Papua New Guinea

A$8.6 million
Budgeted funding

20
Bilateral and regional research projects

5
Small projects and research activities

Papua New Guinea is the largest country in the Pacific region. It has more than 8 million people, of which 85% live in rural communities and rely heavily on subsistence agriculture for food and cash income. The country's economy is made up of 2 main sectors: the labour-intensive agriculture, fisheries and forestry sector, and the mineral and energy extraction sector, which accounts for most of the country's export earnings.

Direction for development in the nation is provided by the Papua New Guinea Vision 2050, Papua New Guinea Development Strategic Plan 2010–2030 and 4 Medium Term Development Plans. In line with the UN Sustainable Development Goals, development aspirations focus on improving health and education outcomes, diversified economic growth (including through improvements to infrastructure and fostering private sector-led development), strengthened resilience for food security and nutrition, institutional strengthening, gender equality and building resilience to climate and disaster risks.

The Papua New Guinea government is emphasising that by 2050, renewable sectors including agriculture, fisheries and forestry must account for 70% of GDP compared with the current 26%. The government is committed to prioritising the agriculture sector for further development, which includes the main export products of palm oil, coffee, cocoa and copra, as well as fisheries and timber products.

The Papua New Guinea National Food Security Policy 2018–2027 guides resources to build sustainable food security for all Papua New Guineans. A primary aim of the policy is to foster strong public–private partnerships and leverage agriculture's potential to promote enhanced nutrition and health by bringing together profitable smallholder farming, efficient food value chains, women's income and child nutrition. Australia's development partnership with Papua New Guinea is governed by a comprehensive strategic and economic partnership, which reinforces the strong bonds between the 2 countries and strengthens an ambitious vision for the future. The partnership framework sets out 6 pillars of commitment that Papua New Guinea and Australia will undertake.

Over many years, ACIAR has supported projects in the Autonomous Region of Bougainville, a part of Papua New Guinea with a population of around 300,000. Following the November 2019 independence referendum, the Autonomous Bougainville Government and the Government of Papua New Guinea will continue to work together to develop an independence package.

The COVID-19 pandemic has exposed challenges in food security and resulted in the loss of commodity export income. Like many countries in the region, Papua New Guinea has responded to the pandemic with border closures and movement restrictions that have disrupted supply chains, affected supply and demand and led to the loss of jobs and income.

In 2020, we assessed the impact of COVID-19 on food systems in the region, including Papua New Guinea. The assessment found that one of the biggest impacts was on the sale of fresh food due to the closure of fresh food and fish markets, which affected the women sellers and urban consumers. The assessment also identified areas of focus for future research to improve food systems resilience.

Country priorities

ACIAR research partnerships with Papua New Guinea will continue to focus on horticulture, livestock, fisheries, forestry and socioeconomics. Ultimately, the research is working to secure improvements in food supply, food access and rural incomes for smallholders through increased productivity and enhanced access to markets and services.

Research partnerships aim to:

- overcome social, cultural and policy obstacles to benefits from agricultural technologies, particularly with respect to gender equity and women
- improve smallholder vegetables and starchy staple systems
- analyse commodity and market chains to guide policy and improve production and marketing for cocoa, coffee, coconut and oil palm crops
- enhance germplasm quality for high-value tree species to improve community forestry and agroforestry systems
- work with private sector partners and farmers to adopt promising agricultural technologies
- monitor and identify options for managing biosecurity threats
- enhance livelihoods from smallholder fisheries, and inland and marine aquaculture
- increase household income through diversifying enterprises.

Development of institutional capacity in research in Papua New Guinea remains a crucial priority for the Australian Government. ACIAR will continue to support partner institutions to build the capacity of research personnel through long-term and short-term courses, informal networking events and hands-on experience at the project level. Through this process, we play a very significant role in contributing to the human capital of Papua New Guinea to develop skills and knowledge in sustainable agriculture, fisheries and forestry. An excellent example is the flagship Transformative Agriculture and Enterprise Development program (TADEP), a multidisciplinary research program that aims to improve the livelihoods of rural men and women in Papua New Guinea through 5 component research projects. TADEP is co-funded by DFAT and ACIAR.

