element supporting the Decade of Reforestation initiated by the Vanuatu Government. Smallholder farmers are enthusiastic about engaging in small-scale commercial planted forestry, but progress can be restricted by a lack of awareness of technologies to optimise efficiencies. Dr Tony Page of the University of the Sunshine Coast leads a project to investigate the applicability and effectiveness of peer-mediated learning (farmer-led extension) in Vanuatu to overcome constraints to government and institutional extension services. The project supports smallholder farmers to adopt 3 high-value forestry species – *Canarium* nut, sandalwood and whitewood – by identifying genetically superior planting material and refining silvicultural techniques for increased productivity in Vanuatu.¹⁶

Although primary forest reduction is significant, Solomon Islands remains dependent on forests. Logging royalties account for 60% of government revenue and 92% of the population are subsistence cultivators who supplement their material economy with forest-derived building materials, food, fuel, medicines, tools and household items. Professor Helen Wallace of Griffith University leads a new project that has the central aim of learning how to efficiently restore forests to meet critical needs of rural Solomon Islanders, accelerating and channelling forest development to support livelihoods. The project also strives to support positive leadership in forest governance to secure remaining forests and those restored. Starting in 2021 are activities to foster community ownership and enhance women's participation, as well as a review of restoration methods for logged forests and establishment of field sites to measure the impact of interventions.¹⁷



The Master Tree Growers teaches smallholder farmers how to improve tree management through a market-focused and community-driven approach. A course was held in Vanuatu where an ACIAR-supported project is investigating farmer-led extension to introduce new technologies. ACIAR project FST/2016/154

Horticulture

Cocoa is an important agricultural export for more than 50,000 households in Papua New Guinea, Solomon Islands and Vanuatu. Significant domestic and potentially useful export opportunities also exist in Samoa and Fiji. A project led by Mr Yan Diczbalis of the Queensland Department of Agriculture and Fisheries is strengthening cocoa value chains in Pacific island countries, as well as in Australia. In 2020-21, the project will complete activities that deliver market-oriented strategies for the exchange and dissemination of superior cocoa genetic resources, methods for intensifying production systems to meet market opportunities and systems for improved post-harvest handling.¹⁸

Coconuts contribute, directly and indirectly, to the livelihoods of coastal communities throughout the Pacific region. Coconut enterprises in Pacific island countries face economic and environmental challenges –diversifying the range of products made from coconuts could offer a path to more-resilient livelihoods. Much of the coconut resource in the Pacific region is ageing or already senile and unproductive. A project led by Dr Carmel Pilotti of SPC aims to support the first step in rejuvenating coconut-based livelihoods in the Pacific islands by strengthening the conservation and use of genetic diversity in coconuts, addressing threats posed by the rhinoceros beetle and Bogia coconut syndrome, and establishing and sustaining a platform for coordinating coconut research-for-development initiatives.¹⁹

While global demand for coconut is strong, well over 50% of the 1.3 million coconut trees in the Pacific region are senile or unproductive. The future of the industry and associated livelihoods depends on the replanting of the coconut estate. This provides the opportunity to not only sustain production, but also increase it through the introduction of higher-yielding hybrids. While there are immense technical challenges to solve (for example, eradicating or reducing the impact of key pests, producing and distributing high-quality planting material and offsetting the effects of climate change), distinctly human and behavioural challenges also need addressing. A small research activity in 2021, led by Mr Cameron Turner of the University of Queensland, will develop a strong evidence base on the viability (or otherwise) of future ACIAR investment in the coconut industry in the Pacific region, and build in-country capability in ethnographic research methodology.²⁰

Vegetable production in the Pacific islands does not match local demand, and locally grown vegetable crops are susceptible to damage and destruction from extreme weather events, making supply to high-value markets unreliable. As a result, vegetables are imported for high-value hospitality and food service markets. A project led by Professor Phil Brown of Central Queensland University, concluding in 2021, evaluates and promotes the adoption of protected cropping systems for improved productivity, climate resilience and higher quality. Value-chain analysis identifying strengths and weaknesses of different markets will be shared and training will be delivered to help farmers to successfully produce and sell into demanding markets.²¹



