

Papua New Guinea

 **A\$8.4** million
Budgeted funding

 **24**
Bilateral and regional
research projects

 **3**
Small projects and
activities

Australia values its longstanding ties with Papua New Guinea, through a shared history and shared geography. As our nearest neighbour and close regional partner, a stable and prosperous Papua New Guinea is in Australia's interest. We share a border, economic interests and common legal frameworks.

Over time, our relationship has matured into an economic and strategic partnership. Despite huge resource potential and its close proximity to Asian markets, Papua New Guinea faces economic challenges and fiscal pressures. Many factors challenge future prosperity, including lack of infrastructure, complex governance arrangements, inequality between men and women and a rapidly growing population. Papua New Guinea also remains vulnerable to climate change and natural disasters, including earthquakes, volcanoes and tsunamis. The population is overwhelmingly poor, with 80% living in traditional rural communities.

The development challenges for young people are stark: an estimated 40% of children experience impaired growth and development (stunting), one in five are not enrolled in school and nearly half the population is under the age of 20.

An overview of Australia's aid program in Papua New Guinea is available on the DFAT website.

Papua New Guinea is the largest island nation in the Pacific region. It has about eight million people, of which 85% live in rural communities and rely heavily on subsistence agriculture for food and cash income.

The economy of Papua New Guinea has two main sectors. The agriculture, fisheries and forestry sector involves most of the country's labour force, but the mineral and energy extraction sector contributes significantly to the export earnings of the country.

Agriculture is the most significant economic activity for rural communities. Most of the food consumed by farmers is produced in subsistence farming systems, and cash income for farmers comes from the sale of crops such as coffee, cocoa, copra and palm oil.

ACIAR has worked in partnership with Papua New Guinea for more than 30 years and contributed to the improved productivity and sustainability of agriculture and food systems resilience.

The Papua New Guinea Government has emphasised that, by 2050, renewable sectors (agriculture, fisheries and forestry) are to account for 70% of GDP compared to 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. However, the high cost of internet in Papua New Guinea remains a major challenge for farmers, and for agencies trying to disseminate information to farmers to improve their understanding of commodity production and markets.

Vision 2050 is a road map that provides overall direction for the long-term development strategy of Papua New Guinea. It was launched in 2010. Following on from Vision 2050, the government developed the Papua New Guinea Development Strategic Plan 2010–2030, which outlines development targets and how the country could achieve these targets by 2030.

In line with the United Nations' Sustainable Development Goals, Vision 2050 and the Development Strategic Plan 2010–2030, the government will develop four medium-term development plans, each for a five-year period. The government is currently implementing the third medium-term development plan (2018–2022), which envisages the future direction of the government, focuses on inclusive economic growth and addresses agriculture, fisheries, forestry, gender, environment and climate change.

While the development plan integrates the Sustainable Development Goals, a major focus remains the promotion of economic growth through sustainable agriculture, fisheries and forest management. The development plan specifically emphasises smallholder rubber production, smallholder and private sector partnerships to grow rice domestically, a commercially viable livestock industry and food security. The Papua New Guinea Government affirmed its commitment to food security by developing the Papua New Guinea Food Security Policy (2018-2027).

In response to the Papua New Guinea Government's development priorities, the Australian Government, through the Pacific Step-up, aims to further improve its support of Pacific island countries, including Papua New Guinea.

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. At a referendum held in November 2019, 97% of voters supported independence for the region. During 2020-21, the Autonomous Bougainville Government and the Government of Papua New Guinea will continue working on an independence package.

The COVID-19 pandemic is having a major impact on the food systems and economy of Papua New Guinea. ACIAR is supporting an [assessment of food system security, resilience and emerging risks in the Indo-Pacific in the context of COVID-19](#). This will help identify areas of focus for our research collaboration with Papua New Guinea to increase food-systems resilience in the face of future shocks.

Country priorities

The Government of Papua New Guinea continues to develop its research focus on the agriculture, fisheries and forestry sectors. Specific aims and activities include:

- » work in partnership and collaboration with current Australian Government-funded programs such as PHAMA Plus, Market Development Facility, Pacific Women Shaping Pacific Development and the Bougainville Partnership Program
- » improve access to good information on agricultural production and land-use planning
- » increase returns, particularly for women, through adaptation of new technologies and farming practices
- » improve livelihoods of smallholders in marine and inland aquaculture
- » improve community forestry and agroforestry systems
- » improve germplasm quality for high-value tree species
- » contribute to institutional capacity in research and organisational development
- » influence policy through communication of research outcomes.