Gender equity is an integral part of all our projects in Papua New Guinea. In 2019, the FAO reported that women make up more than 50% of the labour force engaged in agriculture and 35% of women are actively involved in economic agriculture. Women in rural communities play a significant role in subsistence food production, agricultural value chains and rural livelihoods. Women actively participate in grazing livestock, raising poultry, fish farming and sell surplus produce at local markets to generate income for the survival of their families. Only a few women have ventured into small to medium enterprise activities.

In 2021–22, we will embark on 2 major activities:

- the development of an ACIAR Papua New Guinea Alumni Engagement Plan, in consultation with more than 80 ACIAR alumni in Papua New Guinea
- the development of a 10-year strategy for research collaboration with Papua New Guinea, in consultation with key Papua New Guinea research organisation and state-owned enterprises, and aligned with the ACIAR 10-Year Strategy 2018–2027 and the Papua New Guinea–Australia Comprehensive Strategic and Economic Partnership.

2021–22 research program

- **25 ACIAR-supported projects in Papua New Guinea**
- **19 projects are specific to this country**
- **6 projects are part of regional projects**

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

Crops

Oil palm is a long-term and economically important perennial crop that is grown in large plantations and on smallholder farms in South-East Asia and Pacific island countries. The industry is threatened by basal stem rot, a disease caused by the fungus *Ganoderma boninense,* the incidence of which increases with each successive planting of the crop. A long-term trial led by Professor Ian Godwin of the University of Queensland is starting to show differences in susceptibility to the disease between lines from 81 breeding families that have been genotyped. The 2021–22 activities will explore the genetic basis of resistance and select candidate germplasm for resistant planting material.[1]

Loss of revenue in oil palm plantations due to basal stem rot is of great concern at both local and national levels for Papua New Guinea and Solomon Islands. The only viable long-term control of the disease is through the use of tolerant planting material, combined with sanitation measures to reduce the carryover of the pathogen from older, infected trees to new plantings. In the short term, a possible sanitation method for plantations could be the removal of infected logs for biochar production. A small research activity led by Dr Agnieszka Mudge of the University of Queensland is investigating biochar production, which is tailored and appropriate for the oil palm industries in Papua New Guinea (and possibly Solomon Islands).[2]

Fisheries

Aquaculture and capture fisheries are increasingly important for providing livelihoods and meeting the nutritional needs of a rapidly growing population in Papua New Guinea. However, fisheries are challenged by overexploitation, lack of adoption of new technologies and, in some sectors, lack of information. The National Fisheries Authority of Papua New Guinea recognises the need to integrate livelihood goals into fisheries management plans and policies, and to revise and introduce new policies and strategies to sustainably manage aquaculture and capture fisheries. A new project led by Associate Professor Jesmond Sammut of the University of New South Wales will strengthen the research and management capability of the National Fisheries Authority by building core skills to translate scientific findings into policy and management plans for key fisheries sectors.[3]

For 10 years, ACIAR and the National Fisheries Authority of Papua New Guinea have co-invested in inland fish aquaculture R&D. Research has focused on increasing the production efficiency of small-scale fish (tilapia) ponds integrated into household gardens and helping the National Fisheries Authority improve the production capacity of fingerlings at its central hatchery. To aid dissemination and adoption of best-practice techniques and technologies, Associate Professor Jesmond Sammut of the University of New South Wales leads a new 5-year project to support the National Fisheries Authority to develop commercial tilapia businesses in peri-urban areas and reservoirs, and to support villages in remote regions to gain access to reliable and affordable farming inputs and culturally appropriate training services.[4]

To aid dissemination and adoption of best-practice techniques and technologies, a new 5-year project is supporting the National Fisheries Authority to develop commercial tilapia businesses in peri-urban areas and reservoirs. ACIAR project FIS/2018/154

