Australian Government

Australian Centre for International Agricultural Research

ACIAR

ANNUAL OPERATIONAL PLAN 2022–23

About ACIAR

Research that works for developing countries and Australia

The Australian Centre for International Agricultural Research (ACIAR) is the Australian Government specialist agricultural research-for-development agency, within the Australian development program.

Vision

ACIAR looks to a world where poverty has been reduced, and the livelihoods of many improved through more productive and sustainable agriculture emerging from collaborative international research.

Mission

To achieve more productive and sustainable agricultural systems, for the benefit of developing countries and Australia, through international agricultural research partnerships.

Enabling legislation

ACIAR is established by the *Australian Centre for International Agricultural Research Act 1982*, as amended.

Also established under the Act are the Commission for International Agricultural Research and the Policy Advisory Council.

Responsible minister

ACIAR is part of the Australian Government Foreign Affairs and Trade portfolio, and is accountable to the Minister for Foreign Affairs, Senator the Hon Penny Wong.

Governance

ACIAR has an executive management governance structure headed by the Chief Executive Officer, who reports directly to the Minister for Foreign Affairs.

This report should be attributed as the ACIAR Annual Operational Plan 2022–23

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Cover photo: The ACIAR Annual Operational Plan details programs and projects for 2022–23 that aim to enhance the livelihoods of smallholder farmers, fishers and foresters throughout the Indo-Pacific region. Pictured is ACIAR Meryl Williams Fellow and forest scientist, Agnes Mone Sumareke, who has worked on several ACIAR-supported projects in Papua New Guinea.

Photo (right): Adi Rahmatullah

ACIAR

ANNUAL OPERATIONAL PLAN 2022–23

ACIAR

Welcome

The Australian Centre for International Agricultural Research (ACIAR) is celebrating the achievements and impacts of 40 years of agricultural research-for-development, throughout 2022. Tackling shared challenges with partner countries in the Indo-Pacific region through agricultural research collaboration remains a compelling element of Australian soft power in our region. Australia is well equipped to play a leading role within our region and globally – disproportionate to the size of our population and economy.

At the outset of 2022, ACIAR released a 2-part impact assessment of 40 years of research. The quantitative assessment calculated a total benefit of at least $64 billion dollars, with a $3.7 billion benefit to Australia. This is a conservative result, as the study focused on just 10% of investment since 1982, and is based on parameters that are readily quantifiable. The qualitative assessment identified the key design, management and practice principles that support effective translation of research knowledge into development outcomes.

The study gives us confidence that our well-established but continually evolving research partnership model is delivering against our vision and mission. The work of ACIAR and its partners supports regional stability, health security and economic recovery, and builds scientific and policy capability for more productive and sustainable agriculture, fisheries and forestry.

A time to review and refresh

ACIAR has conducted systemic ex-post economic impact assessment on research investments since the late 1980s. Our work is monitored at the project and portfolio level, to understand the impact of our achievements and to guide future investment. The culture of a learning organisation is central to the ACIAR 10-Year Strategy 2018–2027.

As well as a time for celebrating, the milestone of 40 years of operation is a good time for reflection and coincides with a mid-term review of the 10-year strategy. The Commission for International Agricultural Research appointed a highly qualified panel, chaired by Dr Wendy Craik AM, to review progress against the objectives of the strategy and to assess if the strategy remains fit for purpose, especially given the significant change to the ACIAR operating environment due to the COVID-19 pandemic.

During 2022–23, and the second half of the 10-year strategy, ACIAR will consider and implement the recommendations of the review, with an immediate focus on transferring a proportion of research investment from single issue or single discipline projects, to transdisciplinary and cross-program initiatives. We will also look to maximise synergies between our multilateral and bilateral investments, by developing innovative partnerships with multilateral agricultural research-for-development institutions, including CGIAR. We will also release a refreshed version of the ACIAR 10-Year Strategy 2018–2027.

Equitable, inclusive and empowering

This year we look forward to working with some 370 organisations on approximately 170 projects, to address many challenges and opportunities.

Recognising the centrality of gender equity and of inclusive approaches to diversity across all stages of the research cycle, we look forward to releasing the ACIAR Gender Equity and Social Inclusion Strategy and Action Plan 2022–2027. The plan will provide a road map to scale up and integrate gender equity and social inclusion into ACIAR research, capacity building and outreach programs.

This year we will also work towards a stronger integration of investments by the ACIAR Capacity Building and Research programs by embedding strategic capacity building initiatives at the planning stage of selected research projects. ACIAR projects that share expertise in genuine partnerships, build scientific and policy capability in partner countries and deliver benefits back to Australia.

Recognised global science partner

Australia's reputation as a valued international partner in agricultural research-for-development was in the spotlight in November 2022, as ACIAR hosted the CGIAR System Council for the first time.

The CGIAR is the world's largest agricultural innovation network dedicated to reducing rural poverty, increasing food and nutrition security for human health and improving natural resource systems and ecosystem services. Australia contributes approximately $20 million to CGIAR each year (see more about CGIAR in Chapter 2). ACIAR represents and manages Australia's investment in CGIAR, and as one of the top 15 funders, Australia has a seat on the CGIAR governing body, the System Council. Dr Jurgen Voegele, System Council Chair and World Bank Vice President for Sustainable Development, invited Australia to host the 17th CGIAR System Council meeting.

ACIAR timed the System Council meeting to coincide with the TropAg International Agriculture Conference, also in Brisbane, a biennial conference attended by approximately 800 food and agricultural scientists. Hosted by the University of Queensland, a major ACIAR collaborator, the conference features scientists actively engaged in agrifood systems research for improved nutrition, sustainability and human health.

The Commission for International Agricultural Research and the Policy Advisory Council – bodies established under the ACIAR Act to advise the Australian Minister for Foreign Affairs – also met at this time. To capitalise on the presence of global leaders and leading scientists, the Commission, supported by the Policy Advisory Council, hosted a 3-part dialogue entitled 'Food security and food systems transformation in the Indo-Pacific – the role for science'.

Minister for Foreign Affairs, Senator the Hon Penny Wong, visited ACIAR House, Canberra, in September 2022.

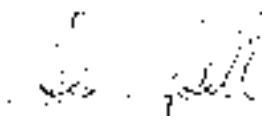
Australia's contribution to the region

In 2022–23, ACIAR will be consolidating the functions of its newest, and eleventh, country office – in Dili, Timor-Leste. ACIAR has been a development partner with Timor-Leste for more than 20 years. However, health and nutrition outcomes in the small nation are not satisfactory, and R&D capacity at the individual, organisational and institutional levels remains low. The opening of an ACIAR country office in Timor-Leste allows for a locally focused but regionally strategic approach to research and capacity building investment.

