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About Partners

Partners in Research for Development is the quarterly publication of the Australian Centre for International Agricultural Research (ACIAR). *Partners* presents articles that summarise results from ACIAR-brokered research projects and puts ACIAR research initiatives into perspective.

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Front cover: A smallholder grower in Vanuatu harvests ripe cocoa pods, with beans increasingly sought-after by fine chocolate makers around the world. Photo: Conor Ashleigh

Back cover: A cocoa farmer in Vanuatu spreads beans for drying. Photo: Conor Ashleigh.

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From the acting CEO

Eleanor Dean

In this issue of *Partners*, we focus on the Pacific region, marking the Pacific Week of Agriculture and Forestry in Fiji in March.

This important event draws global attention to agriculture and forestry in the Pacific region and it will be the first such gathering since the COVID-19 pandemic.

ACIAR is proud to be a supporter of the week's activities, in partnership with the Australian Department of Foreign Affairs and Trade.

The Pacific Week of Agriculture and Forestry will create opportunities for new and continuing regional and international collaborations. It gathers leaders from 22 Pacific nations to set the strategic direction for key regional institutions in agriculture and forestry.

It also brings together the many regional networks and groups that support agriculture and forestry and provides a forum to showcase the latest research and development achievements, including ACIAR-supported research and development projects.

Many countries and territories in the region have common research needs on matters such as biosecurity, climate change and agribusiness development, as well as food and nutrition challenges.

ACIAR supports our partners to investigate new and impactful approaches to these issues. In 2022–23 we have invested A$11.85 million in 35 projects in the region – in Fiji, Kiribati, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu and Papua New Guinea.

We have longstanding relationships with national governments and regional research and development agencies across the Pacific region and we continue to work closely with them. The Pacific Week of Agriculture and Forestry provides us with the opportunity to bring together our many Pacific region alumni.

International Women's Day, on Wednesday 8 March, falls during the week-long event, and many of our projects, including those in the Pacific region, contribute to improved gender equity, enhancing livelihoods and opportunities for women and girls.

For example, in Papua New Guinea, support for the development of the galip nut industry is providing training for 300 women. In another project, the successful Family Farm Teams approach established in Papua New Guinea is being applied in Solomon Islands to engage rural communities in smallholder farm development, with a special focus on women and youth.

Eleanor Dean
Photo: ACIAR

A 5-year pearl farming project in Fiji, Tonga and Papua New Guinea has also increased the resilience, productivity and livelihood opportunities for pearl farmers, including women community groups.

Gender equity is inherent in the capacity-building initiatives we support. To date, nearly half of the 191 Pacific island and Papua New Guinea post-graduate scholars supported through ACIAR programs have been women.

These include John Allwright and Meryl Williams Fellows, and participants in the Pacific Agriculture Scholarships, Support and Climate Resilience (PASS-CR) Program.

Improving gender equity and developing the skills of women in agriculture and research helps them to identify and overcome systemic barriers for women in their communities. ACIAR is immensely proud to support this work in the Pacific region, and in all our partner countries, as a fundamental part of research for development and improved livelihoods for all.

This issue of *Partners* looks at key projects ACIAR supports, developing responses to complex agricultural, forestry and food system challenges Pacific communities are facing.

Eleanor Dean
Acting Chief Executive Officer, ACIAR

Cunningham Molo drying coconuts in Timor-Leste as part of research underway. Photo: ACIAR

Genetic diversity and breeding to protect the coconut industry

Coconuts hold significant cultural and economic value in the Pacific islands and safeguarding the genetic diversity of coconuts in the region allows for more sustainable and productive coconut farming.

Madang Province in Papua New Guinea is home to an International Coconut Genebank, a collection of the South Pacific's coconut palm species to conserve the diversity of the species across the region.

That collection is now under threat from Bogia coconut syndrome (BCS), a largely fatal bacterial disease first identified in nearby coconut groves in Madang Province in 2008.

An ACIAR-funded project launched in 2019 is working with partner countries in the Pacific region to collect, conserve and redeploy the collection to protect the future of the crop and the Pacific island communities that rely on coconuts for food, construction materials and income.

Coconuts contribute directly and indirectly to the livelihoods of approximately 5 million vulnerable people in the coastal communities of the Pacific islands.

Disease challenge

BCS is caused by a phytoplasma, a group of bacteria that also causes the more common lethal yellowing disease that affects many palm species. BCS is primarily spread by insects, making it difficult to contain, and it is usually lethal to infected palms.

Papua New Guinea was initially chosen as the site of the gene bank in the 1990s because it had few coconut pests and diseases. But the appearance of BCS, along with other disease threats on the horizon, is driving the search for new ways to conserve the region's coconut genetic diversity.

One tactic has been to move trees to other countries. But this comes with the risk of spreading BCS outside Papua New Guinea, where it is currently contained.

This has led to the ACIAR-supported project to develop new approaches to conserve coconut genetics while reducing the risks of disease transfer.

The Pacific Community (SPC) is leading the research, with support from the University of Queensland and agricultural government ministries in Fiji, Papua New Guinea, Samoa, Solomon Islands and Vanuatu.

'There is a high level of coconut diversity in these countries, and we're trying to characterise and preserve their diversity.'

'There is a high level of coconut diversity in these countries, and we're trying to characterise and preserve their diversity,' said Dr Carmel Pilotti, associate scientist for Coconut Genetic Resources with the SPC Land Resources Division, who is leading the project.

Due to a long history of human interference, coconut varieties have huge variation in physical characteristics, including colour, size, shape and husk proportions. Through the characterisation of the genetic structures that drive these physical differences, breeding programs will have the ability to become more targeted.

Diversifying methods

'Through partnerships with these countries and the University of Queensland, we're working to develop tissue culture laboratory protocols to conserve Pacific coconuts,' said Dr Pilotti.

This involves collecting isolated embryos from mature coconuts and using tissue culture to germinate plants in laboratories. The new coconut trees are then planted out in a new field collection at the Pacific's regional gene bank, the Centre for Pacific Crops and Trees, housed at SPC in Fiji. The 5-year project also aims to improve coconut cryopreservation (ultra-low temperature freezing) processes. This allows samples of genetic material to be preserved cryogenically (in a suspended, frozen state) to create a gene bank that is less labour-intensive than field collections and also more protected from biosecurity threats such as BCS.

'The idea is to have the germplasm available and fully characterised so the countries can look at the varieties and make a choice on what they want to be introduced to their breeding programs,' explained Dr Pilotti.

Characterising the gene bank creates the potential for new markets by selecting and breeding varieties for specific uses and products, to develop value-added coconut enterprises.

Dr Pilotti said this will increase opportunities for smallholder farmers to replace aged trees with cultivars that show increased coconut production, improved quality and greater adaptability to challenges such as climate change and biotic threats.

Managing biosecurity

The tissue culture program relies on the movement of coconut germplasm between countries. Dr Visoni Timote, plant pathologist adviser at the SPC Land Resources Division, highlighted the development of protocols for the safe exchange of genetic material as a crucial aspect of this project.

'If you want to move any agricultural product, you need to be aware of the most likely pathways for pests and diseases to come into countries, and the biosecurity treatments to mitigate those threats,' said Dr Timote.

'We want to help farmers, producers and exporters improve their ability to address some of the biosecurity threats and create opportunity to improve the value of coconuts.'

Dr Timote also reflected on the cultural significance of coconuts to his home country of Fiji, as well as other Pacific islands, where many people rely on coconuts for their livelihood.

Key points

1. Protecting and deploying coconut diversity provides opportunities to improve livelihoods in the Pacific islands.
2. New conservation methods are being developed to protect gene banks that are vulnerable to biosecurity threats.
3. International collaboration provides opportunities to improve resilience to climate change.

Dr Julianne Biddle (right) and Quang Nguyen (PhD candidate, University of Queensland) inspect coconut varieties grown at the University of Queensland. Photo: ACIAR

Coconut seedling in tissue culture at the Centre for Pacific Crops and Trees laboratory at Narere, Fiji. Photo: The Pacific Community

'From a young age I was taught to respect coconut trees because they give you everything you need: from coconut leaves to thatch your house, to coconut milk, to using the shells as cups to drink from. The coconut is the tree of life for all of us in the Pacific.