Mabé (half-pearl) jewellery and shell handicraft industries provide income opportunities for both coastal communities and women's social enterprises in the western Pacific. Past project activities have increased the technical skills of communities in the production of juvenile oysters and the farming of mabé shell in Fiji and Tonga, and in the production of shell-based jewellery in Papua New Guinea. The development of greater technical capacity and a better understanding of gendered preferences and aspirations sets the basis for a new project in Fiji, Tonga, Papua New Guinea and Samoa, led by Professor Paul Southgate of the University of the Sunshine Coast. Country-specific interventions are required to ensure uniform mabé pearl jewellery/shellcraft production protocols and standards, improve capacity for sector governance within partner institutions and stakeholders, develop marketing strategies and ensure optimal benefits flow to both women and men across the value chains.[5]

In the Fly River area in the Western province of Papua New Guinea, fishers illegally trade high-value marine products, such as shark fin, beche-de-mer and mud crabs, into the growing Asian market. However, returns are low due to a lack of cooperation between fishers and the absence of culturally appropriate business models, and fishing practices are unsustainable due to overexploitation of fisheries. Dr James Butler of CSIRO and Havini Vira of Ok Tedi Development Foundation lead a small research activity that aims to scope and design alternative small-scale fishery business models for Fly River communities with a focus on women's roles in mud crab fisheries, and tilapia processing in mine-affected regions.[6]

The Western province is the largest province in Papua New Guinea. It encompasses great regional diversity in place-based economies, cultures and ecologies. It shares borders, and interacts economically, with Australia and Indonesia. Despite decades of development support, the Western province remains one of the poorest regions in the world. Development interventions to date have been based largely on a deficit approach that identifies the needs and problems to be addressed and offers solutions. This small research activity led by Associate Professor Katharine McKinnon of the University of Canberra offers an alternative, strengths-based approach. It seeks to build on the strengths and assets of individuals, communities and places as a starting point for thinking collectively about solutions. The study aims to identify locally appropriate, strength-based livelihood development practices for the agricultural development sector working across the diverse regions of Western province. It will foster a community of practice among development practitioners working in the Western province to support them trial new approaches.[7]

Another small research activity, led by Professor Katherine Gibson of Western Sydney University, seeks to draw on the lessons learned from the decades of development work in the Western province. It will take a strengths-based approach by building a deeper understanding of local people's current economic (largely artisanal) activities and their diverse livelihood assets across broad geographic and cultural contexts. This new knowledge will allow development practitioners and donors to identify the foundational building blocks (strengths and assets) underpinning people's current artisanal activities that future investments can build upon.[8]

Forestry

A project in the Eastern Highlands province, the Ramu and Markham valleys and the Lae region aims to improve rural livelihoods through family-focused community reforestation and ecoforestry in community-owned natural forests. Led by Associate Professor Grahame Applegate of the University of the Sunshine Coast, the project has implemented family-focused community reforestation activities, identified methods for scaling out community-based reforestation to landscape scale and reviewed institutional arrangements and policies that improve access to formal timber markets. The project concludes in 2021 with the delivery of a proposed improved management system for ecoforestry, for inclusion in national ecoforestry policy, and alternative marketing and financial models to evaluate harvesting and marketing operations of small-scale, clan-based operators.[9]

In East New Britain province, an earlier project focused on value-added processing and developing markets for galip nuts, produced by the *Canarium* or galip tree. The project, led by Professor Helen Wallace of Griffith University, provided market research, technical advice, capacity building, business mentoring and access to infrastructure for both private and public sector stakeholders. It also provided opportunities to improve livelihoods and women's empowerment in the region. Phase 2 of the project will foster private sector-led development of the galip nut industry, increase value-chain efficiency and establish commercially viable business prospects for private sector investment.[10]

Improved germplasm and smallholder-friendly silvicultural systems for teak (Papua New Guinea) and sandalwood (Papua New Guinea and Cape York Peninsula) were successfully developed in an earlier project led by Dr Tony Page of the University of the Sunshine Coast. However, the complexity of cultural, social and land tenure systems in Indigenous communities can be a significant obstacle for investment in the planted forestry sector. A follow-on project starts in 2021 to scale out the smallholder forest estate to the point where supporting services like nurseries and contract harvesting can be sustained, leading to an increase in planted area, wood supply and smallholder incomes. The key research questions in this project address social and legal structures to facilitate planting on customary land to allow larger, more commercial woodlots.[11]