Science partnerships in areas of shared concern like food security, water security, health security and biosecurity – all amplified by climate change – are a distinctive element of how Australia projects itself across the Indo-Pacific region. This Annual Operational Plan provides a comprehensive outline of the investment by ACIAR of around 2.5% of the Australian Overseas Development Assistance (ODA).

The Australian Government is revising its development policy, that will necessarily inform the ODA budget and the delivery of aid programs. From initial discussions with the Foreign Minister, Senator the Hon Penny Wong, I am confident that ACIAR and the research investments we manage are well-positioned to inform development policy and its implementation. Minister Wong has a very clear understanding that Australia's strengths in agricultural, environmental and health sciences are a strategic national asset, highly relevant to the challenges faced by all countries across the Indo-Pacific region. Food security concerns, exacerbated by the 'three Cs' of climate change, COVID-19 and conflict, are central once again. The intersections between food security, biosecurity, water security, health security and national security have never been more obvious or cogent.

This Annual Operational Plan, my last as CEO of ACIAR, sets out where and how we plan to invest over the coming year. I have every confidence that our highly committed and skilled staff and partners in Australia and our partner countries will deliver this plan successfully, adding to the 40 years of durable impact already delivered through ACIAR. It has been an honour to be part of this endeavour since 2016.



Andrew Campbell
Chief Executive Officer

Definitions

ACIAR	Australian Centre for International Agricultural Research
AIRPOH	ACIAR–IDRC Research Program on One Health
Alliance	Alliance for Agricultural Research and Development for Food Security – a joint initiative between ACIAR, the Syngenta Foundation for Sustainable Agriculture and the Crawford Fund
APAARI	Asia-Pacific Association of Agricultural Research Institutions
ASEAN	Association of Southeast Asian Nations
AusAID	a former Australian Government aid program, within DFAT
CAADP	Comprehensive Africa Agriculture Development Programme
CABI	Centre for Agricultural Biosciences International
CGIAR	now identified by the initialism, but formerly the Consultative Group for International Agricultural Research – a global organisation of funders and international agricultural research centres
CIMMYT	International Maize and Wheat Improvement Center
COP27	the 27th UN Conference of the Parties on Climate Change
COVID-19	a highly infectious disease, primarily affecting the lungs, caused by a new strain of coronavirus. 'CO' stands for corona, 'VI' for virus, and 'D' for disease. Formerly, this disease was referred to as '2019 novel coronavirus' or '2019-nCoV'.
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CultiAF	Cultivate Africa's Future Fund
DFAT	Australian Government Department of Foreign Affairs and Trade
DOST–PCAARRD	The Department of Science and Technology – Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
GRA	Global Research Alliance on Agricultural Greenhouse Gases
IDRC	International Development Research Centre (Canada)
IMF	International Monetary Fund
LIFE	Livelihood Improvement through Facilitated Extension
OECD	Organisation for Economic Co-operation and Development
PCAARRD	Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
PSM	Public Service Medal
SPC	The Pacific Community – the principal scientific and technical organisation supporting development in the Pacific region; an international organisation established by treaty (the Canberra Agreement) in 1947
TADEP	Transformative Agriculture and Enterprise Development program
UN	United Nations
WorldVeg	World Vegetable Center

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Overview

Photo: Huynh Minh Dong

Overview

The Australian Centre for International Agricultural Research (ACIAR) brokers and supports collaborative international research partnerships to improve livelihoods in the agriculture, fisheries and forestry sectors in the Indo-Pacific region, while emphasising individual and institutional capacity building and opportunities for development led by the private sector.

As an agency of the Australian Government, ACIAR works with regional partners to tackle the intersecting and complex challenges of growing more food, improving human nutrition and reducing poverty while using less land, water and energy. At the same time, while striving for more productive and sustainable agriculture, we must adapt to and mitigate the effects of climate change.

Our work reflects Australian Government policy imperatives articulated in the:

- Australian Government's development program
- Sustainable Development Goals of the United Nations (UN) 2030 Agenda for Sustainable Development
- Paris Agreement under the UN Framework Convention on Climate Change.

Diversity and flexibility are key to our work, but equally important is that all programs, projects and partners are working towards common objectives and goals.

The ACIAR 10-Year Strategy 2018–2027 sets out 6 high-level strategic objectives that guide our partnerships, programs and projects. These objectives are consistent with the purpose stated in our enabling legislation and reflect the policy imperatives of the Australian Government. Of these objectives, 3 build knowledge to underpin crucial development objectives and 3 ensure that our work is equitable, inclusive and empowering.

Reflecting our ethos of ongoing reflection and improvement, ACIAR will start addressing recommendations arising from a mid-term review of our 10-year strategy during 2022–23. While much of the strategy has been achieved, there is still room for improvement and progress. We have the challenge of developing longer-term transformational and transdisciplinary research programs, and greater synergies between our bilateral and multilateral research investments, to respond to major issues of concern in our region.

ACIAR 10-Year Strategy 2018–2027

ACIAR brokers and invests in research partnerships with developing countries in the Indo-Pacific region to build knowledge to support crucial development objectives

Strategic objectives 1, 2 & 3

1. **Food security and poverty reduction**
   Improving food security and reducing poverty among smallholder farmers and rural communities
2. **Natural resources and climate change**
   Managing natural resources and producing food more sustainably, adapting to climate variability and mitigating climate change
3. **Human health and nutrition**
   Enhancing human nutrition and reducing risks to human health

ACIAR works to ensure that its research-for-development programs are equitable, inclusive and empowering

Strategic objectives 4, 5 & 6

4. **Gender equity and women's empowerment**
   Improving gender equity and empowerment of women and girls
5. **Inclusive value chains**
   Fostering more inclusive agrifood and forestry value chains, engaging the private sector where possible
6. **Capacity building**
   Building scientific and policy capability within our partner countries

An enduring operational model

Establishment of ACIAR

Australian Centre for International Agricultural Research Act 1982 – an Act to encourage research for the purpose of identifying, or finding solutions, to, agricultural problems of developing countries

July 1981

The establishment of a small statutory body was approved by the Cabinet of the Australian Government. The agency would be charged with contracting research work to Australian institutions in the field of agriculture and related disciplines for the benefit of developing countries (Cabinet Minute – Decision No. 15987).

June 1982

The *Australian Centre for International Agricultural Research Act 1982* was passed, establishing ACIAR as a statutory authority in the Foreign Affairs portfolio. Responsibility for operations of the centre was assigned to a Board of Management.

A Policy Advisory Council was established to advise the Minister on the agricultural problems of developing countries and research programs and policies that may address understanding and solving of these problems.