ACIAR-supported plant health doctors are engaging with local farmers at the grassroots level. The farmers bring their suspected diseased plants for diagnosis, and the plant health doctors provide recommended treatments. The plant health doctors work closely with the local agricultural ministries. Photo: Pacific Way. ACIAR project HORT/2016/185

Fruit industry development in the Pacific region enhances food security, rural economies and healthy eating initiatives. A previous project in Fiji, Samoa and Tonga worked towards these benefits by supporting the development of resilient value chains for 5 regionally significant fruit crops: papaya, pineapple, mango, breadfruit and citrus. A new project led by Professor Steven Underhill of the University of the Sunshine Coast will build on the community and school-based citrus orchards established in the first project using introduced improved planting stock. This project will develop viable and sustainable fruit value chains, enhance the local capacity to support these chains, and gain wider human health impacts by piloting school and community healthy eating gardens.²²

Sweetpotato is a necessary component of food, nutritional security and disaster reduction strategies in Pacific island countries. Rapid production of planting material, ease of planting, quick maturation and high nutrition makes sweetpotato an ideal option in disaster recovery. However, yields of sweetpotato are low in the Pacific region compared with developed countries, as farmers do not have access to pathogen-free planting material. In times of high demand, under government assistance schemes following natural disasters, quality cuttings are not available, and those distributed are invariably infested with pests and diseases. Dr Julie O'Halloran of the Queensland Department of Agriculture and Fisheries leads a new project that has the overall aim of building capacity in the provision of high-quality, pathogen-tested sweetpotato planting material to support a larger program for resilient root cropping systems that are responsive to the challenges of pests and diseases and climate change.²³

The development of safe, high-value fruit and vegetable industries is a priority for many Pacific island countries. Dr Michael Furlong of the University of Queensland leads a project to develop integrated pest and disease management strategies for the sustainable intensification of fruit and vegetable crop production, addressing the threats posed by the inappropriate use of pesticides, emerging pests and diseases and climate change. During 2021-22, the project will continue to assess pathways for the introduction and potential spread of insects and test biological control strategies, while developing integrated management approaches for selected crops. The project continues to build surveillance and diagnostic capacity for the management of emerging pests and diseases, including fall armyworm. The project engages with farming communities through local plant health clinics to give growers easier access to expert advice. The project will generate new knowledge, resources and opportunities to encourage the adoption of integrated management strategies.²⁴

In the Pacific region, vulnerability of horticultural produce to postharvest losses often is more dependent on where and how a product is grown, transported and sold, rather than commodity-type. A new project in Samoa, Fiji, Solomon Islands, Tonga and Vanuatu aims to reduce food losses through a market-based and gender inclusive approach to identify where food loss is greatest. Dr Seeseei Molimau-Samasoni of the Scientific Research Organisation of Samoa will lead a project team to identify value chains of fruits, vegetables and root crops that are most critical to improving nutrition and livelihoods of farmers and vendors. The team will then engage with farmers and vendors to trial interventions to address these drivers of food loss, with the ultimate goal of reducing food losses. This project is part of the ACIAR-IDRC Food Loss Research Program (see page 8).²⁵

Livestock Systems

Strong domestic demand for honey and the potential to export honey and by-products offers an opportunity to smallholder farmers in Fiji and Papua New Guinea. A project, led by Dr David Lloyd of Southern Cross University, aims to increase the productivity and profitability of beekeeping enterprises to complement smallholder incomes and promote an income-earning activity for women. During 2021-22, the project will complete spatial and temporal mapping of floral resources and develop best-practice pest and disease management programs in readiness for incursions of varroa and tropilaelaps mites. Capacity building of extension and development agencies to support beekeeping as a sustainable small enterprise will continue.²⁶