'I would like my great-grandchildren to see and know what a coconut tree is because it's not affected by a pest or threat that causes it to become obsolete.'

Approach to climate change

The future of the coconut industry, including breeding for climate resilience, was an important topic at the 50th international COCOTECH conference held in November 2022 in Kuala Lumpur, Malaysia.

The industry's approach to climate change, appropriate policies, agronomic practice strategies and genetic development strategies were part of the discussion.

Dr Julianne Biddle, ACIAR director of multilateral engagement, having a background and continued interest in coconut research, attended the conference.

Coconuts are regularly grown in areas that are exposed to extreme weather events such as cyclones, typhoons, tsunamis and droughts. With climate change further aggravating these conditions, Dr Biddle noted that there appeared to be a common drive towards seeking new coconut varieties with more resilience to these conditions.

'Some farmers are living and growing coconuts in areas that are becoming quite challenging at the moment, and some are not going to be able to stay where they are. We've already seen areas in Fiji where people have had to move due to constant water inundation,' said Dr Biddle.

She said breeding for traits such as higher tolerance to water inundation and salt exposure are things that may be able to reduce the challenges created by changing climate conditions.

'We're looking at more extreme weather and ways we can create more tolerant varieties for these conditions is becoming a priority.'

Conserving and analysing coconut genetic resources will be a very important step in working towards more resilient varieties, and Dr Biddle is optimistic about the growing collaborative spirit in the coconut sector.

'The network seems to be more connected than I have ever seen it over the years, more motivated,' she said. 'There's a lot of people willing to collaborate and willing to find solutions and I'm hopeful that they will be successful in doing that: in sharing germplasm, protecting germplasm and then classifying it.'

The collaboration of Pacific island countries through this ACIAR-supported project aims to empower regional authorities and farmers alike with the resources and knowledge they need to protect this culturally and economically important crop. The project is expected to run until the end of 2025.

> **ACIAR PROJECT:** 'Safeguarding and deploying coconut diversity for improving livelihoods in the Pacific islands' (HORT/2017/025)

A dive into the past guides the future for soil health

Tonga soils researcher Dr Siosiua Halavatau examining the effects of boron deficiency in beans. Photo: James Barringer

An innovative online database and infrared sensing system are providing a user-friendly information resource to help Pacific island farmers fight a decline in soil fertility and crop productivity.

A few years ago, Dr James Quilty was standing in a taro crop in Samoa, chatting with the grower about his cultivation methods and his farming ambitions. Dr Quilty noted, as they were speaking, the yellow-tinged leaves of the taro crop being symptomatic of potassium-deficient soils.

As the ACIAR Research Program Manager, Soil and Land Management, he had a keen interest in this issue. Dr Quilty asked if the farmer used fertiliser, given he had just won the best taro prize in his local agricultural show.

'No' was the unsurprising answer. As the conversation continued, the farmer lamented how the taro plants used to be twice as tall when he was a boy.

This conversation revealed 2 important facts: crop growth and soil nutrition were in decline, but farmers were not linking the 2.

What was needed was soil test data and a way to show farmers the connection between this data, their soil management, the diminishing performance of their crops over time and the long-term impacts for their families and their children.

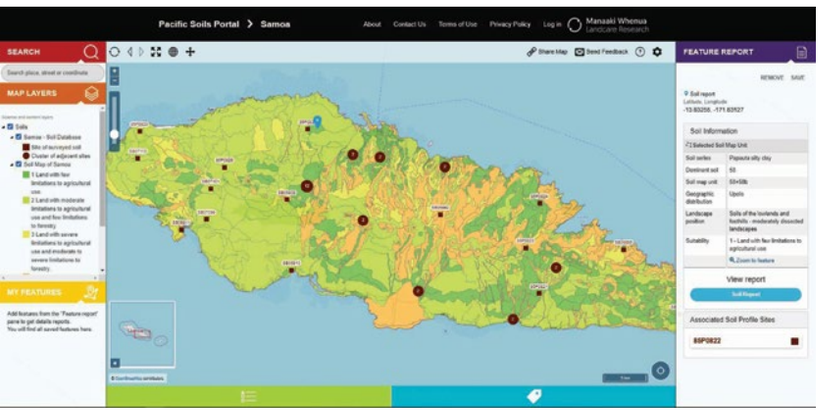
Fast forward 3 years to the development of the Pacific Soils Portal. Created through a CSIRO-led ACIAR-supported project, the portal brings together 50 years of soil test data from Samoa, Fiji, Tonga, Kiribati and Tuvalu into an online data map.

Soil history exposed

The soils portal allows farmers, researchers, extension agents and other stakeholders to compare changes over time for critical elements such as soil carbon, nitrogen, phosphorous and other nutrients, and the consequences for farm productivity.

It is also geo-referenced, which allows information to be correlated with cultivation practices at farm or district level. The historical data used to create the digital maps for the 5 participating Pacific island countries were compiled by geospatial specialist Mr James Barringer from Manaaki Whenua – Landcare Research in New Zealand.

Leading this research project, Mr Barringer's job was to locate half a century of accumulated soils knowledge from archives of earlier work funded by Australia, New Zealand and the FAO, working with the Pacific Community (SPC) and in-country agricultural ministries.



A map of soils in Samoa, created as part of the Pacific Soils Portal. Image: James Barringer

He then had to turn this into a useable reference that would allow farmers and extension officers to see how soil nutrition had deteriorated and to use this as motivation for adopting improved practices. There were obvious issues working with hand-drawn maps and soil survey sheets from up to 40 years ago.

'Some of the old soil maps were fantastically detailed, while other locations were descriptions like "banana plantation, 500 yards N of HQ of church mission station, SW corner of island, near Longamapu, Vava'u",' said Mr Barringer.

Fitting this information to modern-day GPS coordinates was challenging; however, with painstaking cross-references to photos and area maps, the data in the portal is reliable to within tens of metres.

The concept of the Pacific Soils Portal and its role in raising awareness of declining soil nutrition was first raised more than 15 years ago by SPC but shelved in the aftermath of the global financial crisis (2008).

It was revived as an ACIAR-supported project on the back of the larger Pacific soils project in partnership with the 5 Pacific countries (Samoa, Fiji, Tonga, Kiribati and Tuvalu) and New Zealand, and the portal project is now complete.

Practical extension tool

Dr Quilty said the soils portal is expected to be a valuable extension tool to help farmers raise product quality to export standards.

He explained, for example, that there is a strong demand for taro among Pacific islander communities in Australia and New Zealand but a gap has been opening between quality expectations and what is being grown.

'But the farmers aren't getting the information they need in a way that helps them make the practice changes required to meet these export opportunities,' said Dr Quilty. 'That's where the soils portal fits in.'

The data and maps can continue to be updated and linked with other databases such as those covering biodiversity, ecosystems and infrastructure.

'If someone wants to invest in agriculture in, say, Fiji, the decision isn't just about soil health, but biodiversity, infrastructure and market access,' said Dr Quilty. 'All of these elements can be overlaid to create a comprehensive picture of the agricultural landscape and how it is changing.'

Another crucial aspect of the soils portal project has been the local application of mid-infrared spectroscopy (MIR). This provides detailed insights into changing soil chemistry and why soils are becoming less fertile and more prone to drought and erosion. It also cuts soil testing costs from around $300 a sample to less than $5.

'It's a game changer,' said Dr Quilty. 'A smallholder farmer is not going to send off multiple samples for analysis if it's going to cost $1000, but possibly will if soil information and recommendations can be provided for less than $20.'

Researcher with the Fiji Ministry of Agriculture, Ami Sharma, said MIR provided enhanced capability to rapidly and economically analyse large numbers of soil samples, overcoming challenges such as tight resources and budgets.

In the future, spectral analysis of soils will be possible in the field, with the soils portal providing the digital infrastructure to support near real-time soil analysis.

'Logged in the portal, this data shows where we're going and where we need to go in terms of soil health,' said Dr Quilty. 'It supports conversations between farmers, policymakers, development agencies, and creates a whole new digital infrastructure for agricultural development.'