June 2007

The ACIAR Act was amended. Principally, the Board of Management was replaced by an executive management structure with a Chief Executive Officer reporting directly to the Minister for Foreign Affairs. A 7-member Commission for International Agricultural Research was established to provide advice to the Minister on the functioning of the Act. The responsibilities of the Policy Advisory Council were unchanged.

March 2018

The ACIAR 10-Year Strategy 2018–2027 was launched, setting out the high-level direction and priorities of the agency, to achieve its mission of 'more productive and sustainable agricultural systems, for the benefit of developing countries and Australia, through international agricultural research partnerships'.

November 2022

The ACIAR 10-Year Strategy 2018–2027 was updated to incorporate recommendations from a mid-term review of the strategy.

On 3 June 2022, ACIAR marked the 40-year milestone of working with regional partners to reduce poverty and improve livelihoods. The ACIAR business model of brokering science partnerships in agriculture, fisheries and forestry between the Australian innovation system and our neighbours in the Indo-Pacific region remains as relevant today as it was when ACIAR was established in 1982.

Ensuring that the best of Australian science can be combined with local knowledge and implemented effectively in the field depends on the quality and durability of partnerships between farmers, researchers, industry and government. Our outstanding track record of building and sustaining deep, trusting partnerships over the last 40 years is now a great strategic asset.

As the capabilities and capacity of partner countries develop, through maturing economies and innovation systems, ACIAR actively seeks to devolve greater initiative, leadership and control to partners in project initiation, delivery and linking with Australian partners. ACIAR then takes on a more consultative role.

Within this evolving context, our operational model continues to deliver against our enabling legislation, Australia's development program and the UN Sustainable Development Goals, through 6 strategic objectives and 3 key areas of work:

1. **Global research collaborations**
   We develop and foster partnerships and relationships with other international research and development agencies, the most significant being CGIAR. We also develop and foster partnerships with development donors and the private sector to pursue shared goals and ensure that ACIAR-funded research results are implemented at scale.

2. **Bilateral and regional research projects**
   We generate knowledge from ACIAR-funded projects and programs to empower smallholder farmers, extension agents, scientists and policymakers to take on the intersecting challenges of growing more and healthier food and reducing poverty while using less land, water and energy.

3. **Scientific and policy capacity-building activities**
   We identify and establish opportunities for individuals and institutions in partner countries to boost technical, policy and management skills in agriculture, fisheries, forestry and management of land and water resources.

ACIAR partnership model

2022–23 operating environment

Our operating environment within the Indo-Pacific region is being reshaped by global-scale food, health and biosecurity crises, direct and indirect impacts of geopolitical tensions, and unprecedented weather events precipitated by a more variable climate.

While ACIAR has contributed to improved livelihoods in partner countries over 40 years, there is still much work to be done. The COVID-19 pandemic has reversed the 25-year trend of poverty reduction; and COVID-19 is just one of many zoonotic diseases that have the potential for endemic and pandemic impact. ACIAR will continue to build its participation and expertise in One Health and biosecurity – for the benefit of smallholder farmers, as well as the agriculture industry in Australia.

Food and energy shortages and rising inflation are having a global impact, including on the populations of our partner countries. These factors influence the opportunities we have to work with our neighbours to build the partnerships, knowledge and capacity required to achieve more productive and sustainable agricultural systems, while also enhancing food security, nutrition security and livelihoods.

In 2022–23 ACIAR will continue to develop long-term agreements for research collaboration with partner countries. Historically, these agreements defined a program of research collaboration, geographically and thematically tailored to the agricultural development needs of the partner country. Recently and into the future, many of these agreements have and will become partnering arrangements reflecting new opportunities for collaboration as the science capability of partner countries increases and their innovation systems mature.

We will continue to foster positive changes to our operating models that came about during the height of the COVID-19 pandemic, such as increased decision-making and leadership by in-country partners. However, we also plan to embrace the relationship and operational benefits that come from international travel by researchers between Australia and partner countries, and travel to Australia for training by scientists from partner countries.

The purpose of ACIAR to identify or find solutions to agricultural problems of developing countries has remained relevant over 40 years. The work of ACIAR and our partners with smallholder farmers in the Indo-Pacific region contributes to the knowledge, skills, technology and frameworks required to restore disrupted production systems and value chains across the agriculture, fisheries and forestry sectors.

Regional stability and economic security

Australian security and economic interests remain linked with the countries of our region. The Australian Government's investment in agricultural development, through ACIAR, supports regional processes for promoting peace and economic growth, ensuring Australia is a trusted science partner and leader in the agriculture and natural resources sectors.

In June 2022, then Vice Minister Le Quoc Doanh (left) from the Vietnamese Ministry of Agriculture and Rural Development presented a medal to ACIAR CEO Professor Andrew Campbell (right) in recognition of the work of ACIAR and its colleagues to advance agriculture and rural development in Vietnam over many years.

Improving food system security

Our first strategic objective of 'improving food security and reducing poverty among smallholder farmers and rural communities', is central to the purpose, vision and mission of ACIAR.

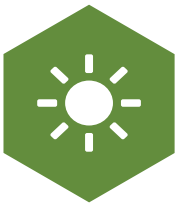
The COVID-19 pandemic exposed and exacerbated existing vulnerabilities in food systems around the Indo-Pacific region. Agriculture has played an important role as 'shock absorber' by sustaining food production and absorbing significant movements of people and providing useful work. While new variants of the coronavirus continue to emerge, countries in our region are opening their borders and rebuilding their economies. ACIAR is well placed to be an integral and constructive part of the response to the COVID-19 pandemic in our region, with our ability to harness the strengths of the Australian agricultural innovation system to provide scientific leadership.

The zoonotic origins of COVID-19 have shone a spotlight on biosecurity and One Health (the intersection of animal, human and environmental health) and during 2022–23 ACIAR will continue to support partnerships and programs that strive to develop far more effective integration across the human and animal health systems.

Our research portfolio will also support innovation in food systems through projects that produce livestock and grain with greater efficiency and targeting higher quality produce. This serves not only to provide more nutritious food for smallholder farmers and their families and communities, it also enables the production of marketable surplus to improve livelihoods.

