



partners

IN RESEARCH FOR DEVELOPMENT

Canarium nuts empower women farmers to build commercial businesses

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Partners in Research for Development is the flagship 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. Technical enquiries will be passed on to the appropriate researchers for reply. Reprinting of articles, either whole or in part, is welcomed, provided that the source is acknowledged.

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Cover: George Tonai collects harvested cocoa pods from Manetai village, Central Province of Bougainville. Mr Tonai is the lead farmer in his community cocoa group that was established under the ACIAR/DFAT Bougainville cocoa project. As a lead farmer, he helps extension officers to introduce better pre and post-harvest practices to the other farmers in the group.
Credit: Conor Ashleigh

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PREFACE

Andrew Campbell, ACIAR CEO

With its wealth of biodiversity—11,000 plant, 250 mammal and 700 bird species—Papua New Guinea (PNG) is a mega-diverse country. People have lived and thrived in PNG for several thousand years, but modernisation presents new and complex problems. Balancing its need for development while preserving its rich cultural and natural heritage, is one of the country's greatest challenges.

As well as our strong historical ties, Australia and PNG are both richly endowed with a wealth of natural resources, including mineral and renewable resources. However, there is a need for more sustainable models of development, given the heavy reliance on depletable resources and harvesting primary resources, combined with rapid population growth. Consequently, the PNG Government and ACIAR colleagues in PNG have refocused on developing sustainable agriculture, fisheries and forestry industries to foster more durable economic growth.

Through research partnerships brokered by ACIAR since the early 1980s, Australia is supporting the PNG forestry sector to support rural communities that depend largely on timber and non-timber forest products, and as a means of both adapting to and mitigating the effects of climate change. As you would expect in an archipelagic nation comprising more than 6000 islands and more than 5000 kilometres of coastline, the fisheries sector will continue to be both a crucial source of protein for local people, and an important source of revenue for the government of PNG through the export of processed and unprocessed fish and other marine products.

As our closest neighbour, improving food security, biosecurity and human nutrition and health in PNG will always be a very high priority for Australian aid, and ACIAR in particular. We are very proud of our track record in PNG, and the stories in this magazine attest to the value of this enduring partnership.



FOREWORD

Bruce Davis, Australian High Commissioner to Papua New Guinea

I am proud to present the PNG issue of *Partners*. PNG is hosting the Asia-Pacific Economic Cooperation Leaders' Summit in November 2018, making this a particularly exciting time to showcase its economic potential and promote greater integration in the Asia-Pacific region.

PNG has rich soils and a favourable climate, giving rise to some of the world's best coffee and cocoa, as well as other crops. Agriculture is how 80% of people in PNG earn an income or sustain their daily needs, yet only around 3% of cultivated land is used for export crops. There is great potential for expansion, and room for more niche PNG agricultural products on foreign shelves.

This is why promoting growth in the agriculture sector is a priority of the PNG–Australia partnership.

The Australian Government's current agricultural research collaboration in PNG is valued at \$14.3 million. It supports Australian and PNG researchers to strengthen supply chains and access to markets, improve quality and consistency of production, enhance livelihood opportunities and sustainability for communities, and increase resilience to climate change.

Since ACIAR first opened its office in PNG 35 years ago, it has played a strategic role in local growth, offering science and technology-based solutions to real-world problems.

I would like to extend my sincere gratitude to PNG and its institutions for the continued partnership and friendship through the work of ACIAR and the PNG–Australia partnership more broadly. It is important that we continue to work together to maintain our momentum and success.



Balsa wood: not just for model aeroplanes

— Peter Papathanasiou

Stephen Midgley is a forester and development specialist who, after a long career with CSIRO, now runs his own consulting business, Salwood Asia Pacific.

Midgley pours me a fresh cup of high-grown Arabica coffee. And I notice it's not the only thing on the table from PNG. There are also some exquisite samples of balsa wood.

'Most people don't realise that balsa isn't just used for model aeroplanes,' he says. 'The vast majority is used for many important applications, including some of the world's finest coffee tables.' He smiles and takes a deep, meditative sip.

Midgley talks about the ACIAR research program that supports the development of durable, engineered wood products in PNG, and specifically plantation-grown balsa. Plantation-grown balsa is kiln-dried and processed in an end-grain configuration, which means the wood is cut across the grain and its growth rings.

'End-grain balsa is ideal for use as a core in sandwich composites,' he says. 'It has extremely high strength and stiffness-to-weight ratios and achieves an excellent bond with all types of resins and adhesives. End-grain balsa also has excellent fire performance, and good sound and thermal insulation.'

Located in PNG's East New Britain Province, ACIAR's balsa program sought to help smallholder farmers grow higher-quality balsa. 'To grow well, balsa needs high-quality soil, uniform rainfall and an even growing period,' Midgley says. 'Our ACIAR project looked at improved genetics and management to ensure

the production of a consistent product, and efficient harvest and handling to avoid blue stain fungi infection.'

PNG is the world's second-largest balsa producer after Ecuador. It's a very competitive global market that includes several Central American countries as minor players. Midgley says that ACIAR's research program cast a light on an otherwise rather secretive industry.

'The beauty of our ACIAR project was that we could release all this know-how as public information. Up until then, the global balsa market was very hushed because it was so competitive. We've had substantial interest in our published reports, and the market was very happy to see them made public.'

With increased transparency of markets and improved knowledge of balsa production, Midgley says that smallholders have been able to grow high-quality balsa more efficiently. The research also explained the significance of the balsa value chain to smallholders, offering them the opportunity to assess land-use options and provide increased income streams to their families and communities.

Midgley is clearly passionate about balsa. His eyes light up as he talks about its many sophisticated applications and prospects for the future.

'Most recently, balsa has found application in renewable energies, and specifically the



Stephen Midgley in his home office explaining the versatility of balsa wood. Credit: Peter Papathanasiou

interior of wind turbine blades. It's also used for boat construction, such as in the hulls of racing boats and decking on yachts. And about 30% of the balsa produced globally has military applications, such as aircraft cargo pallets.'

Servicing these products and markets are all prime examples of ACIAR-funded research having tangible outcomes for both Australian businesses and government defence.

ACIAR PROJECT: Improving the Papua New Guinea balsa value chain to enhance smallholder livelihoods (FST/2009/016)

KEY POINTS

- 1 ACIAR supports sustainable plantation grown balsa research
- 2 PNG is the second largest balsa producer after Ecuador

Canarium nuts empower women farmers to build commercial businesses

— Eva Kuson

From producing and selling their produce at local markets, these women from East New Britain are now working in partnerships to increase their volume and expand markets.

Canarium nuts, known locally as ‘galip’, are marketable products that have great potential to improve the livelihoods of rural households in PNG. Canarium is indigenous to PNG, and the nutritious nuts have a flavour and texture somewhere between macadamia and almond. The main species with commercial potential is *Canarium indicum*.