ACIAR PROJECT: 'Soil management in Pacific Islands: investigating nutrient cycling and development of the soils portal' (SMCN/2016/111)

Key points

1. Soil fertility is declining in many Pacific island countries and territories.
2. Productivity gains and market opportunities stand to be lost without changes to agricultural practices.
3. Online soil maps can help farmers understand soil fertility trends and be motivated to respond.

Summer shelter transforms vegetable production

Protected cropping in the Pacific region is transforming vegetable production, helping smallholder farmers to overcome major weather-related challenges to extend their growing season and increase incomes.

A little shelter in summer goes a long way to improving crop production and the livelihoods of smallholder farmers in the Pacific region.

While many other countries around the world use protected cropping to keep their plants warm, in Fiji, Samoa and Tonga, structures such as walk-through tunnels, shade houses and plastic housing keep damaging summer rains off delicate vegetables and offer some sun protection too.

As part of an ACIAR-supported horticultural project, farmers in these 3 countries have been trialling a stepped approach to protected cropping. They begin with relatively simple structures, made from readily available materials such as bamboo, plastic, timber, shade cloth and even galvanised iron.

With a shelter in place, farmers plant vegetables in the summer off-season, from November to April, such as tomatoes, lettuce, capsicums and cucumbers. This allows them to tap into premium markets for their vegetables at a time of year when many Pacific countries rely on vegetable imports.

The recently completed 5-year ACIAR-supported project worked directly with about 40 smallholder farmers helping to test this new way of farming while developing new skills and knowledge. Hundreds more people have been exposed to the project through local farmer and village networks.

Increased yields and income

Through the project, some farmers moved from this first step to semi-commercial and even to larger commercial-scale protected cropping systems. By growing in the off-season, they have been able to earn more than 3 times the price for their crop. For example, in 2019, tomatoes were FJD 1.54c/kg in August during the traditional growing season, and at FJD 16.67c/kg in April 2020, the end of the off-season.

Yields have tripled compared to unprotected field crops, and farmers say the quality of produce is more consistent.

Mr Joeli Vatavehi-Nawamagi has been using protected cropping for 3 years, and said it allows him to harvest his vegetables daily during the off-season, generating daily income for his family's needs. He is producing more from a smaller area of land and can also work more comfortably under cover, even when it is raining.

He has used the extra income to buy a new car; other smallholders have bought farm equipment and improved their homes.

Mrs Kalesi Ravatu said moving to protected cropping had also helped her family to increase income. 'We're able to meet family needs, village and church obligations, and our children's education,' said Mrs Ravatu.

Four elements for success

Professor Phil Brown, an agricultural scientist at the Central Queensland University, Australia, has led this research for ACIAR, in collaboration with Mr David Hickes from the Pacific Community (SPC).

Professor Brown said there is often an emphasis on the infrastructure in protected cropping, but it is only one of 4 crucial 'legs' in successful systems. The others are

Key points

1. Protected cropping trials in Fiji, Samoa and Tonga have demonstrated how these systems can increase vegetable production and improve livelihoods for smallholder farmers.
2. Production during the off-season has allowed farmers to achieve premium prices for crops such as tomatoes, capsicums and cucumbers.
3. The success of protected cropping involves equally important elements: infrastructure, agronomy, pest and disease management, and marketing.

Joeli Vatavehi shows his grandson a new way of farming.
Photo: The Pacific Community

agronomy, pest and disease control, and marketing. Without the other 3, protected cropping often does not deliver the results it is capable of, he said, and famers abandon their efforts.

'So, we developed an analogy with the kava bowl, which is culturally significant in the region; each of the four components is like a leg on a kava bowl, and all are necessary for the success of a protected cropping system.'

The project team has provided training for farmers, reinforcing the need for all 4 legs in ways that they can relate to. The kava bowl analogy also provides the basis of a training program developed for the ministries and departments of agriculture in Fiji, Samoa and Tonga.

Several of the vegetable varieties that farmers are growing have been selected specifically for their suitability in growing in protected conditions, rather than in the field. Some variety recommendations have come from research in northern Australia undertaken by Dr Elio Jovicich, from the Queensland Department of Agriculture and Fisheries, as part of this project. New species included a Lebanese cucumber, which proved particularly popular when introduced in Samoa.

Local food supply

The project initially targeted resort and hospitality markets as part of the marketing leg of the system, working with farmers to establish collectives that could deal directly with resorts.

When COVID-19 shut down the resort market, growers successfully pivoted to supplying urban markets, dealing directly with supermarkets and customers at local markets to achieve premium prices. This is boosting the availability of fresh produce for local people at the same time as supporting local farmers over imported products.

'This kind of capacity building is really significant,' said Professor Brown. 'The ACIAR work is more than a series of discrete projects; it really acts as a pump, priming change, triggering growth.'

As program coordinator with SPC in Fiji, Mr Hickes highlights the creation of new relationships and a training manual as valuable outputs from the projects.

'Protected cropping is now part of the Fiji Ministry of Agriculture's work plan, and extension staff have our training brochure to continue training farmers.

'We have developed strong stakeholder relationships, including the Ministry of Agriculture and other NGOs, which will help to continue developing protected cropping,' said Mr Hickes.

ACIAR PROJECT: 'Integrating protected cropping systems into high value vegetable value chains in the Pacific and Australia' (HORT/2014/080)

Chairman of the village committee for the first reforestation trial, Herrick Nason, marks out the site.
Photo: Ecological Solutions Foundation

Solomon Islands communities take on forest regeneration trials

Community-led forest restoration trials in Solomon Islands will help form strategies for the future redevelopment of the country's forest resources and will provide a model for similar initiatives globally.

Over recent decades, timber harvesting from native forests in Solomon Islands has provided an important source of national export income – as much as 70% in some years. But many of these repeatedly logged forests have failed to regenerate naturally, and now the country is running out of timber for its own communities and for export.

A new ACIAR-supported project is underway, working with local communities to test different ways to restore forests and to identify the forest services and values communities most want to maintain.

Professor Helen Wallace at Griffith University in Australia leads the Livelihoods in Forest Ecosystem Recovery (LIFER) project for ACIAR and said there is a critical need to find ways to restore the forests in Solomon Islands.

'This is an important part of Solomon Islands government policy because it is potential future revenue, but it is also important for the livelihoods of local communities,' said Professor Wallace.

'In addition to export income, about 90% of people in Solomon Islands are dependent on forests for all sorts of things, for food, for medicine, for animals that live there, for building materials. Between 80% and 90% of forests have been logged and people have lost access to that resource.'

LIFER is a 6-year project that officially began in January 2023, building on a pilot project funded by the United States Forest Service on Kolombangara Island. Professor Wallace said 4 experimental restoration treatments are planned, and these will be replicated in up to 8 communities.

Treatment 1 will serve as the control, with protection but no active effort to restore the forest.

Treatment 2 is 'assisted natural regeneration' where weeding and thinning, for instance, will be used to help valuable species re-establish themselves.

Treatment 3 is 'enrichment' and includes management activities and replanting trees that communities have identified as important for future use.

Treatment 4 is a more intensive 'agroforestry' approach, with substantial planting of timber species, along with other useful tree and food crops.

Professor Wallace said the first steps will involve talking to communities about how they use their forests and what they want and need from future forests – what their aspirations are.

'We have some species in mind for the different treatments, such as indigenous fruit trees and nut trees like *Canarium indicum*, which produces ngali nut (also known as the galip nut), along with species commonly used for building materials, and some target timber species. But final tree selection will be guided by the participating communities,' said Professor Wallace.

Forest incomes and leadership

The project will fund participating communities to maintain the trial sites during the life of the project, and to help monitor tree growth, biodiversity and the livelihood benefits for local communities.

The project will also explore other activities to support livelihoods, such as nurseries to produce seedlings, gathering herbs for food and medicine, and beekeeping. These all provide ways for women, in particular, to earn money.

'We really want to try to empower local women and give them a voice in forest management and promote leadership in forest governance. This will include working with the National Council of Women,' said Professor Wallace.