ACIAR projects improving food systems in 2022–23 include:

- Food loss in the *Pangasius* catfish value chain of the Mekong River Basin (CS/2020/209)
- Sustainable intensification systems for climate-resilient development in Pacific island countries (CLIM/2020/186)
- Innovating fish-based livelihoods in the community economies of Timor-Leste and Solomon Islands (FIS/2019/124)
- Strengthening vegetable value chains in Pakistan for greater community livelihood benefits (HORT/2016/012)
- Increasing the productivity and profitability of smallholder beekeeping enterprises in Papua New Guinea and Fiji (LS/2014/042)
- Crop health and nutrient management of shallot-chilli-rice cropping systems in coastal Indonesia (SLAM/2018/145)
- Cropping system intensification in the salt-affected coastal zones of Bangladesh and West Bengal, India (LWR/2014/073)



Working in a changing climate

'Managing natural resources and producing food more sustainably, adapting to climate variability and mitigating climate change', our second research-based objective, is fundamental to the livelihoods of smallholder farmers, fishers and foresters throughout the Indo-Pacific region. Many countries are experiencing a degraded natural resource base, for example, poor soil health and water quality, and these issues are increasingly amplified by the growing impact of a changing climate.

Many projects across the ACIAR research portfolio address elements of this objective, and in particular the ACIAR Climate Change Program, which continues to consolidate its activities. The year ahead presents several opportunities to contribute and influence global discussions on food security and climate change, including the 27th session of the United Nations Conference of the Parties (COP27) for the Framework Convention on Climate Change. ACIAR plans to share tangible examples of game-changing Australian innovation and investment that, with the right partnerships in place, can be scaled for significant impact globally.

ACIAR will continue to represent Australia in collaborations with international partners through the Adaptation Research Alliance, which aims to increase investment and opportunities for action-orientated research to inform effective climate change adaptation, particularly for vulnerable countries and communities; and the Global Research Alliance for Agricultural Greenhouse Gases, an organisation finding ways to reduce the emissions intensity of agrifood systems.

ACIAR projects supporting climate change adaptation and mitigation in 2022–23 include:

- Transformation pathways for Pacific coastal food systems (CLIM/2020/178)
- Regional networks for large-scale coral and fish habitat restoration in the Philippines (FIS/2019/123)
- Enhancing livelihoods through improved forest management in Nepal (FST/2017/037)
- Responding to emerging pest and disease threats to horticulture in the Pacific islands (HORT/2016/185)
- Climate smart agriculture opportunities for enhanced food production in Papua New Guinea (ASEM/2017/026)
- Farmer options for crops under saline conditions in the Mekong River Delta, Vietnam (SLAM/2018/144)
- Trees for salinity Pakistan (WAC/2021/136)

Building healthier food systems

Better nutrition, food safety and food security are priority concerns in our partner countries, and therefore fundamental elements of the research and programs supported by ACIAR and its partners.

Throughout the Indo-Pacific region, there are countries, provinces and communities experiencing the triple burden of nutrition – acute hunger and malnutrition alongside increasing levels of obesity and diet-associated diseases, such as diabetes and heart disease. Higher incomes and urbanisation have led quickly to obesity and a rise in the incidence of non-communicable diseases. In many cases these are affecting previously under-nourished communities.

As we take steps to recover from the COVID-19 pandemic, the safety of food systems is under scrutiny. During 2022–23, ACIAR will implement a program of One Health projects in partnership with International Development Research Centre (Canada). Focused on the interface between human, animal and environmental health, the program aims to support the continued operationalisation of One Health.

Leaders in farming, business, science and government recognise that if the UN Sustainable Development Goals are to be achieved by 2030, there must be a global transformation in how food is produced, processed, distributed and consumed.

Many projects in our research portfolio are designed with an element of enhancing human nutrition and reducing risks to human health. During 2022–23, ACIAR will continue to develop partnerships and broker research relationships that address the many factors that influence the nutritional value of food harvested and the safety of the food production system.

ACIAR projects supporting healthier food systems in 2022–23 include:

- Agribusiness-led inclusive value chain development for smallholder farming systems in the Philippines (AGB/2018/196)
- Increasing productivity and profitability of pulse production in cereal based cropping systems in Pakistan (CIM/2015/041)
- Fruit trees for climate adaption and mitigation in East Africa (FST/2021/163)
- Timor-Leste bacteria enteropathy and nutrition study (LS/2021/126)
- Climate-smart coastal landscapes for sustaining fisheries-based livelihoods and food security in the Pacific (SSS/2021/120)
- Managing heavy metals and soil contaminants in vegetable production to ensure food safety and environmental health in the Philippines (SLAM/2020/117)

Improving equity and empowerment

Gender equity is crucial to alleviating poverty in rural communities and a key consideration in all contexts in which ACIAR operates. As more than half the world's farmers are women, ACIAR cannot credibly pursue its objectives around food security, human health and nutrition, climate change and reducing poverty unless we also promote gender equality and equity vigorously, both externally and internally.

ACIAR will update and build on its Gender Equity Policy and Strategy 2017–2022 with the ACIAR Gender Equity and Social Inclusion Strategy and Action Plan 2022–2027. The strategy provides a road map to scale up and integrate gender equity and social inclusion into all aspects of ACIAR research, capacity building and outreach programs. These efforts require improved analytical capacity to support research that addresses multiple and intersecting forms of discrimination and exclusion (such as socio-economic status, disability, ethnicity, age, gender and sexual identity, location and migration), while ensuring fair distribution of outcomes of research-for-development in agriculture, natural resources and food systems.

Consistent with the strategy and Australia's aid program targets, we aim for a minimum of 80% of ACIAR investments reflecting the principles of gender equity in project design and implementation. Currently, women make up less than 25% of project leaders in ACIAR-supported research, and the new strategy seeks to address barriers to project leadership for women scientists. The strategy also guides our internal planning and organisation. The proportion of senior positions occupied by women within ACIAR increased from 11% in 2016 to 58% by June 2022.

ACIAR projects improving equity and empowerment in 2022–23 include:

- Rapid breeding for reduced cooking time and enhanced nutritional quality in common bean (*Phaseolus vulgaris*) (CROP/2018/132)
- Towards more profitable and sustainable mabé pearl and shell-based livelihoods in the western Pacific (FIS/2019/122)
- Enhancing private sector-led development of the canarium industry in Papua New Guinea – Phase 2 (FST/2017/038)
- Improving smallholder wellbeing through participation in modern value chains: sustaining future growth in the Pakistan citrus industry (HORT/2020/129)
- Asian chicken genetic gains: a platform for exploring, testing, delivering, and improving chickens for enhanced livelihood outcomes in South-East Asia (LS/2019/142)
- Transforming smallholder food systems in the Eastern Gangetic Plain (WAC/2020/148)

Fostering inclusive value chains

Through the strategic objective of 'fostering more inclusive agrifood and forestry value chains and engaging the private sector where possible', ACIAR brokers projects that identify opportunities and improve business outcomes for people all the way along the value chain, from the input providers and smallholder farmers, to their households and communities.