ACIAR is currently supporting research for development activities on galip nut processing and marketing under the Transformative Agriculture and Enterprise Development Program. Professor Helen Wallace of The University of the Sunshine Coast is the project leader and has been working on fine-tuning the galip nut processing and supply chains for many years.

In an interview with *Business Advantage PNG*, Professor Wallace revealed there is strong consumer demand for galip in PNG, and great potential to expand the domestic markets and develop an export market.

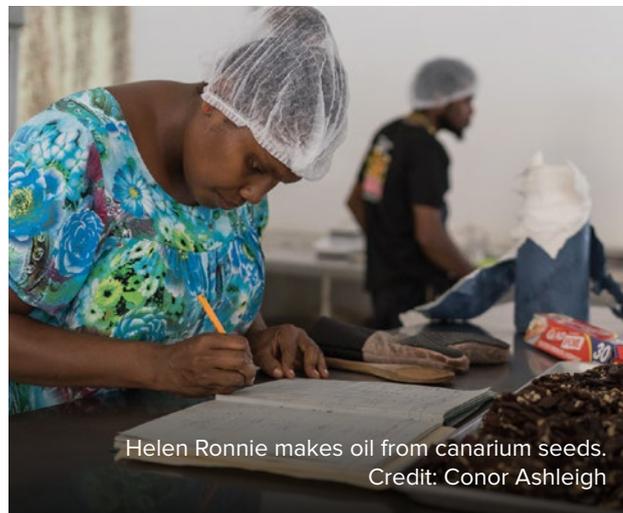
‘Such expansion could improve the livelihoods of rural households by providing a larger market for nuts in Papua New Guinea,’ Professor Wallace says.

ACIAR has been working in partnership with smallholders, the National Agriculture Research Institute (NARI) and the private sector to expand markets and improve the processing quality. A major part of the project is developing a commercially viable factory that produces enough product for an increasing canarium nut market.

NARI Deputy Director General, Dr Akkinapally Ramakrishna explains how NARI has done a lot on galip over the years. ‘With assistance from the Australian Government, I believe we have now created an international market opportunity for the PNG galip nut.’

The project has achieved new markets in East New Britain and Port Moresby, identified key buyers, improved the farmers’ knowledge of supply chains, optimised production and also developed a new solar-drying method for preserving canarium nuts to extend their shelf life.

A major milestone for the project is the trading of canarium nuts in a commercial market in East New Britain Province. NARI staff have begun selling dried and packaged nuts to local retail supermarkets and several wholesalers, and demand is strong.



Helen Ronnie makes oil from canarium seeds.
Credit: Conor Ashleigh





Tinganagalip Women Cooperative Group Chairwoman Caroline Misiel sits with group members as they discuss the canarium products they can make. Credit: Conor Ashleigh

KEY POINTS

- 1 Indigenous canarium nuts have great potential to improve the livelihoods of rural households in PNG
- 2 Research is supporting canarium nut processing and marketing

The sale of canarium nut product to commercial retail outlets is a first for PNG. In 2017 the new factory successfully bought and processed nearly 65 tonnes of nut-in-pulp, resulting in new sources of income for more than 1300 local farmers.

Local farmer Fecilitius Wilimo speaks highly of this new business venture and says the journey was quite an awakening. 'I see mothers crack the nut and sell the kernels at the markets, so I joined in. Now that these women are buying it at NARI, it is a much easier way to make money, instead of sitting at markets.' Wilimo sells canarium nut twice a week, earning more income than she previously made selling cocoa once a week.

Nuts have long had huge potential to improve the livelihood of rural populations, as a result of their excellent nutritional value. They can be stored for long periods of time, sold for cash or be processed and exported to distant markets.

ACIAR's work in the canarium nut industry has been ongoing for more than a decade. The capacity of the industry is growing, new markets for canarium nut products are opening up and more processors are buying larger quantities of product. All this activity puts more money into the pockets of local farmers.

ACIAR PROJECTS: Developing markets and products for the Pacific Island and PNG canarium nut industry (FST/2010/013) and Enhancing private sector-led development of the Canarium industry in PNG (FST/2014/099)

Commended by the Queen

— Eva Kuson

Forest conservation and sustainable development efforts by Australia, in partnership with PNG, have received international recognition from the Commonwealth.

In 2016 an ACIAR project was accredited under the Queen’s Commonwealth Canopy (QCC) initiative.

ACIAR’s former Forestry Research Program Manager, Tony Bartlett, sees this accreditation as recognition for good work being done by ACIAR in PNG and for PNG’s forestry sector.

‘The QCC is a unique network of forest conservation initiatives, which involves all 53 countries of the Commonwealth to facilitate knowledge exchange, share best practice and create new, collaborative initiatives for forest conservation,’ Tony Bartlett says.

The ACIAR project involved The University of Sunshine Coast, Papua New Guinea Forest Authority, Papua New Guinea Forest Research Institute, Ramu Agri Industries Limited, University of Papua New Guinea, and the Foundation for People and Community Development Corporation. It aimed to identify how community forestry in PNG can be boosted to achieve better economic, social and environmental outcomes.

Drawing from traditional communal ownership of land and forest in PNG, the project supported communities in Morobe, Madang and Eastern Highlands to sustainably manage and develop their forest assets. The project also researched community decision-making processes,



analysed the socio-economic impacts on communities and reviewed the current policies relevant to community management of forests to ensure the benefits of these forests are kept within communities.

Tony Bartlett explains that the ACIAR project received its accreditation under the QCC because its activities in the Ramu-Markham valleys and Goroka region had strong engagement with local communities and were promoting forest conservation. The project facilitated training on the establishment and management of village tree seedling nurseries, and the implementation of community reforestation plantings.

Working with Ramu Agricultural Industries Ltd, which is seeking to restore native forests on high conservation value sites, new scientific trials of multi-species reforestation systems involving at least 20 native tree species have been established from seed collected and grown locally. On the basis of this success, work has progressed to developing similar plantings on community land in the neighbouring villages.

This forestry project is just one example of how researchers can work with communities to produce real benefits. It is more than just an academic research program. This work has real impact on the ground and this is well-deserved international recognition of the stellar work the team has done during this project.

ACIAR PROJECT: Enhancing the implementation of community forestry approaches in Papua New Guinea (FST/2011/057)

Win:win training programs

— Cathy Reade, The Crawford Fund

The Crawford Fund has a wealth of active and rewarding relationships with researchers and farmers in PNG.

PNG is rich in cultural and biological diversity because of its rugged and beautiful terrain and its population of hundreds of ethnic Indigenous groups. This presents a challenging and rewarding environment for bilateral agricultural training and development opportunities.

The Crawford Fund is a not-for-profit organisation that promotes and supports Australia's engagement in international agricultural research and development, with the aim of sustaining funding into the future. As the majority of people in developing countries live in rural areas and are dependent on the land for employment and food security, we believe that agricultural research is one of the most effective ways to assist in their development.

The Crawford Fund is particularly proud of its long association with the PNG Women in Agriculture Development Foundation.