Workshops to help women develop business skills could also be included, building on a previous ACIAR-supported project in Papua New Guinea and the Pacific region helping communities to increase incomes through agroforestry. This included supporting entrepreneurial opportunities for women, with training in small business skills, value-adding, food processing and organic certification.

Dr Eric Katovai is Dean of the Faculty of Science and Technology at the Solomon Islands National University and has studied the impacts of logging in his home country for many years. He will lead local ecological research efforts as part of the LIFER project.

Dr Katovai said more than 90% of accessible forests in Solomon Islands have been logged. Buffer zones along waterways, which are protected by law, are also under threat in some parts of the country as they represent the only remaining timber resource. Some areas have been logged multiple times, and there is currently no policy in place to guide how many years an area of forest should be allowed to recover before being logged again.

'We've reached the stage where the heavily logged forest cannot regenerate without intervention,' said Dr Katovai. 'Because most of the trees have been removed, that has changed the microclimate in the forest. This is favouring particular species that also prevent other native trees from re-establishing.

'This project with ACIAR is not a full-scale restoration project. But the knowledge we gain from these

Ecological Solutions Solomon Islands field officer Stanton Mosah measures the diameter of trees as part of a pre-trial biodiversity survey of a site in the LIFER project. Photo: Ecological Solutions Foundation

Key points

1. Solomon Islands communities will test 4 experimental treatments to help re-establish native forests as part of a new 6-year ACIAR-supported project.
2. Restoring forests provides important national and local resources for the future.
3. Training for community members will encourage them to monitor and manage the trial sites and develop forest-based business opportunities.

A Solomons Ground Boa (*Candoia paulsoni*) spotted in a pre-project biodiversity survey at the trial site. Photo: Ecological Solutions Foundation

Solomons Wrinkled Ground Frog (*Cornufer solomonis*). Photo: Ecological Solutions Foundation

Treasury Island Tree Frog (*Litoria thesaurensis*). Photo: Ecological Solutions Foundation

experiments can be workshopped to local communities, allowing them to restore their forests.'

Value in ecosystem services

While researchers at Griffith University will do economic assessments of the different restoration treatments, Dr Katovai and his team will help assess ecosystem services.

'Ecosystem services don't necessarily put money in your hand, but they help support life in the environment,' said Dr Katovai. He highlighted clean water as one example. Following forest logging, sedimentation in local waterways had increased, turning streams brown and reducing the quality of drinking water.

Carbon sequestration is another ecosystem service that will be assessed, and one that could provide an alternative source of income – from carbon credits.

'We'll be trying to see how much carbon is captured within each of these treatments. There are a lot of carbon trading initiatives happening at the moment, and the experiments in this LIFER project might give us some good information to venture into that in the long term.

'And whatever information comes out of this research can actually be shared across Solomon Islands, and with other countries where there has been logging activity such as Vanuatu and Fiji. It will certainly help local communities in heavily logged areas to execute their own forest restoration and to develop best practice restoration protocols.'

ACIAR Research Program Manager, Forestry, Dr Nora Devoe says the LIFER project represents new territory for ACIAR with its focus on native forests, rather than forestry plantations.

'Managing and sustainably harvesting native forests requires a different range of expertise to managing plantations. The research team working on this project brings that expertise,' said Dr Devoe.

'The project aims to help communities see which treatments provide results closer to their desired outcomes. We think it will also provide a broader model for community engagement, and our partners include Solomon Islands NGOs Ecological Solutions and Dignity Pacific, who are part of the local community, to help with this.'

From a scientific perspective, the project will also analyse which treatments most closely reconstitute the forest ecology. This will link with another international research project investigating tropical forest restoration in Ecuador. Both projects will use the same metrics to provide a rigorous cross-site comparison.

'While LIFER will look at how to most efficiently restore forests and how to most benefit people in that process, decision-making about larger forest restoration is a social process that will be determined by Solomon Islanders,' said Dr Devoe.

ACIAR PROJECTS: 'Livelihoods in Forest Ecosystem Recovery (LIFER)' (FST/2020/135); 'Enhancing value added products and environmental benefits from agroforestry systems in Papua New Guinea and the Pacific' (FST/2014067)

From high-quality raw cocoa, smallholder farmers are learning new ways to ferment and dry their beans. Photo: Conor Ashleigh

Boutique chocolate demand revives Pacific cocoa industry

From better tree selection and cocoa bean processing, through to international marketing opportunities, smallholder cocoa producers in the Pacific region are building their skills to tap into the high-end boutique chocolate market.

The inaugural South Pacific Cocoa of Excellence Awards in 2022 was a small affair, a COVID-19 pivot that allowed the region's smallholder cocoa producers to test their mettle, and the quality of their beans, against the same stringent international criteria used for the biennial international Cocoa of Excellence Awards in Paris.

Producers from the Pacific region have previously picked up gold, silver and bronze at the Cocoa of Excellence Awards, including growers from Papua New Guinea, Samoa, Vanuatu and Fiji. But when travel restrictions brought further entries to a halt, it provided the genesis for a purely local affair, says cocoa research, Professor Randy Stringer, from the University of Adelaide.

Professor Stringer has been working on cocoa research in the Pacific region for more than a decade, including a project in the ACIAR-supported Pacific Agribusiness Research for Development Initiative that dates back to 2010.

'In that project, we identified how to help smallholders increase production. Working on farm practices – pruning, weed removal, disease control – they were able to increase their yields threefold. But they were still selling into a bulk commodity market; the increased yield wasn't resulting in any significant increase in income.'

Professor Stringer said as part of that project, smallholder growers, some of them fifth generation, were introduced to 'real' chocolate for the first time. Not the highly sweetened chocolate confectionary bars they were familiar with, but high-end fine dark chocolate that represents the pinnacle in quality and price.

This has become the new goal for farmers to aim for. And helping them to tap into this market is the focus of the latest ACIAR-supported value-chain project working with smallholders in Fiji, Samoa, Solomon Islands, Vanuatu and Australia.

The South Pacific Cocoa of Excellence Awards is part of this 5-year project, which wraps up in March 2023. Professor Stringer says it put the 15 participants in front of international judges and chocolate makers in Australia, New Zealand, the USA and the Netherlands.

The chocolates produced for the competition are made according to the Cocoa of Excellence recipe and highlight the nuances that unique weather, soil and local production methods can contribute to the resulting chocolate flavour and aroma.

Mr Yan Diczbalis, from the Queensland Department of Agriculture and Fisheries, leads the value-chain project and said single-source 'fine' chocolate and trending bean-to-bar chocolate outlets represent the fastest-growing segment of the chocolate industry.

Although 'single-source' can be a country of origin, it can also come down to a growing region, or even a village or growers' cooperative, rather than a specific variety of cocoa bean, explained Mr Diczbalis.

In this fine chocolate market, the origins of the cocoa, the grower's production techniques and the genetics of the cocoa crop are all part of the story and the final value of the product.

As part of the value-chain project, Mr Diczbalis and his team have mapped the genetic make-up of cocoa crops across Fiji, Samoa, Solomon Islands and Vanuatu.

Mr Diczbalis said the existing genetics, for the most part, are the legacy of the region's colonial history; the cocoa tree itself, *Theobroma cacao*, is native to South America.

The project's genetic mapping has helped to identify selections in the Pacific region, highlighting those that produce superior beans suited to premium chocolate making. Of particular note is the high level of Trinitario and Criollo genetics found in Samoa, which are noted as 'fine-flavoured' varieties. The beans are less astringent, less bitter, and are ideal for dark chocolate.

International competitions allow the Pacific region's smallholder cocoa farmers to put their single origin products on the world stage for premium chocolate. Photo: Conor Ashleigh

The value-chain project has also provided smallholders with training in simple propagation techniques to help them reproduce their best varieties and best-performing trees, targeting superior genetics for a higher value end use.

'Clonal reproduction using grafting is a relatively simple and low-cost technique that smallholders can master with readily available tools – a sharp knife and some tape,' said Mr Diczbalis, who helped coordinate a series of grafting workshops. The technique also accelerates new production, with trees beginning to yield in half the time – 18 months, compared to 4 years for trees produced from seed.