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 and short-term courses, informal networking events and hands-on experience working at the project level.



Through this process, ACIAR plays 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 five component research projects. TADEP is co-funded by DFAT and ACIAR.

Gender equity will always be an integral part of all ACIAR projects in Papua New Guinea. According to FAO (2019), 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, poultry, fish farming and sell surplus produce at local markets to generate income for their families' survival. Only a few women have ventured into small to medium enterprise activities.

Currently in Papua New Guinea, other key initiatives and programs working with ACIAR in the agriculture sector include the International Fund for Agriculture Development—Market Bilong Vilis Famas, which will undertake an independent assessment of the business model of galip nut processing and the World Bank PNG Agriculture Commercialisation Project, which continues its support of farmers in cocoa and coffee.

In 2021, ACIAR will work with key partners including the Papua New Guinea Research, Science and Technology Secretariat to develop a 10-year strategy for research collaboration with Papua New Guinea to align with the Pacific Island Strategy.

2020–21 research program

ACIAR supports 27 projects in Papua New Guinea, 20 of which are specific to this country. The remainder are part of regional projects. The projects address our high-level objectives, as outlined in the 10-Year Strategy 2018–2027, as well as specific issues and opportunities identified by ACIAR and 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 seven-year 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 2020–21 activities will try to identify the genetic basis of resistance and select candidate germplasm for resistant planting material.¹

The identification and use of tolerant planting material is expected to offer an effective and durable solution for managing basal stem rot in oil palm plantations. In the meantime, a possible sanitation method could be the removal of infected logs. A small research activity led by Dr Agneszka Mudge of the University of Queensland will determine if this sanitation method could be supported by biochar production, using solutions tailored and appropriate for the oil palm industries in Papua New Guinea (and possibly Solomon Islands).²



Staff of the National Agriculture Research Institute's research station at Kerevat are cracking galip nuts. ACIAR is partnering with farmers, NARI and the private sector to commercialise galip nut production. Photo: Aaron English. ACIAR project: FST/2017/038.

Fisheries

Mabé 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 half-pearl (mabé) shell in Fiji and Tonga, and in the production of shell-based jewellery in Papua New Guinea. In the final year of a project led by Professor Paul Southgate of the University of the Sunshine Coast, researchers will determine the economic and socioeconomic impacts of pearl- and shell-based livelihood development in Fiji, Tonga and Papua New Guinea³, and its potential development in Tonga and Vietnam (in another ACIAR-supported project). 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. 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 men and women across the value chains.⁴

Mariculture enterprises have the potential to provide an alternative source of income for both men and women in coastal communities of the New Ireland province. Although the region generally enjoys healthy fish stocks, the local sea cucumber fishery has collapsed from overharvesting, with the associated loss of an important income source for communities. A project led Professor Paul Southgate of the University of the Sunshine Coast will conclude in 2021, completing activities that support staff at the Nago Island Marine Research Facility in Kavieng to develop skills in hatchery production of sea cucumber and ornamental fish. This offers potential new income sources from export to international markets.⁵

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.⁶

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 is leading a new five-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 gain access to reliable and affordable farming inputs and culturally appropriate training services.⁷

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 eco-forestry in community-owned natural forests. Led by Mr Grahame Applegate of the University of the Sunshine Coast, the project aims to implement family-focused community reforestation activities, identify methods for scaling out community-based reforestation to landscape scale and identify institutional arrangements and policy recommendations that improve access to formal timber markets.⁸

Agroforestry systems are well suited to the Pacific region, and provide food, timber, non-wood forestry products and ecosystem services. However, returns from agroforestry trees take several to many years to be realised. Since 2015, Professor Helen Wallace of Griffith University has led a project to enhance the economic, social and environmental benefits of agroforestry in Fiji, Solomon Islands, Vanuatu and Papua New Guinea. Concluding in 2021, the project will complete training and facilitation activities enabling smallholders to participate in value-adding opportunities identified by the project. These include growing short-term crops in the agroforestry systems and processing and marketing products from the system, e.g. nuts, muesli and dried fruit.⁹

In East New Britain, an earlier project focused on value-added processing and developing markets for galip nuts, produced by the canarium or galip tree (*Canarium indicum*). 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



A newly constructed irrigation system on a farm in the Jiwaka province, which is part of research to improve sweetpotato production in the highlands of Papua New Guinea. Photo: Fresh Produce Development Authority, ACIAR project: HORT/2014/097.