The productivity and profitability of sheep and goat production in Pacific island countries could be improved if domestic production was better aligned with national market requirements and smallholder farmers could more easily participate in value chains. Dr Frances Cowley of the University of New England leads a project addressing the constraints to production efficiency for smallholder and semi-commercial sheep and goat production systems in Fiji and Samoa. During 2021-22, the project will continue assessments to understand farmer motivation to change practices, and test innovations to improve management of feed gaps, reduce mortality and improve turn-off rates.²⁷

Supporting the previous project is a small research activity, led by Dr Rodd Dyer of the University of Queensland, to better understand the current policy environment and undertake cost-benefit analysis to develop recommendations for policy reform to support the Fiji and Samoan small ruminant sectors.²⁸

Increasing smallholder cattle productivity and income from cattle sales is a priority of the Vanuatu Government. A project led by Dr Simon Quigley of the University of Queensland aims to integrate recommendations from previous and new research on cattle production and marketing. A set of best-bet production options will be formulated, from which smallholder farmers can develop their own cattle farming business plan using the Cattle Farm Planning Tool (a decision-tree framework). Local support agency staff will be trained to mentor farmers in the implementation of cattle farming plans.²⁹

In Vanuatu, meat exports are processed through 3 vertically integrated abattoirs. Smallholder beef producers in Vanuatu are largely excluded from these high-value export markets because of poor quality, insufficient quantity, poor organisation and high transport costs. Dr Cherise Addinsall of Southern Cross University will undertake a feasibility analysis to determine if greater equity and inclusivity between smallholders and large cattle producers could occur through an agritourism approach, linking a high-value, sustainable beef brand to Vanuatu's tourism industry.³⁰

Globally, antimicrobial resistance is one of the most urgent emerging threats to human and animal health. It has broad impacts on animal production systems and food security. Dr Walter Okelo of CSIRO leads a project to increase the knowledge of both antimicrobial resistance and antimicrobial use in Fiji, increase skills of laboratory staff in detecting resistance, increase awareness through project advocacy and campaigns, and make recommendations to update legislation and regulation to strengthen antimicrobial systems.³¹

The Australian and New Zealand governments share a common interest in investing and assisting partner countries to improve livestock production and productivity, including the potential to reduce greenhouse emissions from livestock production systems. A small research activity led by Dr Paul Cheng of the University of Melbourne is assessing what data exists for calculation of greenhouse gas emissions for selected smallholder livestock projects supported by ACIAR and the New Zealand Ministry of Foreign Affairs and Trade. The study will focus on livestock systems in Vanuatu and Myanmar. It will provide an understanding of the opportunities and challenges for incorporating livestock monitoring, reporting and verification data collection and/or analysis in development projects in the longer term. The study will also provide an understanding of the attitudes and interest of project partners to participate in such activities into the future.³²



A project led by CSIRO aims to enhance the integrated management of antimicrobial resistance through existing national structures in Fiji, to achieve sustainable and improved health outcomes across human, animal and environmental sectors. Pictured are vets monitoring cattle at the Koronivia Research Station in Suva. Photo: Dave Lavaki. ACIAR project LS/2019/119

Social Systems

The agriculture sector has been identified as a sector for growth to support economic development and poverty alleviation in Fiji and Tonga. Livelihoods and landscapes in these countries are highly interconnected, so the populations are acutely vulnerable to the impacts of climate change and variability as well as the impacts of policy-driven intervention. With a vision of climate-smart landscapes, Dr Eleanor Bruce of the University of Sydney and Dr Bryan Boruff of the University of Western Australia lead a team to develop a collaborative geospatial platform that will identify response to climate-smart landscape adaptation. During 2021–22, the researchers will evaluate the effectiveness of the platform for promoting community and multi-stakeholder exchange and engagement with landscape knowledge. The project will also identify adaptation objectives for communities within the landscape to foster climate resilience and enhance environmental livelihood security.³³