Better ways to ferment

To improve processing, the research team also helped develop fermenting and drying techniques suited to smallholders. Poor processing, rather than the quality of the beans themselves, was identified as one of the key factors reducing the quality of the beans for sale.

The standard box fermentation technique is also a legacy of large colonial plantations, processing large quantities of beans, a tonne or more at a time.

But it is not well-suited for fermenting small quantities of beans and many smallholders are only processing a few hundred kilograms. Researchers have successfully trialled a tray-based system, working with smallholders in Vanuatu and Samoa. The trays are 10 cm deep and can be stacked on top of each other. A series of trays could effectively stack up to the same volume as a box – traditionally a 1 m cube.

'But each tray is individual and can be sized according to the amount of wet bean you may expect to process,' explained Mr Diczbalis. 'So, it just gives smallholder growers a lot more flexibility in creating a good product.'

Key points

1. Mapping the genetics of cocoa trees in Fiji, Samoa, Solomon Islands and Vanuatu has identified sought-after varieties for premium chocolate making.
2. Smallholder farmers have received training in simple clonal propagation of trees to help increase their production.
3. Small-batch fermentation trials and training are helping smallholders to improve processing, increasing the quality and value of their cocoa beans.
4. International excellence awards are showcasing Pacific cocoa in premium, single-origin chocolates.

Impact and income

The NGO Alternative Communities Trade in Vanuatu (ACTIV) is a partner in the cocoa value-chain project, and ACTIV founder and manager Ms Sandrine Wallez said it has helped smallholders increase their incomes.

'This project and the long partnership with ACIAR, since 2010, has been really valuable in making an impact and improving the quality of cocoa in Vanuatu. And there is international price recognition for premium cocoa; growers are earning 3 times the standard price. When I look at where we started from, there's a huge difference,' said Ms Wallez.

ACTIV has established its own chocolate factory, producing chocolate for 5 different islands on the archipelago. Collectively ACTIV fine dark chocolate has won 27 international awards, with 2 growers named in the top 50 in the Cocoa of Excellence Awards in 2017.

Ms Wallez said the awards recognised that growers were doing a good job at a farm level, growing cocoa, but also instilled a sense of pride in growers that their cocoa is high quality.

'With this project we could put Vanuatu on the map of fine flavour cocoa, which it was not before,' said Ms Wallez. It has also helped to put fine cocoa on the Vanuatu Ministry of Agriculture's priority list for development.

ACTIV is developing a 'share-factory' project to help smallholders produce their own premium chocolate, with producer organisations interested in a partnership to support the industry.

More beans needed

The reputation of Fijian cocoa is likewise spreading globally and winning international awards, including a top 50 listing for the beans from Cacao Fiji at the Cocoa of Excellence awards in Paris. Cacao Fiji, founded by Mr Arif Khan, also claimed the silver award in the South Pacific Cocoa of Excellence Awards last year.

'These awards are a great platform for farmers to get their cocoa into a world showcase. It increases the awareness and marketability of their product,' said Mr Khan. 'They receive a lot of interest and their cocoa crop is pretty much pre-sold.'

In fact, demand is outstripping supply in Fiji, where Mr Khan is a grower, buyer and exporter of beans. He is excited about the potential of clonal reproduction techniques shared through the ACIAR-funded project to help rebuild the cocoa industry in Fiji, using targeted genetics.

'For my business, we are working with smallholders to share this cloning knowledge, to help revive traditional cocoa farms and improve supply and bean quality,' said Mr Khan.

Combined with the post-harvest and marketing initiatives, he says the value-chain project provides valuable information to help revive cocoa in Fiji, and in the Pacific region more broadly, generating much-needed jobs and income in rural areas.

ACIAR PROJECTS: 'Aligning genetic resources, production and post-harvest systems to market opportunities for Pacific island and Australian cocoa' (HORT/2014/078); 'Facilitating improved livelihoods for Pacific cocoa producer networks through premium market access' (PARDI/2011/001)

Cocoa farmers in Vanuatu discussing farming practices. Photo: Conor Ashleigh

Landcare LIFE lessons from Philippines to Fiji

A community landcare approach has led to the development of a new sustainable farming extension model in the Philippines, which is now being trialled in Fiji, bringing smallholder farmers together to protect the future capacity of their land.

Small-scale farmers in Taveuni, Vanua levu Fiji, involved in the ACIAR-supported Livelihood Improvement through Facilitator Extension (LIFE) project. Photo: ACIAR

Among the many challenges that smallholder farmers in Fiji face, there is an increasingly urgent need to protect the health and productivity of their land. It is an issue that lies at the heart of their continued ability to farm and maintain their livelihoods.

Accessing and sharing the information needed to do this is critical and is driving renewed interest in a community-centred approach to improving sustainable practices in the country.

This closely mirrors the drivers of Australia's successful landcare movement, which has brought farmers and other community members together for more than 30 years, to care for the land and preserve natural resources and biodiversity for generations to come.

The Philippines also has its own landcare movement, which emerged in the 1990s, with ACIAR becoming involved in 1999. One of these ACIAR-supported projects was the Mindanao agricultural extension program, which ran from 2013 to 2021.

A promising outcome of this project was the Livelihood Improvement through Facilitated Extension (LIFE) model, developed to assist farmers in conflict-vulnerable areas of Mindanao.

In 2021, as the Philippines' project wound up, ACIAR supported a follow-up project, bringing together partners from the Philippines and Australia to trial a similar LIFE approach in Fiji.

LIFE in Fiji

Dr Mary Johnson, RMIT Research Fellow, leads the Fiji LIFE project, and highlighted the importance of adapting the model to account for Fijian society, culture and governance, as well as being inclusive of minority groups.

'That adaptation requires the promotion of mutual interests and common priorities to understand the issues from all perspectives,' said Dr Johnson.

'For example, the Fiji Ministry of Agriculture and Fiji National University provide a critical role to agricultural research, extension and training and, through the project, are working jointly with farmers on local solutions to their issues.

'And with the complex impacts of climate change, sustainable agriculture and management of natural resources are becoming increasingly important.'

Farming for the next generations

An important partner in local Fiji land management is Tei Tei Taveuni, a non-government organisation formed by Taveuni farmers, with a focus on sustainable farming.

Mr Alan Petersen, chair of Tei Tei Taveuni, said the island is dependent on agriculture, with about 4,000 farming families.

'In the early 1990s there was a shift from farming just for your family to semi-commercial farming. Most of the farmers use the same subsistence management programs when going into commercial farming and it has done a lot of damage to the environment,' said Mr Petersen.

Since 2010, Tei Tei Taveuni has been working on establishing more sustainable and environmentally conscious farming practices, such as planting trees to combat deforestation and diversifying crops.

The Fiji LIFE project is working with Tei Tei Taveuni to facilitate the building of networks between farming communities and institutional service providers that could partner with them.

'A lot of these farmers aren't grouped together, they're working by themselves,' said Mr Petersen. 'It is really hard to move forward in their farming practices by themselves, because they are so small.'

'A large farm on Taveuni is about 10 hectares, and most farmers have less than one hectare. This means farmers tend to hesitate in moving away from what has worked in the past.'

However, he said it is becoming evident that these practices will not continue to work in the long term. To demonstrate the viability of more sustainable agricultural practices, Tei Tei Taveuni has established 10 model farms, which will become training stations for local farmers.

'When our great-grandparents farmed, they really looked after the land. But with commercial farming, price dictates what you do. We're trying to build an understanding that you can make the same amount of money, but by doing things more organised and slowly,' said Mr Petersen.

'This project has been a real blessing because it has come at the right time, and we are ready to really move it along because we think landcare is very important, especially for the next generations.'

Natural resource management practices are helping rural communities to build their resilience and cope with climate change. Photo ACIAR

Key points

1. Partners from Fiji, the Philippines and Australia are collaborating to trial a new extension model to establish a landcare approach in Fiji.
2. Landcare is a grassroots approach to developing sustainable farming practices that support farm productivity, environmental health and rural livelihoods.
3. Collaborative partnerships between farmers, agencies, researchers and service providers are essential to a successful landcare approach.