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. 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. Key questions in this research are around social and legal structures to facilitate planting on customary land to allow larger, more commercial woodlots.¹¹

Horticulture

Sustainable intensification of fruit and vegetable crop production in the Pacific region requires integrated pest and disease management strategies. Dr Michael Furlong of the University of Queensland leads a project to address the threats posed to smallholder livelihoods and their communities by inappropriate use of pesticides, emerging pests and diseases and climate change. During 2020–21, the project will continue to assess pathways for the introduction and potential spread of insects that threaten the region, including fall armyworm, and test biological control strategies against target pests while developing integrated management approaches for selected crops. 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.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. 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. In its final stages, the project will continue to foster and strengthen public and private sector partnerships, which is giving new enterprises access to premium markets.¹³

Also focused on increased production and profitability and enterprise development, a project in East Sepik, Madang, New Ireland and Simbu (formerly Chimbu) provinces works with communities and extension services to rejuvenate old, overgrown and low-yielding cocoa plantings. A project led by Dr Phil Keane of La Trobe University has helped smallholder farmers adopt new cocoa varieties and plant management methods. The final year of the project will see further development of the village-based extension services, other support services, such as microfinance, and R&D services.¹⁴

About 90% of Papua New Guinea's population consists of semi-subsistence smallholder farmers for whom sweetpotato is a major crop species. A project led by Dr Geoff Gurr of Charles Sturt University is supporting the intensification of sweetpotato production. During 2020–21, the project will promote the best-bet combinations of integrated pest and disease management methods, while continuing to evaluate the social and economic benefits of these methods and build research capacity.¹⁵ This and other concluded projects provide technical support for a project led by Professor Phil Brown of Central Queensland University. Forming part of TADEP (page 64), the project is in its final year of developing and strengthening sustainable and market-oriented value chains for sweetpotato-based production systems in the Papua New Guinea highlands.¹⁶

Coconuts contribute, directly or indirectly, to the livelihoods of coastal communities throughout the Pacific region. Coconut enterprises in Pacific island countries face economic and environmental challenges; however, 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.¹⁷

Coffee is one of the most important crops in Papua New Guinea, providing employment for more than 2.5 million people and a major source of income for approximately 400,000 smallholder farmers, who produce 85% of the coffee. 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 millions of rural families and their communities and poses a significant biosecurity threat to 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 2020–19, a review of local and global management strategies will continue. The review aims to determine a best-bet management package and identify research priorities, with the longer-term aim of finding long-term sustainable integrated pest-management solutions.¹⁸

Livestock Systems

Beekeeping offers many opportunities for smallholder farmers, based on strong domestic demand for honey and the potential to export honey and by-products. A project in Fiji and Papua New Guinea, 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 2020–21, the project will continue to develop and test appropriate technical and business practices, improve disease control at community and government levels, and build the capacity of extension and development agencies to support beekeeping as a sustainable small enterprise.¹⁹

Two small research activities are underway in Papua New Guinea, as part of the Research for One Health Systems Strengthening program (page 48).

Japanese encephalitis virus is an important cause of human viral encephalitis in South-East Asia. The virus is mosquito-borne, with pigs and waterbirds acting as hosts, and is of public health importance. In Papua New Guinea, Japanese encephalitis has the potential to be an economically important disease of pigs. A small research activity, led by Dr David Williams of the CSIRO Australian Animal Health Laboratory, is using a One Health approach to establish surveillance strategies for Japanese encephalitis and zoonotic arboviruses in Papua New Guinea.²⁰

Tuberculosis is a leading cause of death in Papua New Guinea, and a leading cause of death from infectious diseases worldwide. In addition to pulmonary tuberculosis, there is a high burden of suspected extra-pulmonary tuberculosis in the Pacific. This can be a sign that zoonotic and environmental strains of tuberculosis are also circulating, requiring different approaches to management and prevention. Dr Philipp Du Cross of the Burnet Institute is conducting a small research activity to determine the types of bacteria causing tuberculous lymphadenitis, with a particular focus on risk factors associated with exposure to animals. This will be done by assessing consenting patients with suspected tuberculous lymphadenitis.²¹

Social Sciences

The socioeconomic and cultural factors influencing smallholders' farming and livelihood systems, and their capacity to adapt and respond to stress on cocoa and oil palm production systems, were studied in a project led by Associate Professor Gina Koczberski of Curtin University of Technology. In its final year, the researchers will collaborate with extension and private sector organisations and non-government organisations in cocoa, coffee, oil palm and fresh food produce to develop policies and programs that empower rural women to create agribusiness opportunities.²²