The Crawford Fund connected with the group in 2008–09 when we were approached for training support by Australian Women in Agriculture, which was helping ACIAR's work with the women's network. In addition to assistance with media outreach, we have supported training in leadership, communication and floriculture skills.

Maria Linibi, a foundation leader, has also benefited from Crawford Fund training programs, including our master class in communicating research to stakeholders—experience that she puts to good use. In 2013, Mrs Linibi won the PNG Westpac Outstanding Woman of the Year award for her 'tireless efforts and sheer determination in helping build the capacity for women farmers in PNG and parts of the Pacific'. In response to our congratulations, Mrs Linibi wrote. 'Thank you. The win is ours, as we all contributed to making this award. Thank you, Crawford, for putting us on the map in Australia.'

The Crawford Fund's PNG training focus is on knowledge shared and gained, connections made and fostered, and outcomes achieved. The win is indeed ours!

| MORE INFORMATION: crawfordfund.org



Dr Murom Banabas (centre) during his Crawford Fund training at James Cook University. Credit: The Crawford Fund

Success: PNG women as smallholder farmers

— Peter Papathanasiou

Helping PNG's smallholders think of their farms as a family business improves their finances, shares the load more equitably and leads to better outcomes for men and women.

Professor Barbara Pamphilon, from the University of Canberra, has heard many heart warming comments as a result of an ACIAR - commissioned project examining women's business acumen in PNG.

'My husband and I are now best friends.'

'I feel happier. I feel included.'

'For the first time in my life, I have spare money in my bag wherever I am. I feel so good about that.'

'It was originally a project to learn how to involve PNG women more effectively in smallholder farming training,' Professor Pamphilon explains. 'But we soon realised we faced a number of fundamental issues.'

The first was educational: most women farmers were illiterate. There were also cultural issues, since men were seen as the people to be trained. And lastly, there were gender issues.

'There are high rates of family-based violence in PNG, and we were conscious of avoiding further conflict for women at home. We were also aware that when women in low-income countries learnt new skills, they often worked harder and longer. The men still control the income from the women's labour.'

Through the research, Professor Pamphilon found that women and men did not really know what each other did in a day, although they all agreed that women had a double burden of farm work and family responsibilities. As a result, Professor Pamphilon and her team decided to take what she calls a 'family farm teams' approach to the situation.

'This way, we could use the talents of everyone in the family,' Professor Pamphilon says, 'and not burn anyone out.'

A major breakthrough came in viewing each family's agricultural work as a 'farm business'. Annual farm plans were drawn up to ensure that harvests would be planned to meet agreed family goals and withstand climate events. Corporate terminology was introduced: 'husbands and wives' became 'company directors'.

'It was all with a view to moving families beyond a subsistence mindset,' says Professor Pamphilon. 'Most PNG families are big, they often have a husband and wife, a grandparent or two, adult children, younger children, and their crops are diverse including sweetpotato, coffee or cocoa, greens, fruit, poultry and pigs, with gardens both near the house and far away. These were all what we, in the Western world, would definitely call small businesses. This shift of terms helped farmers to be proud and productive.'

The project reaped impressive outcomes. Following a pilot in East New Britain and the Western Highlands, it has since been rolled out across the country, including islands like Bougainville and New Ireland. Partnerships were forged with local organisations including the National Agricultural Research Institute, Baptist Union, Bougainville Women's Federation, New Ireland Department of Primary Industry and Voice for Change, as well as with the Pacific Adventist University and the PNG University of Technology.





Dr Barbara Pamphilon Credit: Peter Papathanasiou

For families, outcomes have been tangible. Many went from bush huts to having permanent houses within 18 months. Children were able to stay in school. This approach has been integrated into a major project of US\$50 million recently awarded to the Fresh Produce Development Agency by the International Fund for Agricultural Development and the PNG Government which aims to reach 25,000 farming households in four provinces.

Despite some initial reservations about the program, many men were quickly won over. Not only did they see tangible outcomes for their families—permanent homes, education, clothes, increased incomes—but they felt less pressured when they were able to make decisions as a team with their wives.

‘I always share Australian situations as part of my work because we all face gender challenges across the world,’ Professor Pamphilon says. ‘And we can learn from each other. It only took for me to explain the increased rates of male suicide among Australian farmers to underscore the importance for both men and women of working as a family farm team. A problem shared is a problem halved.’

KEY POINTS

- 1 A major breakthrough has come in viewing each family’s agricultural work as a farm business, and the whole family as a team
- 2 Sharing the agricultural workload more equitably leads to better farming outcomes

PROJECT: Examining women’s business acumen in Papua New Guinea: working with women smallholders in horticulture (ASEM/2010/052)

Clean sweetpotato improving income for farmers

— Eva Kuson

The economy of the PNG highlands is evolving rapidly as smallholders turn from growing sweetpotato to feed their families to growing food to feed the nation. Sweetpotato, or ‘kaukau’ as it is known locally, plays a key role in this evolution. It has become a cash crop, providing income for farmers.

The collaborative partnership between ACIAR, Fresh Produce Development Agency (FPDA), PNG National Agricultural Research Institute (NARI) and Central Queensland University has supported smallholders to improve production to meet market and customer needs.

It focuses on accelerating income generation from the sweetpotato supply chain and supporting highland farming communities that benefit from the adoption of new and emerging agricultural technologies.

Research funded by ACIAR in partnership with NARI has resulted in production of pathogen-tested (PT) (or virus free) planting material for sweetpotatoes, which can be used by farmers in their production systems to improve their yield.



A range of kaukau for sale along the roadside close to Asaro Station in the Eastern Highlands. Credit: Conor Ashleigh

This includes new technology that enables farmers to produce seedlings that are free of disease, increasing their productivity and allowing them to grow larger tubers and greater volumes of the vegetable.

The project is already benefiting farmers in Eastern Highlands Province. Kuman Kuman is implementing the clean kaukau yielding method. Kuman is excited about the prospect of the project and the potential income that larger yields are likely to generate.

KEY POINTS

- 1 Research has improved production to meet market and customer needs
- 2 The partnership with NARI has resulted in production of pathogen-tested planting material



At the NARI research station in Aiyura, Eastern Highlands, sweetpotato researcher Winnie Maso inspects some of her clean kaukau growing in the lab. Credit: Conor Ashleigh

‘My contributions include seven bags of sand [clean planting material]. I also assisted the casuals working on the screen house to strain soil and pack it into boxes for the nursery,’ Kuman says.

FPDA provided the seedlings, the quarantine mesh igloos and training on growing the sweetpotatoes.

LEARNING FROM AUSTRALIA

The sweetpotato industry in Queensland has been very successful in using the clean sweetpotatoes to improve the yield and quality of tubers.

All major Queensland sweetpotato growers are now using 100% PT stock as their planting materials and have increased their marketable yields by 25–30 tonnes per hectare.

The establishment of a similar scheme in PNG not only benefits farmers but also assists researchers and helps improve the food security of the food crop. A critical aspect of the project is the

insights it is providing to help producers better understand pathogens and threats to the crop.