Effective, efficient and inclusive value chains have the power to transform livelihoods of some of the poorest regions of the world. Unlocking the potential for people to participate equitably in markets and benefit from the opportunities provided by business is a proven way to create employment, improve business outcomes for smallholders and communities and increase economic security in developing countries.

The ACIAR Agribusiness Program focuses on research opportunities to develop new or better business systems and build partnerships to increase the efficiency, safety and inclusivity of supply chains. However, projects in other programs of the ACIAR research portfolio link best practices in agriculture, fisheries and forestry to opportunities to support innovation in production systems and value chains, and create new domestic market opportunities.

During 2022–23, ACIAR and IDRC will continue the Food Loss Research Program, which is a series of projects working with partners in developing countries to address food loss through innovative, locally driven solutions. Read more on page 23.

ACIAR projects fostering inclusive value chains in 2022–23 include:

- Inclusive agriculture value chain financing (AGB/2016/163)
- Preparing for mangrove-based climate and agribusiness transformation in the Mekong Delta (CLIM/2021/138)
- Innovating fish-based livelihoods in the community economies of Timor-Leste and Solomon Islands (FIS/2019/124)
- Coconut and other non-traditional forest resources for the manufacture of engineered wood products (FST/2019/128)
- Strengthening vegetable value chains in Pakistan for greater community livelihood benefits (HORT/2016/012)
- Improving small ruminant production and supply in Fiji and Samoa (LS/2017/033)
- Improving livelihoods of smallholder coffee communities in Papua New Guinea (ASEM/2016/100)

Building capability

Innovation in agriculture is a key pathway to poverty reduction, increased food security and economic growth. Building the capacity of agricultural researchers and policymakers, their networks and institutions contributes to innovation potential and supports partners to deploy relevant and effective agricultural practices and policies to reduce poverty.

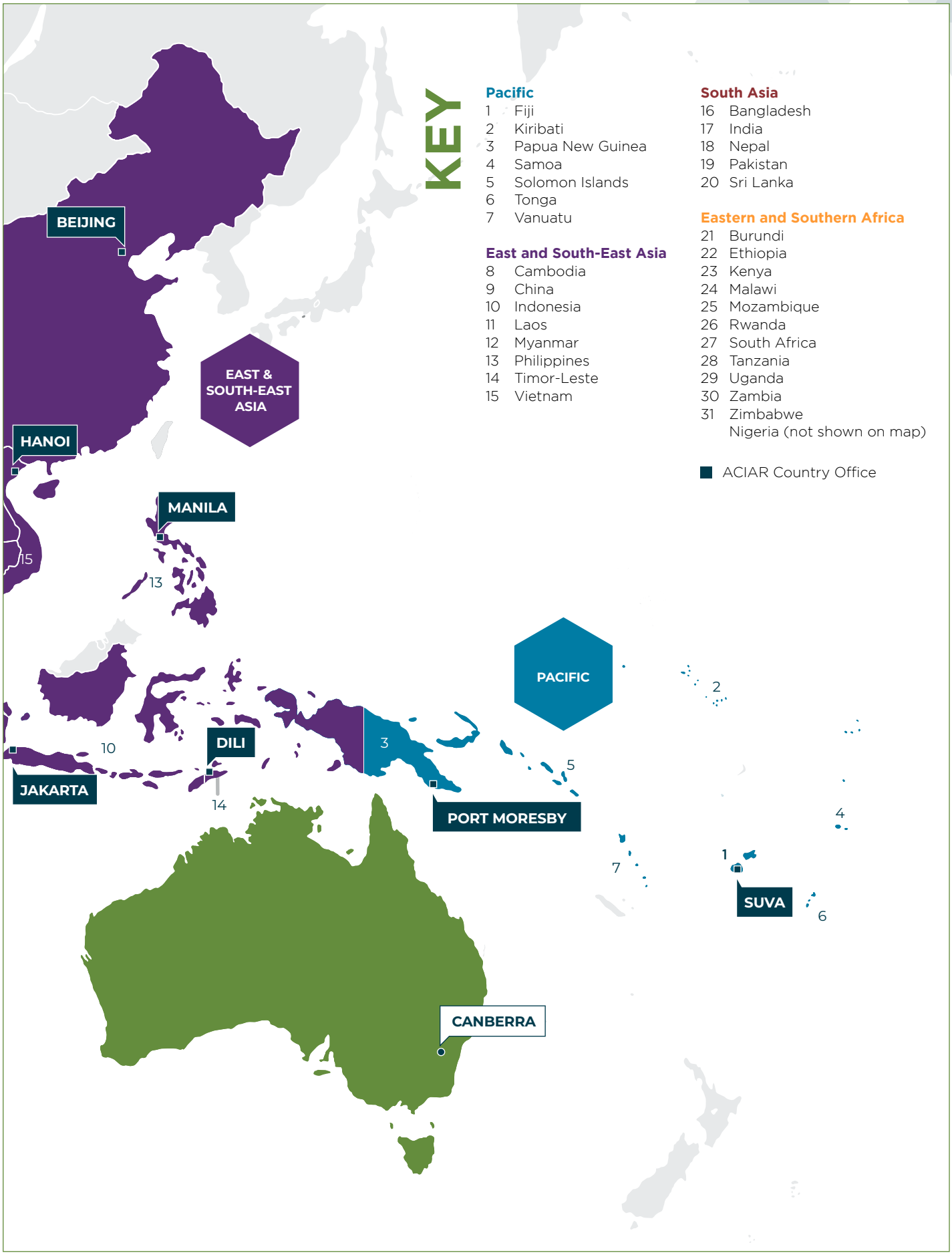
The ACIAR 10-Year Strategy 2018–2027 committed ACIAR to building its investment in postgraduate research training for individual scientists, as well as value-added training in management and leadership. Further, the strategy also identified the value in developing ongoing relationships with the network of ACIAR collaborators. During 2022–23, we will continue to deliver our core activities within the Capacity Building Program, being flexible and adaptive as COVID-19 continues to affect our region. Where possible, we will return to face-to-face learning opportunities and build on our lessons learned to strengthen our online platforms.

Capacity building is an intrinsic factor of many of the research projects we broker. This ensures that the people we work with have the skills, resources and knowledge to sustain new initiatives, systems and approaches, so our investment leads to lasting change. The collaborative international programs and partnerships underpinning ACIAR-supported research also serve to improve Australian scientific capabilities. We will also be reviewing our program to further integrate with the research function of ACIAR, a key recommendation from the mid-term review of the 10-year strategy.