Coffee is economically important for rural livelihoods in Papua New Guinea, but national production is declining, despite a rapidly growing population in the highland coffee-growing areas. A project led by Professor George Curry of Curtin University aims to increase returns for labour, particularly for women. The project will use combinations of extension methods tested earlier in the project to 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.²³

Communities reliant on agriculture-based livelihood systems in Papua New Guinea have been identified as being particularly at risk from climate variability and change. A project, led by Dr Steven Crimp of the Australian National University, aims to provide farming communities with knowledge and skills related to seasonal climate risk and adaptive management, to help them reduce risk and secure adaptive opportunities for food production.²⁴

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.²⁵

Soil and Land Management

Yields of cocoa can be increased with improved soil management and better soil fertility, which in turn can lift incomes and result in healthier communities. A project, led by Associate Professor Damien Field of the University of Sydney, is evaluating opportunities to use green waste composts produced from smallholder cocoa farming systems to supply nutrients to the soil and improve the management, health and productivity of cocoa plantations. The project is evaluating the influence of composts and crop diversification on soil and plant health and nutrient content in cocoa produced in cocoa farming systems, and is developing region-specific soil-management strategies for smallholdings.²⁶

Papua New Guinea's Vision 2050 aspires to a vibrant, sustainable and profitable agriculture sector, and requires the contribution of agriculture to GDP to increase from 20% to 70%. A new project supports this by providing useful and targeted information about the natural resource base for better infrastructure, agriculture and forestry planning, development and management. Led by Mr Peter Wilson of CSIRO Agriculture and Food, the project will modernise the Papua New Guinea Resources Information Systems, which was developed by CSIRO with the support of ACIAR in the 1980s and 1990s. The project 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.²⁷



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See page 209 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 Island (CIM/2012/086)
2. Managing basal stem rot in oil palm by converting infected logs to biochar [Papua New Guinea] (CROP/2019/147)
3. Developing pearl industry-based livelihoods in the western Pacific [Fiji, Papua New Guinea, Tonga] (FIS/2014/060)
4. Towards more profitable and sustainable pearl-industry based livelihoods in the western Pacific [Fiji, Papua New Guinea, Samoa, Tonga] (FIS/2019/122)
5. Improving technical and institutional capacity to support development of mariculture-based livelihoods and industry in New Ireland, Papua New Guinea [Papua New Guinea] (FIS/2014/061)
6. Institutional strengthening in Papua New Guinea: translating fisheries research into policy and management (FIS/2018/151)
7. Improving peri-urban and remote inland fish farming in Papua New Guinea to benefit both community-based and commercial operators (FIS/2018/154)
8. Enabling community forestry in Papua New Guinea (FST/2016/153)
9. Enhancing value-added products and environmental benefits from agroforestry systems in Papua New Guinea and the Pacific [Fiji, Papua New Guinea, Solomon Islands, Vanuatu] (FST/2014/067)
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. Responding to emerging pest and disease threats to horticulture in the Pacific islands [Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga] (HORT/2016/185)
13. Developing the cocoa value chain in Bougainville (HORT/2014/094)
14. Enterprise-driven transformation of family cocoa production in East Sepik, Madang, New Ireland and Chimbu Provinces of Papua New Guinea (HORT/2014/096)
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. Safeguarding and deploying coconut diversity for improving livelihoods in the Pacific islands [Fiji, Papua New Guinea, Samoa, Solomon Islands, Vanuatu] (HORT/2017/025)
18. Protecting the coffee industry from coffee berry borer in Papua New Guinea and Australia (HORT/2018/194)
19. Increasing the productivity and profitability of smallholder beekeeping enterprises in Papua New Guinea and Fiji (LS/2014/042)
20. A One Health approach to establish surveillance strategies for Japanese encephalitis and zoonotic arboviruses in Papua New Guinea (One Health) (LS/2018/213)
21. Drug sensitive and resistant tuberculosis and zoonotic infections as causes of lymphadenitis in three provinces in Papua New Guinea (One Health) (LS/2018/217)
22. Identifying opportunities and constraints for rural women's engagement in small-scale agricultural enterprises in Papua New Guinea (ASEM/2014/054)
23. Improving livelihoods of smallholder coffee communities in Papua New Guinea (ASEM/2016/100)
24. Climate-smart agriculture opportunities for enhanced food production in Papua New Guinea (ASEM/2017/026)
25. Gender equitable agricultural extension through institutions and youth engagement in Papua New Guinea (SSS/2018/137)
26. Optimising soil management and health in Papua New Guinea integrated cocoa farming systems (SMCN/2014/048)
27. 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)