Family Farm Teams is a peer education model of agricultural extension that has benefited the economic development of women smallholders in 9 areas of Papua New Guinea. Dr Deborah Hill of the University of Canberra leads a new project to improve agricultural development opportunities for women smallholders in rural Solomon Islands. The project will investigate the adaptability of the Family Farm Teams approach in Solomon Islands, and provide comparative learning to apply it to other Pacific island countries to help communities move from semi-subsistence to planned farming in a gender-equitable way.³⁴

The Livelihood Improvement through Facilitator Extension (LIFE) model of improved extension, based on a Landcare approach, was developed through research in the Philippines. It rapidly enhanced agricultural livelihoods by improving both farmer-based learning networks and community social capital. Dr Mary Johnson of RMIT University, in partnership with Filipino collaborators, will make a substantial contribution to understanding the adaptability and adoptability of the Landcare-LIFE combination by trialling the LIFE model for livelihood improvement within a Fijian smallholder farmer context. The project will broker an escalation of the Landcare approach to deliver sustainable land management outcomes with government and civic partners.³⁵

Pacific labour mobility is a major component of the Australian Government Pacific Step-up and closely connected to initiatives among Pacific island countries that have re-prioritised agricultural production and food security as a COVID-19 recovery strategy. A largely underexplored opportunity exists for understanding how farm workers involved in labour mobility programs between Australia and the Pacific region develop innovative agricultural skills and new agricultural knowledge through their engagement on Australian farms. A small research activity led by Dr Federico Davila of the University of Technology Sydney aims to understand barriers and enablers for the exchange of agricultural skills and knowledge between Pacific island and Australian farmers. This research will analyse skills and knowledge acquired in different agrifood systems across selected value chains. This project contributes to stage 3 of the ACIAR assessment of COVID-19 impacts on food systems in our region.³⁶

Soil and Land Management

Agriculture in the Pacific region is generally confined to smallholder farms and household gardens. Its sustainability is threatened by nutrient imbalances, erosion, declining soil fertility and carbon, and climate change. A previous project (SMCN/2016/111) developed a soil information system and identified appropriate technologies for improved soil health and efficient water and nutrient use. A new project in 2021 builds on this research to build farming systems resilience in Fiji, Samoa, Tonga and Vanuatu. Led by Dr Ben Macdonald of CSIRO, the project will address knowledge gaps in understanding soil organic carbon and nutrition management, and develop the next generation of agronomic advisors and appropriate networks for collaboration. The project will continue the development and extend the reach of the Pacific Soils Portal. Cost-effective in-field technologies for rapid soil and plant analysis and real-time data capture will be introduced to agricultural extension services. The project seeks to improve the linkages along the export value chain through the development of information pathways between the grower and exporter, with a focus on nutrient management.³⁷

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See page 197 for contact details.