ACIAR programs and projects building capability in 2022–23 include:

- Pacific Agribusiness Research in Development Initiative Phase 2 (PARDI 2) (AGB/2014/057)
- Locally led learning to turn polders into flexible assets for adaptation (CLIM/2021/137)
- Demand-led plant variety design for emerging markets in Africa (FSC/2013/019)
- Building effective forest health and biosecurity networks in South-East Asia (FST/2020/123)
- Development of area-wide management approaches for fruit flies in mango (HORT/2015/042)
- Intensification of beef cattle production in upland cropping systems in Northwest Vietnam (LPS/2015/037)
- Managing heavy metals and soil contaminants in vegetable production to ensure food safety and environmental health in the Philippines (SLAM/2020/117)
- Transforming smallholder irrigation into profitable and self-sustaining systems in southern Africa (TISA) (LWR/2016/137)

ACIAR regions and partner countries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Pacific
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6 Tonga
7 Vanuatu
East and South-East Asia
8 Cambodia
9 China
10 Indonesia
11 Laos
12 Myanmar
13 Philippines
14 Timor-Leste
15 Vietnam
South Asia
16 Bangladesh
17 India
18 Nepal
19 Pakistan
20 Sri Lanka
Eastern and Southern Africa
21 Burundi
22 Ethiopia
23 Kenya
24 Malawi
25 Mozambique
26 Rwanda
27 South Africa
28 Tanzania
29 Uganda
30 Zambia
31 Zimbabwe
Nigeria (not shown on map)
ACIAR Country Office
BEIJING
EAST & SOUTH-EAST ASIA
HANOI
MANILA
DILI
JAKARTA
PACIFIC
PORT MORESBY
SUVA
CANBERRA

Operating structure

ACIAR is established by the *Australian Centre for International Agricultural Research Act 1982* (ACIAR Act), as amended, and it is an agency of the Australian Government Foreign Affairs and Trade portfolio.

ACIAR is a non-corporate Commonwealth entity under the *Public Governance, Performance and Accountability Act 2013* and a statutory agency under the *Public Service Act 1999*.

ACIAR has an executive management governance structure headed by the CEO, who reports directly to the Minister for Foreign Affairs.

The CEO manages the administrative and financial affairs of ACIAR and its staff, subject to, and in accordance with, any directions given by the Minister. An executive team supports and advises the CEO on strategic priorities and corporate and operational policies.

The CEO is supported by an Audit Committee, which provides independent assurance to the CEO on financial and performance reporting responsibilities, risk oversight and management, and systems of internal auditing of ACIAR.

Also established under the ACIAR Act is the Commission for International Agricultural Research (the Commission), which provides collective decision-making and expert strategic advice to the Minister on the operations of ACIAR; and the Policy Advisory Council, which provides advice to the Minister on strategic aspects of national and regional development.

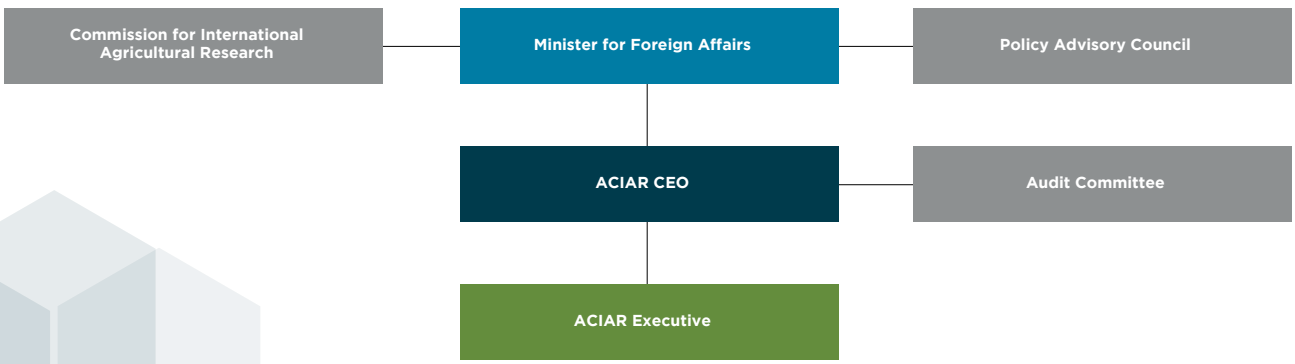
ACIAR CEO

Chief Executive Officer
Professor Andrew Campbell FTSE FAICD

The CEO is directly responsible to the Minister for managing the affairs of ACIAR, in a way that provides proper use of the Commonwealth resources for which the CEO is responsible. As agency head, the CEO is also responsible for managing the agency with direct accountability to the Australian Government.

Professor Andrew Campbell was appointed to the role of CEO on 31 July 2016, and reappointed to the role for another 2 years in June 2021. Andrew has played influential roles in sustainable agriculture and natural resource management in Australia for more than 30 years. He has a Diploma of Forestry from the Victorian School of Forestry, Creswick, a Bachelor of Forest Science (Honours) from the University of Melbourne and a Master of Science (Management of Agricultural Knowledge Systems) from Wageningen University in The Netherlands. Andrew is an elected Fellow of the Academy of Technology and Engineering, Fellow of the Australian Institute of Company Directors and an honorary Professorial Fellow at the Australian National University.

Governance structure of ACIAR



ACIAR Executive

Chief Finance Officer
Ms Audrey Gormley

The Chief Finance Officer is responsible for providing strategic financial advice to the organisation, in addition to managing human resources, business services (information technology), procurement, legal, property and other corporate activity.

Ms Audrey Gormley joined ACIAR in July 2017 and has over 30 years experience in all facets of finance and accounting both at strategic and operational levels, working in investment banking and insurance sectors before joining the Australian Government. Prior to joining ACIAR, Audrey was Chief Finance Officer at Food Standards Australia New Zealand for over 10 years. She holds a Bachelor of Commerce from University College Dublin and is a Fellow of the Association of Chartered Certified Accountants.

Chief Scientist
Dr Daniel Walker

The Chief Scientist oversees the strategic science focus of the ACIAR research portfolio and its impact assessment, monitoring and evaluation work. The Chief Scientist also provides leadership for research program managers across 10 research areas, and oversight of our relationship with the Australian innovation system.

Dr Daniel Walker joined ACIAR in November 2017 to take up the newly created role of Chief Scientist. Prior to ACIAR, Daniel spent 23 years at CSIRO, where he was Research Director for Agriculture and Global Change with CSIRO Agriculture and Food and previously, Chief of CSIRO Ecosystem Sciences. Daniel has a Bachelor of Science (Honours) in agriculture, forestry and rural economy from the University of Edinburgh and a PhD from the University of Wales.

General Manager, Country Partnerships
Dr Peter Horne

The General Manager, Country Partnerships is responsible for leading and setting the partnership approach for ACIAR country (bilateral) programs, managing the ACIAR Country Network, and leading the engagement with key research partners and stakeholders overseas.