‘We’ve got an opportunity to survey for what viruses are present in the crops in PNG, and we can reasonably expect some of those viruses, over time, to make their way to Australia,’ says Professor Phil Brown from the Central Queensland University.

‘We’ve also started to trial some new technology for virus detection in the field rather than having to collect samples and send them off to a laboratory. That technology can be used in Australia as well, so when we’re doing our virus survey work in the field we’re going to be much better prepared to identify when something comes into the country or just to look at the ones we already know are here.’

ACIAR PROJECT: Supporting commercial sweetpotato production and marketing in the Papua New Guinea highlands (HORT/2014/097)

Boosting cocoa production through improved pest management

— Polly McDougall

PNG is benefiting from integrated pest and disease management strategies that are reducing incidences of cocoa pod borer and ensuring profitable cocoa crops.

More than 150,000 households in PNG depend on cocoa for their livelihoods. Families and communities rely on the income generated from their cocoa crops to buy food, making it an important industry for the nation's food security.

The cocoa pod borer is a prolific pest that can destroy cocoa crops quickly. It arrived in PNG in 2006 to devastating effect. Since then, several ACIAR projects have focused on how integrated pest and disease management strategies can be deployed to ensure this pest has minimal impact on cocoa yields and doesn't impact the livelihoods of smallholder farmers.

One project on improved management strategies for cocoa in PNG was led by the

University of Sydney in collaboration with the PNG Cocoa and Coconut Institute¹ and The Centre for Agriculture and Biosciences International (CABI).

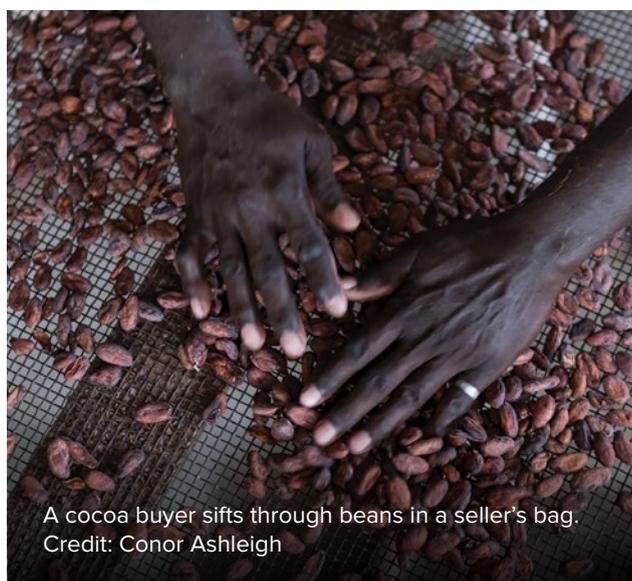
Professor David Guest from the University of Sydney explains that improving cocoa production in PNG relies on a participatory training and extension approach.

'By the 1990s most of PNG's cocoa producers were smallholders who weren't actively looking after their cocoa crops and big problems started to emerge with pests and diseases, particularly when cocoa pod borer arrived in 2006.'

Eradication of cocoa pod borer is difficult, so the best strategy is for farmers to use a combination of techniques under integrated pest and disease management to lower infestation levels.

'Traditionally farmers hadn't had to worry about their cocoa crops and had treated them almost like ATMs. They would harvest their cocoa pods only when they needed cash but otherwise left them alone. We started by asking smallholder farmers what they wanted to know and then trained them in how to manage their crops to limit cocoa pod borer incursions.'

The practices recommended for integrated pest and disease management in PNG cocoa crops include basic block sanitation, pruning, canopy reduction and height control, frequent and complete harvest, regular and systematic monitoring, removal of infested pods, target pod



A cocoa buyer sifts through beans in a seller's bag.
Credit: Conor Ashleigh



Grace Enoch (striped shirt) demonstrates to other farmers how to correctly graft cocoa seedlings.
Credit: Conor Ashleigh

spraying, pod sleeving and the use of cocoa pod borer-tolerant planting materials.

‘There are huge opportunities for cocoa production in Papua New Guinea,’ says Professor Guest. ‘For now, around 70% of the world’s cocoa comes from West Africa but, as new markets for chocolate open up in China and India, there is room to expand cocoa production in South-East Asia and the Pacific. The climate and soils in areas of PNG are well suited to producing high-quality cocoa beans with a particular flavour and there is definitely potential to increase annual production rates.’

He says, ‘The work being done on cocoa production in PNG is vital and is having positive impacts. Through the research projects conducted with ACIAR over many years we have moved from simply controlling a disease to working on how to make cocoa an industry that is viable, sustainable and profitable for the country.’

The cocoa pod borer management strategies piloted in PNG have been integrated into the World Bank-funded PNG Productive Partnerships in Agriculture project.

Professor Guest is continuing his work in PNG, enhancing cocoa production with a current ACIAR project (HORT/2014/094) in the autonomous region of Bougainville that is focused on developing the cocoa value chain and improving profitability for smallholder cocoa farming families and communities. This project has included establishing the Bougainville Chocolate Festival to promote the industry internationally and led to chocolate made from Bougainville beans winning awards in Perth, London, New York and Paris.

ACIAR PROJECT: Improved management strategies for cocoa in Papua New Guinea (HORT/2012/026)

‘The Cocoa and Coconut Research Institute is now under management of the Cocoa Board of Papua New Guinea.’

Research to halt a deadly disease in coconut palms

— Lastus Kuniata, New Britain Palm Oil

Nine pathogen carrying insects have been identified as responsible for the spread of Bogia coconut syndrome that destroys coconut crops.

Bogia coconut syndrome (BCS) was first discovered in the Bogia district of PNG's Madang Province in the late 1970s, where it wiped out coconut plantations. The disease is caused by the phytoplasma *Candidatus Phytoplasma noviguineense*, which is one of a group of pathogens that causes lethal yellowing-type diseases in a range of plants. So far, this particular pathogen has been detected in coconuts, bananas and betel nut palms. BCS in coconuts has been confirmed in the Bogia, Sumkar and Madang districts of Madang.