A growing relationship

Partners from the Philippines involved in developing the LIFE model are collaborating on the Fiji project. These partners include the University of the Philippines Los Banos and the University of the Philippines Mindanao, the Landcare Foundation of the Philippines, and the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD).

Dr Reynaldo Ebora, executive director of PCAARRD, said the LIFE model allowed communities that had been fragmented due to prior conflict to work together.

'They gained access to technology, and access to government programs, by building a connection with the local government,' said Dr Ebora.

This new project will also be an opportunity to build new working relationships with partners from Fiji.

'We plan to host some personnel from Fiji to observe the ongoing programs we have and we hope to send some of our personnel over there to learn from their system. We are looking at this as a process of exchange of knowledge and experience, as there is no single approach to extension.'

ACIAR PROJECT: 'Landcare–an agricultural extension and community development model at district and national scale in Fiji' (SSS/2019/140)

Main market (Mama's Market), Port Vila, Efate Island, Vanuatu. Photo: Shutterstock

Using data as a starting point for food and health initiatives

A food systems approach is part of several new strategies being explored in the Pacific region to help address complex nutrition and health challenges while also supporting local food producers.

A series of ACIAR-supported projects is working across agriculture, food, health and education sectors in the Pacific region to broaden the understanding of factors influencing the availability and consumption of food.

A major 4-year project nearing completion has focused on national and regional agrifood system data analyses. Partner countries across the Pacific region are working with researchers to better understand what their food systems look like.

A second project is examining the potential of home-grown school meal programs to improve health and learning outcomes for children while also supporting local producers.

And a third project, poised to begin in 2023, will expand regional analyses and examine the 'food environments' that shape people's decision-making as consumers.

Gathering food data

Professor Neil Andrew at the University of Wollongong, Australia, is leading the ACIAR-supported agrifood system data project in partnership with the Pacific Community (SPC), CSIRO and The University of Sydney. This work is gathering information to address gaps in what is known about diets across the region, and how the food trade and food systems are evolving.

'Food systems are defined as all those activities that transition food from either the soil or the ocean to the plate, and the outcomes in terms of food security and public health,' said Professor Andrew. 'And the food systems across much of the Pacific are in transition.'

Within the span of a generation, Pacific island countries and territories are reporting some of the world's highest rates of obesity...

He points to a decline in consumption of locally produced fish, fruit and vegetables, with increases in imported animal proteins such as beef and chicken, and processed foods. Increased urbanisation, migration and the globalised food trade are also driving these dietary changes.

Within the span of a generation, Pacific island countries and territories are reporting some of the world's highest rates of obesity, heart disease and other non-communicable diseases.

'Many Pacific communities are greatly affected by the coexistence of undernutrition, nutrient deficiencies and obesity,' said Professor Andrew. 'And food systems thinking is essential to address these food and nutrition security challenges.'

Professor Andrew said by understanding how food is acquired and consumed, national, provincial and local agencies can identify changes to local policies and actions to influence how people make their food choices.

This foundational project will wind up this year and has already produced a range of publicly available reports, housed on the SPC website. These include food consumption reports based on national household income and expenditure surveys, as well as food system briefs, and access to the Pacific Food Trade Database, which has been developed as part of the project.

Home-grown school meals

Focusing on more specific, on-the-ground initiatives, Dr Sarah Burkhart from the University of the Sunshine Coast, Australia, is co-leader of a school meals scoping project along with Dr Danny Hunter from the Alliance of Bioversity International and CIAT. This project aims to better understand how providing meals at schools, using nutritious foods procured from local farmers, could improve the diets, nutrition and livelihoods of people in the Pacific region.

Dr Burkhart said there is a global move towards providing food in schools to support good nutrition, children's ability to learn and grow, and also to support attendance at school, which further enhances educational outcomes.

'We are particularly keen to look at the potential to link in local food systems – local farmers and fishers and food processors. But first we need to learn what is actually happening in the region and identify whether there is interest in trials from schools and local communities,' said Dr Burkhart.

This 2-year scoping project will be finalised in mid-2023. The preliminary findings were presented at the International Congress of Nutrition (ICN), a 4-yearly global event that was held in Tokyo in December 2022.

Dr Burkhart said while there is a good body of evidence globally about the value and success of school food programs, there is little formal evidence in the scientific literature related to programs in the Pacific region.

The scoping study found only 24 formal reports of school meal and garden programs in a literature review of the past 15 years, including peer-reviewed studies, project reports and country-level summaries from the Global Survey of School Meal Programs. These collectively mentioned 18 of the 22 Pacific island countries and territories.

Gathering information about diets and nutrition is helping to shape food initiatives to improve health in the Pacific region. Photo: Lorima Vueti, The Pacific Community

Key points

1. Improved data and analysis of food consumption, nutrition and trade in the Pacific region is informing efforts to improve food and health policies and programs.
2. A scoping study is evaluating if home-grown school meal programs can offer a practical way to improve student health and support local producers.
3. New research will consider the food environments that influence food choices and health.

Speaking at the International Congress of Nutrition about the school meals programs in the Pacific, from left, Brynn Demei, Sefano Katz, Helmtrude Sikas-Iha, Jessica Raneri and Dr Sarah Burkhart. Photo: Kenichi Yoshida

'We know there are other activities across the region, but the information hasn't necessarily been collated or published,' said Dr Burkhart.

Among the programs identified, 3 were presented at the ICN conference as case studies, demonstrating how local school meals and gardening projects can work in a Pacific context to increase food security and address health issues, while supporting local production.

For example, Palau Food Service Program manager Brynn Demei outlined her country's program, which has been running since 2014, and is part of the national health strategy to reduce the incidence of overweight and obese school children.

The program provides meals for about 2,250 public school students each year and has removed highly processed meats from the menu and increased fish, fresh fruit and locally grown vegetables. Nutritionists are involved in developing menus, and the program provides food preparation training. It is also progressively upgrading equipment in school kitchens.

Other smaller and more recently launched projects in Papua New Guinea and Fiji involve school gardens that teach valuable skills, while producing fresh food that is provided to students through school meals.

Analysing food environments

ACIAR Research Program Manager, Fisheries, Professor Ann Fleming has been supporting the food systems approach at ACIAR and she highlights a new project that will begin in 2023 focusing more specifically on food environments, which she describes as 'the elephant in the room.'

She said it can be a difficult issue to address, involving factors that range from the physical availability of food to advertising, social and cultural preferences, affordability and education.

'You can have shelves full of healthy food and all of the food knowledge in the world, but if we don't address people's local food environments and adopt a broader view of how people make decisions about food in their everyday lives, then interventions will be left wanting,' said Professor Fleming.

The ACIAR-funded project will be led by Associate Professor Deana Leahy of Monash University to help communities in Pacific island countries analyse how people are exposed to food in their local environments and what influences their ability to make healthy food choices.

It will work particularly with young people and uses a citizen science approach to help young people develop the skills to critically analyse their food environments, from sports grounds and church groups, to social media feeds and local village stores. Using their findings, participants will collectively analyse the data and develop recommendations about what their communities could do to improve those food environments.

Partner communities in the Pacific region are still being finalised for this project, but there is already lots of interest in taking part. Professor Fleming said a critical awareness and analysis of food environments will be an important part of an integrated food systems approach to address the health and dietary challenges in the Pacific region.

ACIAR senior nutrition-sensitive agriculture adviser Mrs Jessica Raneri is also helping to integrate a food systems approach into income-orientated projects that might primarily focus on other issues, such as agricultural production or livestock.

She said there is a growing awareness of the importance of incorporating health and nutrition into these projects, with a 'first, do no harm' approach.

'Sometimes an unintended consequence of efforts to improve production and increase incomes is that the extra income is used to buy more highly processed foods – instant noodles rather than taro, for example. And this can lead to poorer health outcomes.

'That's where a food systems or food environment approach can help support outcomes of other projects,' said Mrs Raneri.