Current and proposed projects

1. Pacific Agribusiness Research in Development Initiative Phase 2 (PARDI 2) [Fiji, Tonga, Vanuatu] (AGB/2014/057)
2. Transforming Pacific coastal food production systems [South Pacific general] (FIS/2020/108)
3. Transformational pathways for Pacific fisheries communities [Kiribati, Solomon Islands, Tonga, Vanuatu] (WAC/2020/178)
4. Conservation agriculture and sustainable intensification systems for transformational climate adaptation and greenhouse gas mitigation in Pacific island countries [Samoa, Tonga] (CLIM/2020/186)
5. Improving greenhouse gas inventory systems to support the mitigation ambitions of Fiji and Vietnam (WAC/2019/150)
6. Developing a foundation for the long-term management of basal stem rot of oil palm in Papua New Guinea and Solomon Islands (CIM/2012/086)
7. Half-pearl industry development in Tonga and Vietnam (FIS/2016/126)
8. Towards more profitable and sustainable mabé pearl and shell-based livelihoods in the western Pacific [Fiji, Papua New Guinea, Samoa, Tonga] (FIS/2019/122)
9. Strengthening and scaling community-based approaches to Pacific coastal fisheries management in support of the New Song [Kiribati, Solomon Islands, Vanuatu] (FIS/2016/300)
10. Agriculture and fisheries for improved nutrition: integrated agrifood system analyses for the Pacific region [Kiribati, Solomon Islands, South Pacific general, Vanuatu] (FIS/2018/155)
11. Improving nutrition through women's and men's engagement across the seaweed food chain in Kiribati and Samoa (FIS/2019/125)
12. Innovating fish-based livelihoods in the community economies of Timor-Leste and Solomon Islands (FIS/2019/124)
13. Spatially integrated approach to support a portfolio of livelihoods [Solomon Islands, South Pacific general] (FIS/2020/111)
14. Coalitions for change in sustainable national community-based fisheries management programs in the Pacific [Kiribati, Solomon Islands, South Pacific general, Vanuatu] (FIS/2020/172)
15. Coconut and other non-traditional forest resources for the manufacture of engineered wood products [Fiji] (FST/2019/128)
16. Enhancing returns from high-value agroforestry species in Vanuatu (FST/2016/154)
17. Livelihoods in forest ecosystem recovery [Solomon Islands] (FST/2020/135)
18. Aligning genetic resources, production and post-harvest systems to market opportunities for Pacific island and Australian cocoa [Fiji, Samoa, Solomon Islands, Vanuatu] (HORT/2014/078)
19. Safeguarding and deploying coconut diversity for improving livelihoods in the Pacific islands [Fiji, Papua New Guinea, Samoa, Solomon Islands, Vanuatu] (HORT/2017/025)
20. Building a business case for investment in a coconut industry in the Pacific [Fiji, Samoa, Vanuatu] (HORT/2020/190)
21. Integrating protected cropping systems into high value vegetable value chains in the Pacific and Australia [Fiji, Samoa, Tonga] (HORT/2014/080)
22. Enhanced fruit systems for Tonga and Samoa (phase 2): community-based citrus production (HORT/2019/165)
23. Improving root crop resilience and biosecurity in Pacific island countries and Australia [Fiji, Samoa, Solomon Islands, Tonga] (HORT/2018/195)
24. Responding to emerging pest and disease threats to horticulture in Pacific islands [Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga] (HORT/2016/185)
25. Adopting a gender-inclusive participatory approach to reducing horticultural food loss in the Pacific (Food Loss Research Program) [Fiji, Samoa, Solomon Islands, Tonga] (CS/2020/191)
26. Increasing the productivity and profitability of smallholder beekeeping enterprises in Papua New Guinea and Fiji (LS/2014/042)
27. Improving small ruminant production and supply in Fiji and Samoa (LS/2017/033)
28. Sectoral analysis and investment requirements for improving Fiji and Samoa small ruminant sector (LS/2018/183)
29. Assessing the potential of a high value 'sustainable beef' brand within the Vanuatu tourism sector to improve beef production and increase the market share for smallholders (LS/2020/155)
30. Enhancing the management of antimicrobial resistance in Fiji (LS/2019/119)
31. A farm planning approach to increase productivity and profitability of smallholder cattle systems in Vanuatu (LS/2018/185)
32. Livestock climate lens Part 1: data landscape analysis [Myanmar, Vanuatu] (LS/2020/207)
33. Climate-smart landscapes for promoting sustainability of Pacific island agricultural systems [Fiji, Tonga] (ASEM/2016/101)
34. Improving agricultural development opportunities for female smallholders in rural Solomon Islands (SSS/2018/136)
35. Landcare - an agricultural extension and community development model at district and national scale in Fiji (SSS/2019/140)
36. Agrifood systems transformation through circular migration between Pacific islands and Australia (COVID-19 impacts program) [Samoa, Tonga, Vanuatu] (CS/2020/212)
37. Soil management in Pacific islands (phase 2): investigating nutrient dynamics and the utility of soil information for better soil and crop management [Fiji, Samoa, Tonga, Vanuatu] (SLAM/2020/139)