Horticulture

Coconuts contribute, directly and indirectly, to the livelihoods of coastal communities throughout the Pacific region. Coconut enterprises in Pacific island countries face economic and environmental challenges –diversifying the range of products made from coconuts could offer a path to more-resilient livelihoods. Much of the coconut resource in the Pacific region is ageing or already senile and unproductive. A project led by Dr Carmel Pilotti of SPC aims to support the first step in rejuvenating coconut-based livelihoods in the Pacific islands by strengthening the conservation and use of genetic diversity in coconuts, addressing threats posed by the rhinoceros beetle and Bogia coconut syndrome, and establishing and sustaining a platform for coordinating coconut research-for-development initiatives.[12]

Cocoa production directly supports about two-thirds of the population of the Autonomous Region of Bougainville. Many cocoa farmers have formed cohesive communities with clear goals and objectives, which include assistance to improve crop profitability. Professor David Guest of the University of Sydney leads a project to improve the productivity, profitability and vitality of smallholder cocoa farming families and communities. During 2021–22, the project focuses on the establishment of village budwood gardens and nurseries, and demonstration of crop management practices. It will continue the establishment of support networks, research hubs and farmer training for cocoa production and other potential enterprises.[13]

Coffee production in Papua New Guinea provides employment for more than 2.5 million people and is a major source of income for approximately 400,000 smallholder farmers. The most serious pest of coffee globally, the coffee berry borer, is a recent incursion to highland coffee production areas. The pest is a major threat to the livelihoods of rural families and their communities, and a significant threat to biosecurity in Australia. Dr Ian Newton of the Queensland Department of Agriculture and Fisheries leads a project to limit damage and introduce world-best crop protection practices. During 2021–22, activities will include evaluation and updating of a best-practice integrated pest management (IPM) package, and testing of biological and chemical control solutions.[14]

Sweetpotato is the major staple food crop of Papua New Guinea. About 90% of the population are semi-subsistence smallholder farmers for whom sweetpotato is a major crop species. Increasingly, the crop is becoming commercialised, especially in the highlands, where it is beginning to rival coffee as a preferred source of cash income. A project led by Professor Geoff Gurr of Charles Sturt University is supporting the intensification of sweetpotato production by developing, testing and promoting sustainable solutions to major pest and disease threats. The project concludes in 2021 with the delivery of information and protocols for best-bet combinations of integrated pest and disease management methods, and the development of the capacity of individuals and organisations to continue the research of integrated management methods.[15]

A project in Papua New Guinea will evaluate and update a best-practice integrated pest management package for cocoa producers.
Photo: Conor Ashleigh. ACIAR project HORT/2014/094

An increase in market-oriented production will create income-generating opportunities for growers as well as enable other groups to enter sweetpotato fresh product and sweetpotato-based food product supply chains. Professor Phil Brown of Central Queensland University has led a 5-year project supporting an expansion in market-oriented sweetpotato value chains by strengthening supply chains to selected high-value markets and promoting enterprise development along supply chains. The project has also improved crop production capacity by introducing a scheme to supply clean, high-performing planting material. The project will conclude in 2021, working with agencies in Papua New Guinea to consolidate the supply of virus-free sweetpotato and enable the scale out of the program to other regions.[16]

The development of safe, high-value fruit and vegetable industries is a priority for many Pacific island countries. Dr Michael Furlong of the University of Queensland leads a project to develop integrated pest and disease management strategies for the sustainable intensification of fruit and vegetable crop production, addressing the threats posed by the inappropriate use of pesticides, emerging pests and diseases and climate change. During 2021–22, the project will continue to assess pathways for the introduction and potential spread of insects and test biological control strategies, while developing integrated management approaches for selected crops. The project continues to build surveillance and diagnostic capacity for the management of emerging pests and diseases, including fall armyworm. The project engages with farming communities through local plant health clinics to give growers easier access to expert advice. The project will generate new knowledge, resources and opportunities to encourage the adoption of integrated management strategies.[17]