> **ACIAR PROJECTS:** 'Agriculture and fisheries for improved nutrition: integrated agri-food system analyses for the Pacific region' (FIS/2018/155); 'Understanding school food provision in the Pacific: Scoping the potential of local food systems to improve diets, nutrition and livelihoods' (HORT/2021/159); 'Extending integrated analysis for improved food system outcomes in Timor-Leste and the Pacific region' (FIS/2022/120)

Taking charge of the Pacific research agenda

Pacific island countries and territories are exploring new ways to collaboratively determine their own research priorities, tapping into existing networks to identify issues and lead joint initiatives.

Every year the agriculture and forestry leaders from across the 22 Pacific island countries and territories gather to discuss common problems. Emerging from the 2021 Regional Meeting of the Pacific Heads of Agriculture and Forestry Services was a desire to examine how they could work together more effectively, tapping into the different strengths that each country and territory has to drive their own collective research agenda.

The Pacific Community (SPC) was charged with developing a process to determine what a locally driven, cohesive and collaborative research agenda might look like.

Ms Florence Rahiria is operations manager for SPC's Land Resources Division and has been leading this project. Her final report will be presented at the next Pacific Heads of Agriculture and Forestry meeting in Fiji in March 2023.

ACIAR has supported the 'Pacific research agenda' project, which outgoing general manager for country partnerships at ACIAR, Dr Peter Horne said is an investment in leadership in the region.

'It was a valuable process Pacific countries were undertaking, looking inwardly at their collective research needs and how they can best harness their own resources to meet those needs,' said Dr Horne.

Ms Rahiria said if consensus could be reached on a regional collaborative approach, Pacific island communities would have greater self-determination in what research was undertaken, rather than being the subject of other organisations' research agendas. It would also allow the region to better direct collaboration with other organisations to fill gaps in local research resources and capabilities.

The project began with a desktop review of examples of successful and failed collaborative research in the Pacific region and in other countries, to identify what were the incentives and disincentives as well as the enablers for success.

Following this, the project team consulted extensively with 'key informants' – senior government staff in the Pacific region, university leaders, development partners and private enterprises, asking for their 'vision of success'.

Ms Rahiria said a key message from interviews was the need to tap into existing collaborations and networks.

'Where these can be quite technical in their focus and identify many issues, a regionally endorsed framework could help to elevate and prioritise the researchable issues,' she explained.

'It needs to give these Pacific countries and the existing technical networks a voice to raise research issues and opportunities up into the bigger forums so that our leaders can have visibility of what the research is and what the research can do in terms of impacts on development work.

'Also, we want our regional leaders to be able to raise questions with research or development organisations, such as SPC or ACIAR, about what the science is and, where needed, seek support. It could create more space for that interaction to happen.'

ACIAR PROJECT: 'Developing a framework for Pacific Regional Research Collaboration' (GMCP/2021/170)

Florence Rahiria, operations manager for the Pacific Community's Land Resources Division. Photo: ACIAR

Taro for tomorrow

Young researcher Christian-Yves Amato-Ali is helping to address food security in the Pacific region in the face of climate change, supported by the ACIAR PASS-CR scholarship program.

There was a moment of insight at COP27 – The United Nations Climate Change Conference held in Egypt in 2022 – where everything fell into place for Mr Christian-Yves Amato-Ali.

The Rotuman Master of Climate Change student is motivated by the potential of his research to have impact in his community, but he has often despaired that as an individual, he could do little to address the grand challenge of global food security.

However, at COP27, as a representative of the University of the South Pacific and an official observer in negotiations for the region, he experienced a profound moment of connection and understanding.

Through meeting like-minded delegates from all over the world, he saw that each one was working to make a difference in their own way. When put together, those individual efforts were combining to create meaningful, large-scale change.

He left COP27 buoyed up by more than the historic official agreement for a 'loss and damage' fund for countries most vulnerable to climate change, including those in the Pacific region.

'I saw that by making impacts in our small pockets of the world we are all contributing to the bigger picture,' said Mr Amato-Ali, who also provided a youthful perspective on strengthening food systems as part of an ACIAR panel at the conference.

Christian-Yves Amato-Ali (right) with the ACIAR-led delegation at the United Nations COP27 conference where ACIAR sponsored a session on how to implement food systems change. Photo: ACIAR

Stronger supply chain

For his part, Mr Amato-Ali, through his master thesis, is looking at mitigating losses associated with taro production in Tonga. Taro is a popular root vegetable that has been cultivated throughout Asia, the Pacific islands and New Zealand for centuries. He is identifying weaknesses along the supply chain – from on-farm production practices to storage, transport, and the domestic and export markets.

'My study looks at food loss across the whole value system,' he said. 'And then it looks at how reducing this food loss through innovation would add to the climate resilience of farming systems.'

He hopes that by addressing weaknesses in the supply chain, food loss and wastage will be reduced, and improved processes will lead to both environmental and economic benefits.

'Funds gained from reducing food losses can be used to strengthen the supply chain and ultimately strengthen the whole system against financial and climate hazards.'

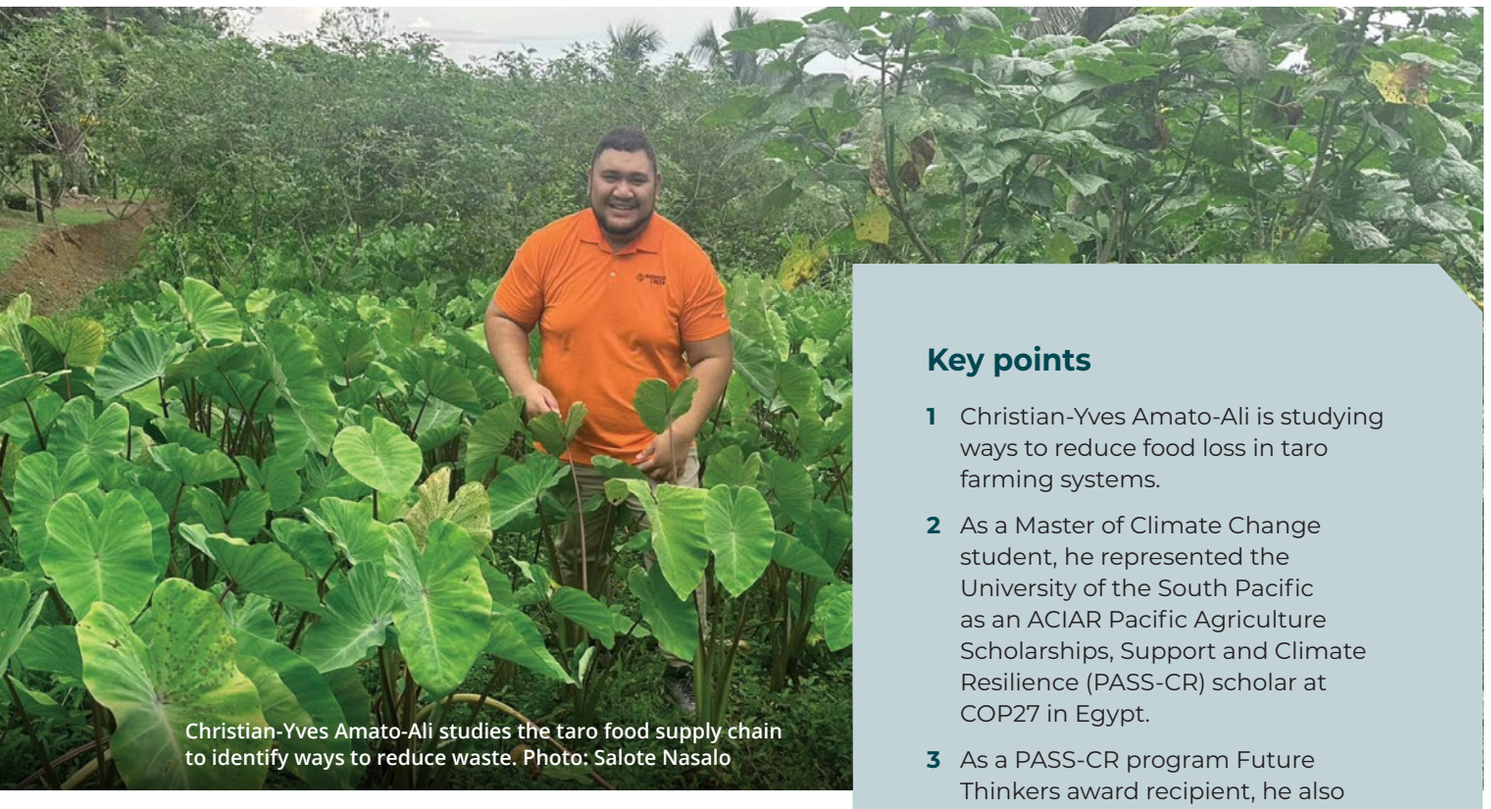
'Funds gained from reducing food losses can be used to strengthen the supply chain and ultimately strengthen the whole system against financial and climate hazards,' he said.