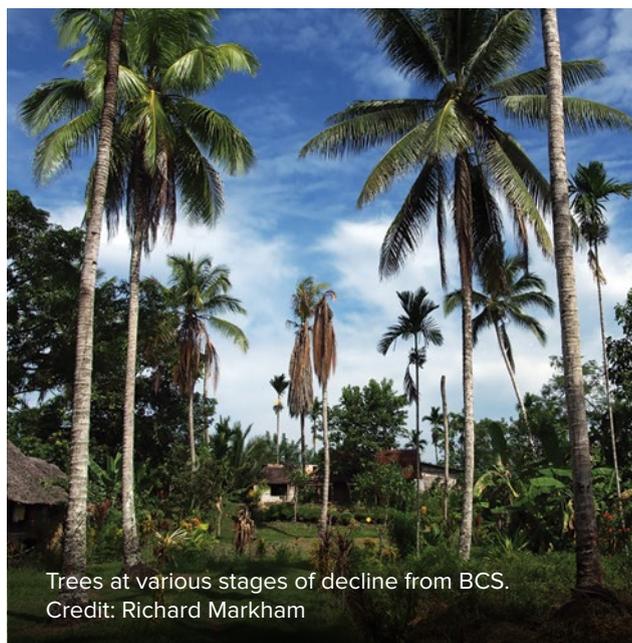
Surveys in all other PNG coastal provinces in 2009 did not show the presence of BCS in

coconut palms. Current research at present has established that the disease is confined to Madang. However, PNG's coastal communities, including those on offshore islands in Madang, depend on coconuts, betel nuts and bananas for their livelihood. BCS puts these communities at potential risk. While insect vectors have been identified, infected planting materials are likely to be the source of the spread.

As infected planting materials are most likely to be a major source for the spread of the disease, an internal quarantine checkpoint was established on the major highway that leads out of Madang Province to the neighbouring Morobe Province. No-one was allowed to take any planting materials from any crops out of Madang Province. This was done to prevent further spread of BCS, especially to the oil palm plantations on the other side of the mountain range that separates the Madang and Morobe provinces.

The disease development studies conducted by Ramu Agri-Industries Limited, Cocoa Coconut Institute Limited and National Agricultural Quarantine and Inspection Authority showed that it only takes three to six months after the symptoms first appear for the palms to die.

There is currently no cure for BCS in PNG and very limited biological knowledge of the organism and its transmission. Sanitation of diseased palms has been used in Africa, Reunion Island and the West Indies, and this has delayed the spread of the lethal yellowing-type diseases.



Trees at various stages of decline from BCS.
Credit: Richard Markham

ACIAR PROJECT: Bogia coconut syndrome in Papua New Guinea: developing biological knowledge and a risk management strategy (HORT/2012/087)

A homecoming through fish farming research in PNG

— Jesmond Sammut, UNSW

Fish farming research is revealing a suite of social and economic benefits, and helping to create strategies to clear bottlenecks to farming.

Shanice Tong spent the first seven years of her life in East New Britain Province (ENBP) in PNG. Her family, along with thousands of others, was displaced by the 1994 eruption of Tavurvur in Rabaul. Family connections, regular visits and wonderful memories of her childhood have helped her to retain ties to Rabaul and ENBP. It's been more than 17 years since Rabaul was Tong's home, but she's back to make a difference through a Master of Philosophy at the University of New South Wales (UNSW) under the ACIAR Inland Aquaculture Project.

'I have seen the struggles many people in the community were up against, witnessed the corresponding changes in livelihoods, and admired the resilience of displaced people in ENBP. I felt the need to make a difference, or at least learn more about livelihood strategies used by the community. I was lucky enough to find an accommodating supervisor, who enabled me to have ENBP as my study site. My research now feeds into a larger UNSW and National Fisheries Authority (NFA) project on inland aquaculture funded by ACIAR,' says Tong.

'As a young girl I had always thought that the kids had big tummies because they ate too much. I later learned this is a sign of malnutrition, caused by a lack of protein and essential micronutrients in their diet. While they may be getting sufficient caloric intake, protein deficiency can lead to stunting and it's harder for children to focus in school,' she says.



Shanice Tong. Credit: Jesmond Sammut

Tong's research found that the impacts of fish farming were not restricted to meeting nutritional needs and generating income. Fish farming also generates many social benefits.

'Fish farming gives people purpose, where opportunities can be scarce. Fish farming is an effective livelihood strategy that has numerous positive outcomes. For example, fish farming empowers women to provide financially for their household, which is traditionally a male-dominated role. It also gives individuals a sense of responsibility and a will to keep improving their livelihoods and lifestyle.'

Tong's research results will inform decision-making and strategic development guidelines and policy in PNG, and underpin future research on inland aquaculture in a culturally-diverse country.

ACIAR PROJECT: Increasing production from inland aquaculture in Papua New Guinea for food and income security (FIS/2008/023)

Building vital research skills in the fisheries sector

— Anne Moorhead

In a new approach to capacity building for ACIAR, a formal qualification in research skills has been delivered in Port Moresby by the University of Tasmania.

In 2014, the ACIAR Fisheries Program joined forces with the University of Tasmania (UTAS) and the PNG National Fisheries Authority (NFA) to address a gap in research skills in the fisheries sector. UTAS sent a small team of academics to Port Moresby to deliver a tailored version of its Graduate Certificate in Research Skills to PNG fisheries researchers. Previously, the only option for this level of training was for students to travel internationally—but, for many students, leaving their families and jobs for an extended period was not feasible. With the new approach, 39 researchers have completed the course over the last three years. The most recent cohort received their certificates in February 2018.

This was an experiment in capacity building at the institutional level, according to Dr Chris Barlow, former ACIAR Fisheries Program Research Program Manager, who championed the novel approach. ‘The aim was to use this project to really strengthen the research capacity of the national fisheries program,’ says Dr Barlow.

AQUACULTURE IN PNG

ACIAR’s Fisheries Program in PNG includes a suite of aquaculture projects. Fish farming is growing in the country, and has great potential for food security and income generation. Some 60,000 small-scale fish farms are producing tilapia, carp and trout for home consumption and sale, but production levels are low compared,

for example, with South-East Asian countries. ACIAR projects addressing production issues are now benefiting from stronger research skills in the NFA.

Georgina Bernard is a Provincial Fisheries Officer and a recent graduate of the course. She is using her new skills to find local alternatives to expensive imported feed, which is one of the main problems for aquaculture in PNG. ‘I’m working in a province where there is a lot of oil palm, so we have an abundance of kernel, and we’re trialing different kernel-based feeds,’ she explains.

By basing the course in PNG, and ensuring it had a strong industry focus, UTAS staff were able to make sure the training had direct relevance to the students’ work. ‘[The students]



Aquaculture ponds in PNG. Credit: Jesmond Sammut





Fish farmers show off their produce. Credit: Jesmond Sammut

KEY POINTS

- 1 A new approach to training fisheries researches is being developed in PNG
- 2 Graduates have access to higher studies as a result of the new qualification

were able to really relate what was being taught in the classroom with their jobs, and if they had any issue [with their work], they could bring it into the classroom,' says Jacob Wani, Executive Manager of Aquaculture and Inland Fisheries at the NFA.

Graduates now have access to higher studies as a result of their new qualification. Philomena Sinkau, trainer in aquaculture at the National Fisheries College, hopes to register for a PhD and carry out research on developing a training policy for the aquaculture sector. 'It's [provided] a bridge for me,' she says.

In the third year, the course broadened its intake to researchers in other agriculture disciplines, drawing on the ACIAR project network. The course proved highly transferable.

February's graduation marked the end of the three-year project, but the partners are hoping to build on its success and develop a second phase. This approach to capacity building could also be extended to other countries in the Pacific region, and other sectors.