Livestock Systems

Strong domestic demand for honey and the potential to export honey and by-products offers an opportunity to smallholder farmers in Fiji and Papua New Guinea. A project, led by Dr David Lloyd of Southern Cross University, aims to increase the productivity and profitability of beekeeping enterprises to complement smallholder incomes and promote an income-earning activity for women. During 2021–22, the project will complete spatial and temporal mapping of floral resources and develop best-practice pest and disease management programs in readiness for incursions of varroa and tropilaelaps mites. Capacity building of extension and development agencies to support beekeeping as a sustainable small enterprise will continue.[18]

It is widely reported that the impact of COVID-19 on food systems across the Indo-Pacific is exacerbating gendered inequalities in the region, such as unequal access to productive resources, markets and institutions for women. Professor Sara Davies of Griffith University leads a small research activity to develop an evidence-based approach to identify and understand the specific gendered impacts of COVID-19 responses on food security and socioeconomic outcomes in Myanmar, the Philippines and Papua New Guinea. These insights will be used to outline opportunities and design approaches that will begin to mitigate the harm caused by the COVID-19 disruption at the individual, household and community level. This project contributes to stage 3 of the ACIAR assessment of COVID-19 impacts on food systems in our region.[19]

A project in Papua New Guinea and Fiji aims to increase the productivity and profitability of beekeeping enterprises to complement smallholder incomes and promote an income-earning activity for women. Photo: Cooper Schouten. ACIAR project LS/2014/042

A project in the highland coffee-growing areas is facilitating the development of a model for the use of a demucilager by farmer groups. ACIAR project: ASEM/2016/100

Social Systems

Coffee is economically important for rural livelihoods in Papua New Guinea. Despite a rapidly growing population in the highland coffee-growing areas, national production is declining. A project led by Professor George Curry of Curtin University aims to increase returns for labour from the crop, particularly for women. Using combinations of extension methods tested earlier in the project, the researchers will facilitate the development and adoption of culturally acceptable and nutrient-efficient coffee–vegetable intercropping systems and develop a model for the use of a demucilager by farmer groups.[20]

Communities that are reliant on agriculture-based livelihood systems in Papua New Guinea are particularly at risk from climate variability and change. Dr Steven Crimp of the Australian National University leads a project examining ways in which seasonal climate information, with a 3 to 6-month lead time, can be communicated and integrated with existing farm practices. The aim is to increase the adaptive capacity of farmers, to help them reduce risk and secure adaptive opportunities for food production. During 2021–22, activities focused on field sites will continue to demonstrate the potential value of integrating scientific and Indigenous knowledge. The results of social network analysis and trials will be provided to government, industry and non-government organisations to contribute to existing programs and initiatives across Papua New Guinea.[21]

The successful Family Farm Teams approach will be adapted and applied to develop the capacity of religious institutions in Papua New Guinea to work in a gender-inclusive way when engaging rural agricultural communities in smallholder farm development. The project led by Dr Josephine Caffery of the University of Canberra will also provide pathways for increasing youth involvement in family farm teams and sustainable farming futures.[22]

Soil and Land Management

Papua New Guinea's Vision 2050 requires the contribution of renewable sectors including agriculture, fisheries and forestry to GDP to increase from 26% to 70%. A new project, led by Mr Peter Wilson of CSIRO, will provide useful and targeted information about the natural resource base for better infrastructure, agriculture and forestry planning, development and management. The project will modernise the Papua New Guinea Resources Information Systems that was developed in the 1980s and 1990s. It will deliver a technologically advanced, well-managed soil information system that adheres to FAIR (findable, accessible, interoperable, reusable) data principles and provides valuable information to key decision-makers and a range of stakeholders in agriculture and forestry sectors.[23]

To cope with growing population pressure, sweetpotato is being grown with a shorter fallow period, more rotations with legume crops and shorter cropping periods compared with 10 years ago. Sustainable intensification of production is needed, and this project focuses on smallholder farmers who have the potential to increase their household income through sweetpotato marketing. Professor Neal Menzies of the University of Queensland leads a project to determine the optimum rates of mineral fertilisers and opportunities to use available and accessible organic nutrient sources to avoid soil fertility decline, increase production, and improve the benefit:cost ratio of input. The project also focuses on the social aspect of practice change to understand what is effective and acceptable to smallholder family farmers, and how women and men farmers can share soil management roles.[24]