Previously, Dr Peter Horne was Research Program Manager for Livestock Production Systems for ACIAR. Peter has spent most of his career based in Asia, involved in agricultural research-for-development with a particular focus on forages and livestock systems. Peter has a Bachelor of Science (Honours) in environmental sciences from Griffith University and a PhD in tropical forage agronomy from University of New England, Australia.

General Manager, Outreach and Capacity Building
Ms Eleanor Dean

The General Manager, Outreach and Capacity Building leads the development and implementation of the ACIAR outreach strategy, and leads and directs a team responsible for ACIAR communications, stakeholder engagement, capacity building and outreach activities.

Ms Eleanor Dean has worked in public affairs and communication for the Australian Government for more than 25 years on a diverse range of issues including natural resource management, biodiversity, education and training. Prior to joining ACIAR in 2017, Eleanor led the safety promotion and communication branch at the Civil Aviation Safety Authority. She has a Bachelor of Communication (Honours) from the University of Canberra.

Organisational structure 2022–23

ACIAR is a small government agency with 82 staff (full and part-time).

- 60 people are located at ACIAR House in Canberra, Australia
- 22 people are locally engaged staff at missions and embassies of the Australian Government, throughout the Indo-Pacific region.

Staff are organised into 4 lines of management:

- Country Partnerships
- Research Programs
- Outreach and Capacity Building
- Corporate Services.

The organisation of executive and management staff is shown in the diagram.

Commission for International Agricultural Research

The Commission for International Agricultural Research (the Commission) has a critical governance role under the ACIAR Act to provide strategic advice to the Minister. The Commission will continue to play an important role as a sounding board and source of strategic advice for ACIAR. In 2022–23, it will also focus on the implementation of recommendations of the mid-term review of the ACIAR 10-Year Strategy 2018–2027. The Commission will also undertake recruitment of a new CEO for ACIAR, with the term of Professor Campbell ending 31 July 2023.

Commissioner	
Mrs Fiona Simson GAICD BA (Chair)	Grazier, northern New South Wales President, National Farmers' Federation
Professor Andrew Campbell FTSE FAICD	Chief Executive Officer, ACIAR
Dr Sasha Courville	Chief Impact Officer, Bank Australia
Emeritus Professor Lindsay Falvey FTSE, FAIAS	University of Melbourne
Ms Su McCluskey	Cattle farmer, southern New South Wales Non-executive director and commissioner Australia's Special Agriculture Representative
Dr Beth Woods OAM FTSE	Independent consultant, agricultural management Chair of the Council of the Australian Institute of Marine Sciences
Mr Tony York	Farmer, central wheatbelt, Western Australia Director, National Farmers' Federation

Policy Advisory Council

The role of the Policy Advisory Council under the ACIAR Act is to advise the Minister and ACIAR on the agricultural problems of developing countries, providing rich contextual detail and insight that informs the design and implementation of ACIAR-funded research. The Council will continue its important role of facilitating partnerships and being pivotal in discussions for setting priorities and research focus when developing new ACIAR partner country strategies.

Council member	
Prof Wendy Umberger (President)	Executive Director, Centre for Global Food and Resources, and Professor of Agricultural and Food Economics and Food Policy, University of Adelaide, South Australia
Dr Audrey Aumua	Chief Executive Officer, Fred Hollows Foundation, New Zealand; Australian Pacific Women Advisory Board
Dr Nguyen Van Bo	Former President of the Vietnam Academy of Agricultural Sciences; Member, Vietnam Panel on Climate Change; Vice Chairman, Vietnam Rural Development Science Association; Board of Trustees member of Vietnam National University of Agriculture
Prof Ramesh Chand	Union Minister of State & Member of Fifteenth Finance Commission NITI Aayog, India. Member, Board of Trustees, CIMMYT (International Maize and Wheat Improvement Centre), Mexico
Dr Rachel Chikwamba	Member, Group Executive, Chemicals, Agriculture, Food and Health Division, South Africa Council for Scientific and Industrial Research (CSIR)
Dr Reynaldo Ebora	Executive Director of the Department of Science and Technology – Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST – PCAARRD)
Dr Segenet Kelemu	Director General and CEO of the International Centre of Insect Physiology and Ecology (icipe), Kenya; Member, United Nations University Council
Prof Teatulohi Matainaho	Vice Chancellor, Pacific Adventist University, Papua New Guinea
Dr Surmsuk Salakpetch	Former Director-General Thailand Department of Agriculture; Member, The Senate Sub-Committee on Factors of Production under The Senate Committee on Agriculture and Cooperatives, Thailand; Advisor of National Bureau of Agricultural Commodity and Food Standards, Thailand
Prof Achmad Suryana	Member, former Indonesian Agency for Agricultural Research and Development (IAARD) Experts Communication Forum; Professor, Indonesian Centre for Social, Economic and Policy Studies
Mr Sunny Verghese	Co-founder & Group CEO, Olam International Limited Singapore; Chairman of the World Business Council for Sustainable Development (WBCSD); Chairman of the Board of the Human Capital Leadership Institute (HCLI) Singapore; Chairman of JOil (S) Pte Ltd, and Member, Board of Trustees of Singapore Management University
Ex-officio member	Secretary of the Department of Foreign Affairs and Trade, or nominee of the Secretary

Funding and expenditure

Table 1.1 Overview of planned funding and expenditure, 2022–23

Budget estimate		
Funding		**A$ million**
Administered	Administered appropriation	92.92
	Special accounts	8.31
	Total administered funding	**101.23**
Departmental	Departmental appropriation	9.44
	s 74 Retained revenue receipts[a]	2.11
	Expenses not requiring appropriation[b]	1.27
	Total departmental funding	**12.83**
Total funding		**114.07**
Expenditure		
Administered	Bilateral and regional research projects[c]	71.06
	Global research collaborations[d]	18.79
	Scientific and policy capacity building activities[e]	9.35
	Outreach	2.03
	Total administered costs	**101.23**
Departmental	**Total departmental costs**[f]	**12.83**
Total expenditure		**114.07**

a) Revenue from external sources.
b) Depreciation, amortisation and audit fees.
c) Includes program support and impact evaluation.
d) Includes unrestricted funding to international centres.
e) Does not include training and communication activity within projects.
f) Includes salaries, executive, Commission, Policy Advisory Council and corporate support.

Table 1.2 Planned contribution to ACIAR activities by external funders or partners, 2022–23

Activity area	Partner funder	Expenditure
		A$ million
Regional and country projects	Department of Foreign Affairs and Trade	4.01
Postgraduate Scholarships	Department of Foreign Affairs and Trade	2.73
Food Futures Research Program	International Development Research Centre (Canada)	0.63
Total		**7.37**

Note There is no external funding expenditure on projects and programs in Africa by Department of Foreign Affairs and Trade.