This is an adapted version of a story that first appeared on SciDev.net.

ACIAR PROJECT: Building research and project management skills in fisheries staff in Papua New Guinea (FIS/2010/055)

Fishing for a better future: innovative Fish for Prisons program

— Jesmond Sammut, UNSW

Prisoners in PNG are regaining hope for a better future while gaining fish farming skills under a bespoke training program.

Fish farming research, under the ACIAR Inland Aquaculture Project in PNG, provides technical knowledge and expertise to the National Fisheries Authority (NFA) Fish for Prisons program. University of New South Wales (UNSW), Australian Nuclear Science and Technology Organisation and NFA staff work alongside the wardens from PNG Correctional Services to train, monitor and mentor prisoners and ex-prisoners. The main goal is to teach livelihood skills, but the spin-offs are making an even greater difference.

Fish farming keeps prisoners active and builds emotional resilience and self-esteem. Working alongside them is an opportunity to hear their stories—how they ended up in prison and the type of person they aspire to be. Seeking redemption, regaining social status and becoming useful members of their community are common themes.

Farming fish also enables prisoners to add much-needed protein to their diet. Physical activity, through building and maintaining ponds, improves their health and outlook on life. Prisoners run over to the ponds with nets in hand and buckets of fish feed to show off their fish husbandry successes.

Corporal Alois Siune from Bihute Prison near Goroka, speaks with pride about the impacts of the program. ‘Former prisoners become better men. They provide for their families and community. They reflect on their past and look

to the future positively. They become accepted again and let go of shame and stigma. They don’t reoffend,’ he says.

Moxy, from the Asaro tribe, speaks openly about the changes fish farming has brought. He has regained his place in the community and is now a lead farmer. Moxy takes pride in his nickname, ‘Daddy Fish’, as he recalls his former life of crime, his incarceration, his time on the training program and a subsequent decade of success as a free man and a fish farmer.

‘Whenever I feel down, or I am tempted to do wrong, I sit by my fish ponds and look at what I achieved. It brings peace and comfort, and those negative feelings disappear. I can provide food, clothing and buy things with money I have earned from the ponds I dug and the fish I have stocked, cared for and then sold,’ says Moxy.

Gaius still has more time to serve, but like many others involved in the Fish for Prisons program, he feels his time in prison is not idle. He has a daily routine and has set life and livelihood goals with mentoring from the team. His day starts with breakfast and then he spends time on the ponds, caring for fish and maintaining the infrastructure. Wardens trained to farm fish oversee his activities, and ACIAR project team member Joe Alois visits regularly to monitor his progress. Gaius has plans—grand plans—but they are achievable. On release, he will dig ponds and help others to do the same, share farming knowledge and enrol himself in formal



Jesmond Sammut, Jacob Wani and Fish for Prisons participants. Credit: Jesmond Sammut

aquaculture training at the College of Fisheries, another NFA resource that supports capacity building for people in PNG.

‘When I am released from prison, I will become somebody again,’ he says, without the anger that once led him to prison. He is affable and softly spoken, but his eyes light up as he outlines his plans, and his voice breaks with excitement.

KEY POINTS

- 1 The National Fisheries Authority Fish for Prisons Program is providing fish farming skills
- 2 This program is providing prisoners with technical knowledge and expertise to prisoners
- 3 Fish farming training in the PNG highlands delivers huge social benefits

A year ago, prisoners from Baisu Prison near Mount Hagen were facing starvation. They are now part of the Fish for Prisons program, with support from Jacob Wani from NFA and the ACIAR project team. Ponds have been constructed and soon fish will be a regular part of the prison diet.

While the focus of the program has been in the Eastern Highlands Province, other provinces have adopted the model and word has even travelled to other countries, where there is now interest in implementing the same strategy.

The Fish for Prisons program is one of several NFA initiatives involving the ACIAR inland aquaculture project. A Fish for Schools program and a TAFE-equivalent program at the Maria Kwin Centre are also changing lives in PNG. The ACIAR project is transforming lives, for the better.

MORE INFORMATION: Improving technologies for inland aquaculture in Papua New Guinea (FIS/2014/062)

Investigating sharks and rays in PNG

— Eva Kuson

Leontine Baje has been conducting research on sharks and rays that aims to ensure PNG is able to manage its marine environment and fisheries economy.

Researching sharks and rays has traditionally been the domain of men, but not any more. For the past 10 years, Leontine Baje has been employed by PNG National Fisheries Authority (NFA). Baje also has a long history with ACIAR. Through its capacity building program, she was awarded a post-doctoral fellowship to conduct vital research on PNG's marine environment and its economic benefits.

Baje has been part of a research collaboration between ACIAR, the NFA and CSIRO to determine the biological and socio-economic characteristics of sharks and rays in PNG waters.

'This was the first major international research collaboration that I was involved with from its onset and I was keen to do my best to achieve the aims of the project,' says Baje.

In 2015, she was awarded an ACIAR-funded John Allwright Fellowship that enabled her to do a Masters at the Centre for Sustainable Tropical Fisheries and Aquaculture at James Cook University in Queensland. In 2017, her research work was approved and upgraded to a PhD program, making her the first PNG woman from the NFA to carry out doctoral research into the biology and ecology of coastal sharks.



Simon Vieira conducting fisher survey questionnaires in the Milne Bay Province. Photo: William White.

'I believe that it's important for the NFA to develop strong research capacity on which to base management decisions. I felt that this would contribute positively towards the development of my country,' Baje says.

SHARKS AND RAYS

Shark is PNG's fifth most important export fishery, worth K8 million (A\$3.31 million) annually. It is also an important artisanal fishery for coastal communities and a potential resource for ecotourism and cultural conservation.

All coastal communities in PNG are involved in fishing for local food supply and wider commerce. Sharks and rays are particularly vulnerable to over-exploitation due to their life history characteristics. Population declines can affect the livelihoods of communities that rely on those resources.

Given the importance of the shark and ray fishery for livelihoods and commerce in PNG, the lack of



(L-R) Leontine Baje, Sharon Appleyard and William White during the taxonomy and genetics workshop in Hobart in September 2014. Credit: William White

information on species composition, distribution and abundance is an impediment to sustainable management. This needs to be addressed.

Over the last four years, ACIAR has provided training and local capacity building programs, and supported dedicated researchers such as Baje. 'Being part of the PNG shark and ray project has given me the opportunity to work with very experienced Australian researchers,' she says. 'I've undergone specific training as a John Allwright Fellow awardee, and it has been invaluable.'

Baje explains that her ongoing research is focused on determining biological and ecological aspects of coastal sharks caught in the Gulf of Papua prawn trawl fishery. This will aid in assessing the impact of fishing on shark populations.

'I would like to continue in a research role when I return to PNG,' says Baje. 'I think there is much more to learn about the fisheries stocks that are

being harvested. We can use that information to ultimately achieve sustainable fisheries in PNG.'