The first stage of a cocoa farming systems project in Papua New Guinea demonstrated that yields can be increased with improved soil management and better soil fertility, lifting smallholder incomes and improving the livelihoods of smallholder cocoa farming households. A new project, led by Professor Damien Field of the University of Sydney, will build on the outputs and outcomes of the first phase of research. The project will evaluate opportunities to develop site-specific solutions to improve cocoa farming systems using locally available resources to address soil constraints, and improve the soil health and productivity of cocoa plantations. The influence of composts and crop diversification on soil and plant health and the quality of cocoa also will be investigated. The second phase of research also allows for greater dissemination of findings of the first stage of the project, working with households to support shared decision-making between men and women and equitable distribution of benefits.[25]

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See page 197 for contact details.

Current and proposed projects

1. Developing a foundation for the long-term management of basal stem rot of oil palm in Papua New Guinea and Solomon Islands (CIM/2012/086)
2. Managing basal stem rot in oil palm by converting infected logs to biochar [Papua New Guinea] (CROP/2019/147)
3. Institutional strengthening in Papua New Guinea: translating fisheries research into policy and management (FIS/2018/151)
4. Improving peri-urban and remote inland fish farming in Papua New Guinea to benefit both community-based and commercial operators (FIS/2018/154)
5. Towards more profitable and sustainable mabé pearl and shell-based livelihoods in the western Pacific [Fiji, Papua New Guinea, Samoa, Tonga] (FIS/2019/122)
6. Developing alternative small-scale fishery models in the Fly River, Western province, Papua New Guinea (FIS/2020/110)
7. Strengthening agricultural resilience in Western province: methods for place-based livelihoods approach [Papua New Guinea] (FIS/2021/113)
8. Strengthening agricultural resilience in Western province: mapping place-based strength and assets [Papua New Guinea] (FIS/2021/122)
9. Enabling community forestry in Papua New Guinea (FST/2016/153)
10. Enhancing private sector-led development of the canarium industry in Papua New Guinea (phase 2) (FST/2017/038)
11. Promoting smallholder teak and sandalwood plantations in Papua New Guinea and Australia (FST/2018/178)
12. Safeguarding and deploying coconut diversity for improving livelihoods in the Pacific islands [Fiji, Papua New Guinea, Samoa, Solomon Islands, Vanuatu] (HORT/2017/025)
13. Developing the cocoa value chain in Bougainville [Papua New Guinea] (HORT/2014/094)
14. Protecting the coffee industry from coffee berry borer in Papua New Guinea and Australia (HORT/2018/194)
15. Developing improved crop protection options in support of intensification of sweetpotato production in Papua New Guinea (HORT/2014/083)
16. Supporting commercial sweetpotato production and marketing in the Papua New Guinea highlands (HORT/2014/097)
17. Responding to emerging pest and disease threats to horticulture in Pacific islands [Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga] (HORT/2016/185)
18. Increasing the productivity and profitability of smallholder beekeeping enterprises in Papua New Guinea and Fiji (LS/2014/042)
19. COVID-19: gendered risks, impact and response in the Indo-Pacific: rapid research and policy guidance (COVID-19 impacts program) [Myanmar, Papua New Guinea, Philippines] (LS/2020/203)
20. Improving livelihoods of smallholder coffee communities in Papua New Guinea (ASEM/2016/100)
21. Climate smart agriculture opportunities for enhanced food production in Papua New Guinea (ASEM/2017/026)
22. Gender equitable agricultural extension through institutions and youth engagement in Papua New Guinea (SSS/2018/137)
23. Better soil information for improving Papua New Guinea's agricultural production and land use planning: building on PNGRIS and linking to the Pacific Regional Soil Partnership (SLAM/2019/106)
24. Sustaining soil fertility in support of intensification of sweetpotato cropping systems [Papua New Guinea] (SMCN/2012/105)
25. Optimising soil management and health in Papua New Guinea integrated cocoa farming systems (phase 2) (SLAM/2019/109)