Facing the climate challenge

Mr Amato-Ali's research is supported by the ACIAR PASS-CR program that partners with Pacific universities to foster agricultural research, education and innovation systems across the region. It is linked to the Australian Government's Pacific Step-up strategy.

Producers in the Pacific region are at the coalface of the impacts of climate change – facing threats from one-off natural disasters, such as intensifying cyclones, as well as constant incremental rises in temperature and sea levels.

Taro is one of the most valuable exports of the Pacific region, so it is critical that losses are minimised in the face of these climate challenges, Mr Amato-Ali said. 'Farmers have to figure out how they can improve their farming systems given different climate scenarios.'



Christian-Yves Amato-Ali studies the taro food supply chain to identify ways to reduce waste. Photo: Salote Nasalo

Key points

1. Christian-Yves Amato-Ali is studying ways to reduce food loss in taro farming systems.
2. As a Master of Climate Change student, he represented the University of the South Pacific as an ACIAR Pacific Agriculture Scholarships, Support and Climate Resilience (PASS-CR) scholar at COP27 in Egypt.
3. As a PASS-CR program Future Thinkers award recipient, he also values opportunities to further integrate climate change thinking into his research.

On-farm he is looking to minimise losses by applying a conservation agriculture-based sustainable intensification (CASI) approach that includes reduced tillage, residue retention and crop rotations aimed at enhancing biodiversity, soil health and wateruse efficiency.

'I'm investigating how we can improve on-farm practices because sometimes simple things like adding one chemical that increases or decreases the pH of your soil or changes soil structure can improve yields,' said Mr Amato-Ali.

Further along the value chain, it is equally important to identify opportunities to mitigate food losses – and make gains, he added.

'I hope to improve awareness and practices. Some may seem like small issues (such as storing produce out of the sun), but these small things all add up.'

Enabling change

In addition to the PASS-CR scholarship, Mr Amato-Ali is a Future Thinkers awardee, receiving extra funding to focus on climate change resilience by comparing approaches across various countries.

In April 2023 he will travel to The University of Melbourne's Dookie campus in Australia where his supervisors, Associate Professor David Ugalde and Dr Viliamu Iese, are based. He will study on-farm practices to maximise yields of fodder crops and mitigate climate change impacts within the CASI framework, with a view to implementing relevant elements in the Pacific region.

During the year he will also visit Samoa and an ACIAR-supported project looking at food losses at market ('Adopting a gender-inclusive participatory approach to reducing horticultural food loss in the Pacific'). Mr Amato-Ali said it will provide valuable insight into how research can be translated into community initiatives, as well as providing mentoring opportunities.

ACIAR PASS-CR initiatives support scholars via monthly meetings to discuss their progress during their studies. It also provides seminars to guide the writing process, which Mr Amato-Ali nominates as an invaluable resource.

'Everyone likes fieldwork, but figuring out how to translate that into your thesis can be daunting,' said Mr Amato-Ali, whose 2-year master program is due for completion in December 2023. 'But through the seminars and ongoing support, we are provided with tools to translate our research.'

It is critical, he said, that the research can be understood by the people who will be responsible for implementing it, and ultimately making a difference. 'It needs to be taken up on the ground,' he said. 'That's the main thing'.

MORE INFORMATION: Pacific Agriculture Scholarships, Support and Climate Resilience Program (PASS-CR) | ACIAR

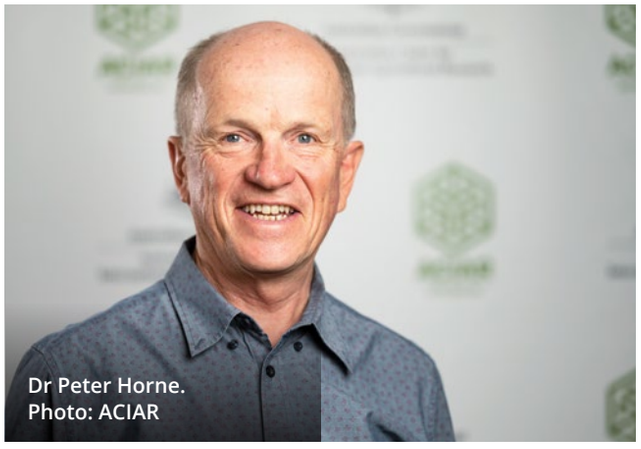
ACIAR Mekong region alumni met in person in Thailand for the first time since the COVID-19 pandemic began. Photo: ACIAR

ACIAR alumni in Africa were joined by Luke Williams, High Commissioner to Kenya, Rwanda, Tanzania and Uganda, and Ambassador-designate to Burundi and Somalia. Photo: ACIAR

Alumni engagement in Kenya and Thailand

ACIAR alumni engagement is continuing across the Indo-Pacific region, with 2 recent events in Kenya and Thailand. In December, 30 alumni from across the Mekong countries of Laos, Cambodia and Thailand met to exchange experiences on research outcomes in policy development processes in their own countries.

Alumni from across 7 eastern and southern African countries also recently met in Nairobi, Kenya. The event marked the first in-person meeting since COVID-19. Attended by 25 alumni, the event was held at a farm that participated in the Cultivate Africa's Future Fund initiative, which is supported by ACIAR.



Dr Peter Horne. Photo: ACIAR

ACIAR Philippines communications officer, Ms Jing Damaso-Grey, surrounded by student visitors. Photo: ACIAR

Dr Peter Horne departing ACIAR

After 16 years of working at ACIAR and a life-long connection to the organisation, general manager for country partnerships, Dr Peter Horne, is leaving ACIAR. Thank you, Peter, for your service to ACIAR and the broader agricultural research-for-development community.

Science on display in the Philippines

The ACIAR Philippines team attended a National Science and Technology Week event held at the World Trade Center in Pasay City, Manila. They had the opportunity to engage with scientists, researchers, students, policymakers, government officials and industry during the event. The team showcased the Australia–Philippines partnership in agricultural research-for-development.

Supporting gender equity in fisheries and aquaculture

ACIAR provided support to 18 delegates to attend the 8th Global Conference on Gender in Aquaculture and Fisheriese held in Kochi, India, late last year. The conference is organised by the Gender in Aquaculture and Fisheries Section of the Asian Fisheries Society, ICAR (Central Institute of Fisheries Technology), Kochi, and the Society of Fisheries Technologists, India.

Delegates pictured with agricultural research leader and gender equality pioneer, Dr Meryl Williams, ACIAR outreach and capacity building general manager, Eleanor Dean, and ACIAR Research Program Manager, Fisheries, Professor Ann Fleming. Photo: ACIAR

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Research highlights

The ACIAR Annual Review features highlights and achievements for ACIAR during 2021—22. This includes the 40-year milestone since the establishment of ACIAR and reflections on the substantial impact ACIAR projects have had in partner countries and in Australia during that time.

Fruit and vegetables in north-western Vietnam

An evaluation of outcomes of several integrated agribusiness projects in Vietnam designed to improve vegetable production for women farmers and ethnic minority smallholder farmers and improve their access to fruit and vegetable markets.

A stronger industry for Fiji papaya

An impact assessment of a project to strengthen the Fijian papaya industry and improve the livelihoods of rural people in Viti Levu. The project delivered benefits to both the Fijian and Australian papaya industries.

Rice, shrimp and mangroves

An impact assessment of two rice–shrimp farming projects and a mangrove forestry project in the Mekong Delta to support the local polyculture shrimp farming systems.

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