ACIAR PROJECT: Sustainable management of the shark resources of Papua New Guinea: socioeconomic and biological characteristics of the fishery (FIS/2012/102)

KEY POINTS

- 1 Shark is PNG's fifth most important fishery
- 2 New research has determined the biological and ecological aspects of sharks and rays in PNG

Improving soil fertility in the highlands

— Polly McDougall

Soil fertility is an often-overlooked critical global issue with implications for food security, particularly in developing countries.

Food production the world over relies on fertile soil, but the UN warns that a significant proportion of soils are facing exhaustion and depletion.

One place where the issue of soil fertility is coming to the fore is PNG, particularly in the Highlands Region.

ACIAR's Research Program Manager for Soil and Land Management, Dr Robert Edis, explains that it is a critical issue.

'So much of PNG's non-oil and gas wealth comes from agriculture. The whole food web and the health of the soil is essential to people's income security and the nation's social stability. If soil fertility is allowed to decline, the potential problems for PNG could be enormous,' says Dr Edis.

'This is why soil fertility is an issue that is touched upon in many ACIAR projects. We recognise that soil health is an essential component of the country's long-term prosperity.'

While the population of PNG has tripled in the last three decades, the area used for agricultural production in the Highlands Region has remained relatively stable. Land use has intensified to keep up with demand for food and this is affecting the health of the soil.

Finding a way to sustainably intensify food production systems in PNG so that a rapidly growing population can be fed without degrading the soil is a challenge currently being tackled by ACIAR and researchers from the University of Queensland.

PNG's main source of carbohydrates is sweetpotato. As demand for product has increased, the production system has changed. In the Highlands Region, block sizes are smaller and the fallow periods between crops have shortened dramatically. Combined with high rainfall that produces nutrient leaching, this leads to declining soil fertility.

A compounding issue is that as soil fertility declines so too does the quality of the sweetpotatoes harvested. Dr Edis says, 'As the nutrients are taken from the soil over time, not only do yields go down but the nutritional profile of the product also declines, both in terms of protein content and micronutrients. Given that sweetpotato is a staple food crop,

KEY POINTS

- 1 Soil fertility is declining globally
- 2 Research is looking at ways of increasing production of sweetpotato in PNG without degrading soil



Recent fieldwork completed with help of farmers. Credit: Robert Edis

this is a potential threat to nutrition security at a bulk level.’

To improve the livelihoods of rural communities in the Highlands Region and protect the productive capacity of the land, developing a system of sustainable intensification of the sweetpotato cropping system is critical.

With low rates of farmer commercialisation—less than 20%—using synthetic fertiliser to replace soil nutrients isn’t a viable option in much of PNG. Instead, better land management techniques are required to improve crop yields and manage soil health.

These techniques include improved fallows—resting the land from cultivation—and planting

species of leguminous trees and shrubs that rapidly replenish soil fertility. Another technique is to incorporate non-leguminous, nutrient accumulator plant species into the system.

Dr Edis says, ‘PNG is in a state of transformation as the population grows and traditional agricultural practices are abandoned to keep up with the demand for food. Protecting the country’s soil fertility through sustainable intensification of agriculture systems will be very important for long-term food security.’

ACIAR PROJECT: Sustaining soil fertility in support of intensification of sweetpotato cropping systems (SMCN/2012/105)

Australia pitches in

— Eva Kuson

Following the devastation caused by a 7.5 magnitude earthquake in PNG, Australia has taken a leading role in the disaster relief efforts.

On Monday 26 February 2018, a 7.5 magnitude earthquake, at a depth of nine kilometres, struck the Highlands Region of PNG. A series of strong aftershocks were reported, including a 6.7 magnitude quake on 7 March 2018.

PNG police reported that at least 125 people were killed and the United Nations (UN) estimated that up to 500,000 people were affected.

On 1 March 2018, PNG's Prime Minister, Peter O'Neill, announced a state of emergency in the Hela, Southern Highlands, Western and Enga provinces. The PNG Government made up to A\$180 million available for disaster relief, service restoration and the rebuilding of infrastructure.

A request for assistance was also made to the Australian Government. Australia has played a leading role in the international relief effort and provided a total humanitarian commitment of up to A\$5 million.

Australia provided up to A\$3 million to support the recovery effort, including service restoration and the rebuilding of infrastructure through trusted NGO partners.

An Australian Medical Assistance Team (AUSMAT) was sent to support the Mendi Hospital in Southern Highlands and to help the local provincial health centres with emergency operations and planning. AUSMAT treated



AUSMAT staff at Mendi Hospital in Southern Highlands.
Credit: Australian High Commission, PNG

1,025 patients, including 37 surgeries, and assisted with five births.

Up to A\$1 million was provided to support vulnerable women and children in the earthquake-affected areas, in partnership with UN Women, the United Nations Population Fund and UNICEF.

Electrical transformers worth A\$400,000 were provided to re-establish reliable power supplies in Hela and Southern Highlands provinces, benefiting businesses, health clinics, schools and family homes.

Australia also provided a total of A\$200,000 in humanitarian supplies, including tarpaulins, water containers, blankets, tents and bed mats.

The Australian Defence Force (ADF) launched one of its largest humanitarian air operations in history, Operation PNG Assist 2018, to support the relief efforts.

The Royal Australian Air Force C-130J Hercules and three Army CH-47F Chinook



Australian Defence Force deploys assets and personnel to support the relief efforts. Credit: Australian High Commission, PNG

helicopters allowed ADF members and their PNG Defence Force colleagues to deliver food, water and medicine to remote and badly affected communities.

The ADF also provided direct support to the PNG Defence Force in its operations to distribute medical supplies and equipment to hospitals and health facilities in the Hela and Southern Highlands provinces.

GOING FORWARD

Four RedR Australia humanitarian specialists have been deployed to work in key UN agencies to help manage and coordinate relief assistance, including World Food Programme, UN Women, The Office for the Coordination of Humanitarian Affairs and the International Organization for Migration.

An Australian-funded UN Development Programme coordinator is also working with the PNG National Disaster Centre and the UN

Resident Representative Office to assist with information management.

Geoscience Australia has provided advice on the scientific basis for the earthquake and seismic activity in the region to help with further disaster preparedness and response.

KEY POINTS

- 1 Australia has taken a leading role in PNG's disaster relief effort
- 2 Australia provided \$5 million following the February 2018 earthquake

New oil palms replanting model

— Polly McDougall

A new program of replanting oil palm trees one hectare at a time is improving food security and access to income in smallholder farming communities in PNG.

The oil palm industry in PNG isn't just critically important for the export income it provides, it is also a source of income for nearly 20,000 smallholder families and an estimated 200,000 people.

The long-term sustainability of the industry depends on oil palm stands being replanted approximately every 22 years but, because of increased social and economic pressures, farmers have been delaying replanting until many of their palms are too tall to harvest.

Dr Gina Koczberski and Professor George Curry of Curtin University have been involved in a number of ACIAR oil palm research projects in PNG. Dr Koczberski explains how the problem in this instance was not just an agricultural or scientific one but also a socio-economic dilemma. The standard replanting program sees farmers replacing a two-hectare stand of oil palms in one go.

'The growers know they need to replant their ageing stands of oil palm, but doing so means they have to firstly go into debt (via a replanting loan from the oil palm companies that pays for the seedlings) and secondly go without income from a two hectare stand for two years while the new oil palms mature enough to produce



Aibika growing on frond row. Credit: George Curry

fruit. That's a double disadvantage, so it's no wonder growers were reluctant to replant,' says Dr Koczberski.

Through a number of research projects commissioned by ACIAR and conducted collaboratively between Curtin University, James Cook University, PNG University of Technology and the Oil Palm Research Association, a solution was devised where a two-hectare stand

KEY POINTS

- 1 The oil palm industry is critically important for PNG
- 2 ACIAR is developing replanting industry programs to improve long-term sustainability and smallholder livelihoods



Visiting a young farmer's plants while conducting field work research. Credit: George Curry

of oil palm could be replanted one hectare at a time, two to three years apart.

Instead of four hectares of oil palm being in production with a two-hectare replant, our replanting program suggests five hectares of oil palm in production with a one-hectare replant. Using this new program, farmers have five palms in production for every seedling compared with two palms for every seedling in the traditional model. This means more income is available for the farmers, which makes loan repayments much easier to manage.

When the old palms are taken out of production to make way for the new seedlings, their fronds collapse around the trunk allowing sunlight to penetrate to the ground and making it possible to grow fruit and vegetables for two to three years until the canopy of the new oil palm closes. Staggered replanting under the new one hectare replant model has the added efficiency of doubling the period that farmers can grow food crops on their own blocks.

Professor Curry also says that the involvement of some of the oil palm companies and the main extension agency, the Oil Palm Industry Corporation, were instrumental in the success of the project.

'Hargy Oil Palms hosted and supported the trial of the one-hectare replant program because they could see how it would benefit the industry in terms of long-term sustainability.'

'These research projects and ACIAR's investments in PNG have been valued by farmers and the oil palm industry alike. Each research project has been able to build on a previous one, which means we see outcomes that have positively impacted the income potential of smallholder communities and improved food security.'

ACIAR PROJECT: Strengthening livelihoods for food security amongst cocoa and oil palm farming communities in Papua New Guinea (ASEM/2012/072)

Spotlight on Dr Veronica Bue

— Polly McDougall

2017 John Dillon Fellow Dr Veronica Bue is an inspirational agriculture researcher and academic

Dr Veronica Bue, a senior lecturer in the Department of Agriculture at the PNG University of Technology in Lae, talks about what she thinks is one of the most important issues in agricultural development in her country.

As one of only three women in her department, and having worked for many years in a male-dominated field, Dr Bue is passionate about encouraging women's involvement in agriculture.

In 2017, Dr Bue was one of 10 people awarded a John Dillon Memorial Fellowship by ACIAR. For Dr Bue, the John Dillon Fellowship was the fulfilment of a lifelong ambition to always learn and develop her skills and experience.

After finishing high school, Dr Bue planned to go to university, but other aspects of life got in the way. Instead, she worked for five years as a bank officer and had four children.

Just as she had given up on her dreams of university study, an opportunity to study a Bachelor of Science in Agriculture through a New Zealand aid scholarship presented itself. She applied and was accepted, and in 2004 began her incredible career in agriculture.

After completing her Masters in PNG, Dr Bue was a recipient of the ACIAR John Allwright Fellowship between 2009-2013 which allowed her to pursue her PhD studies at Curtin University.

Reflecting on her John Dillon Fellowship experience, Dr Bue says, 'It was a wonderful opportunity for me to advance my career, my research skills and my leadership capabilities. I am and forever will be grateful to ACIAR for developing me into what I am today. The fellowship was a worthwhile experience because I was exposed to the operations of other research institutions and got to discuss food security and approaches to agricultural change with international and Australian researchers who lead the field.'

Dr Bue concludes, 'Thanks to the John Dillon Fellowship, I can play an even greater role in advancing agricultural research in PNG and act as a mentor to other researchers, especially women.'

A key part of the ACIAR strategy is to develop long-term scientific capability in the places we work. Dr Bue is a classic beneficiary of this investment.

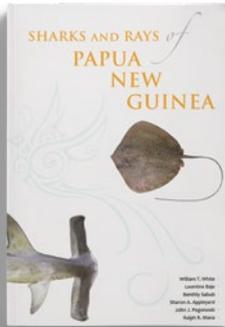
ACIAR PROJECT: Identifying opportunities and constraints for rural women's engagement in small-scale agricultural enterprises in Papua New Guinea (ASEM/2014/054)



Dr Veronica Bue during her John Dillon Fellowship visit to Canberra in February 2017.
Credit: Kirsten Davey

Publications

For the full range of ACIAR publications visit www.aciar.gov.au/publications-and-resources

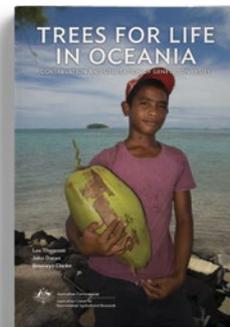


SHARKS AND RAYS OF PAPUA NEW GUINEA

The first comprehensive reference on the sharks and rays of PNG, it contains everything you need to know about recognising and identifying the sharks, rays and chimaeras found in PNG waters, both marine and freshwater.

TREES FOR LIFE IN OCEANIA—CONSERVATION AND UTILISATION OF GENETIC DIVERSITY

This book, prepared with inputs from 85 specialists in the nominated subject areas, including many Pacific Island foresters and horticulturalists, aims to provide information on a selection of important trees species of Oceania.



A GUIDE TO MANUFACTURING ROTARY VENEER AND PRODUCTS FROM SMALL LOGS

Over the past decade, new technologies have emerged that now offer the potential for widespread development of new veneer processing operations that can utilize small diameter trees grown by farmers.

K3.5 MILLION TO GROW GALIP NUT INDUSTRY

The Australian Government announced further support to develop the galip nut industry for an additional three years with a A\$1.4 Million (K3.5 million) grant.

Image caption: Mr Mahesh Patel, Managing Director of City Pharmacy Group of Companies with representatives of the East New Britain 'tolai' singing group. Credit: ACIAR



IN THE MEDIA

A woman with dark hair, wearing a purple floral patterned shirt and denim shorts, is smiling and holding a large green leaf. She is standing in a field of tall, green, leafy plants, possibly a rice field. The background is filled with similar plants under bright sunlight.

The Australian Centre for International Agricultural Research (ACIAR) operates as part of Australia's international development cooperation program, with a mission to achieve more productive and sustainable agricultural systems for the benefit of developing countries and Australia. ACIAR commissions collaborative research between Australian and developing-country researchers in areas where Australia has special research competence. ACIAR also administers Australia's contribution to the International Agricultural Research Centres.



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