Table 1.3 Australia's funding to international agricultural research centres, 2022–23

	Unrestricted	Restricted (project specific)	Total
	A$ million	A$ million	A$ million
CGIAR	17.30	2.21	19.51
Other centres	5.93	—	5.93
Total	**23.23**	**2.21**	**25.44**

Note 'Other centres' encompasses international partners that do not belong to the CGIAR network.

Table 1.4 **Planned project expenditure by country, 2022–23**

Region and country	Target appropriation budget allocations	ACIAR base appropriation	DFAT and other external funding	Total allocation
	%	A$ million	A$ million	A$ million
Pacific region	**31**	**16.35**	**2.29**	**18.64**
Fiji	—	3.69	0.20	3.89
Kiribati	—	0.50	0.36	0.86
Samoa	—	1.36	0.03	1.39
Solomon Islands	—	2.12	0.39	2.51
Tonga	—	1.10	0.03	1.13
Vanuatu	—	1.01	0.36	1.37
Pacific island countries - general	—	0.34	0.36	0.70
Papua New Guinea	—	6.23	0.56	6.79
East and South-East Asia	**44**	**23.41**	**1.83**	**25.24**
Cambodia	—	3.35	0.31	3.66
China	—	0.07	—	0.07
Indonesia	—	4.27	0.78	5.05
Laos	—	4.11	0.09	4.20
Myanmar	—	0.79	—	0.79
Philippines	—	3.92	0.55	4.47
Timor-Leste	—	1.98	—	1.98
Vietnam	—	4.92	0.10	5.02
South Asia	**14**	**7.50**	**0.25**	**7.75**
Bangladesh	—	2.06	0.05	2.11
India	—	0.67	—	0.67
Nepal	—	0.77	—	0.77
Pakistan	—	3.49	0.10	3.59
Sri Lanka	—	0.51	0.10	0.61
Eastern and Southern Africa	**10**	**5.52**	**2.68**	**8.20**
Burundi	—	0.06	—	0.06
Ethiopia	—	1.36	0.11	1.47
Kenya	—	1.89	0.80	2.69
Malawi	—	0.14	0.15	0.29
Mozambique	—	0.23	0.24	0.47
Nigeria		—	0.10	0.10
Rwanda	—	0.31	—	0.31
South Africa	—	0.09	0.28	0.37
Tanzania	—	0.43	0.15	0.58
Uganda	—	0.58	0.13	0.71
Zambia	—	0.13	0.07	0.20
Zimbabwe	—	0.30	0.65	0.95
Total project expenditure		**52.78**	**7.05**	**59.83**

Note: Due to rounding, subtotals may not always add up to the totals shown

2

Global collaborations

Photo: Lorima Vueti, The Pacific Way

Global collaborations

ACIAR works with international partners to foster and implement global research collaborations that support strategic development in agriculture, fisheries and forestry.

The ACIAR 10-Year Strategy 2018–2027 proposes that by leveraging strategic international partnerships we can continue to influence and promote more productive and sustainable agricultural systems for the benefit of low-income and lower-middle-income countries and Australia. ACIAR builds and maintains multilateral partnerships with a range of international organisations, institutes and associations that are engaged in agricultural research and the delivery of global public goods. Our goal is to be a valued, engaged donor and a strong, innovative partner in international agricultural research.

The funding and support of international agricultural research centres is one of the roles of ACIAR, mandated by the ACIAR Act. We foster and maintain active working relationships with international agricultural research centres by providing timely, reliable and consistent funding, as well as strategic advice on research and governance.

The largest component of support is provided to CGIAR, an international network of research centres dedicated to reducing rural poverty, increasing food and nutrition security for human health, and improving natural resource systems and ecosystem services.

In addition to CGIAR, we establish and foster partnerships with other international research centres and networks relevant to our mission.

We also develop and manage co-investment alliances and partnerships with like-minded organisations and donors. Co-investment partnerships demonstrate deep trust, enabling partners to leverage capacity and complement research strengths to build a critical mass of resources to invest in more ambitious research.

During 2022–23, we will seek to strengthen multilateral collaborations by serving the international research community as:

- an engaged investor
- a strategic research facilitator
- a broker of Australian science (by engaging relevant Australian research expertise).

Australia as a global contributor

Partnerships built by ACIAR Multilateral Collaborations contribute to Australia's global citizenship goals. Our deep engagement in collaborative international research maximises the influence of the Australian agricultural innovation system and the international standing of Australian agriculture.

Investing in global agricultural innovation

Australia has invested in CGIAR since it was established in 1971. CGIAR is the world's largest global agricultural innovation network, comprising 15 international agricultural research centres with more than 9,000 scientists who work mostly in low-income and lower-middle-income countries.

With 50 years of experience, a presence in 89 countries, and a deep knowledge of local customs, values and markets, CGIAR research centres work closely with more than 3,000 partner organisations. These include national and regional research institutes, civil society organisations, academia and the private sector. CGIAR research centres work towards a world free of poverty, hunger, malnutrition and environmental degradation. The centres conduct world-class, interdisciplinary research that combines biophysical and social sciences to deliver development impact at scale. CGIAR operates on an annual budget of about US$900 million. The location of these centres is shown in Figure 2.1.

CGIAR is better connected to the global development agenda than any other agrifood research entity. CGIAR research centres are responsible for hands-on research programs and operations guided by policies and research directions set by the CGIAR System Board with guidance from the CGIAR System Council. A strong research-based relationship between ACIAR and CGIAR was forged soon after the establishment of ACIAR in 1982. With an amendment to the ACIAR Act in 1992, ACIAR was then mandated as Australia's representative to CGIAR.

As a significant funder of CGIAR, Australia has high-level representation on CGIAR governance bodies. The CEO of ACIAR represents Australia on the System Council.

During 2022–23, CGIAR will finalise reforms to a more unified and integrated One CGIAR. This will better equip the network to swiftly respond to new challenges in international agricultural research while keeping up with emerging crises. In essence, the reform involves a move from the network of 15 independent international research centres, currently configured mostly around agricultural commodities, to a more cohesive structure under a common board. ACIAR has been deeply engaged in the reform process, which has involved profound change across CGIAR, its culture, values, people, policies and systems. We have actively contributed to the reform to ensure CGIAR is well-placed to deliver against both the UN Sustainable Development Goals and the Paris Agreement under the UN Framework Convention on Climate Change, as well as to attract new funder contributions.

Australia contributes to CGIAR alongside the World Bank, United States of America (USA), Bill & Melinda Gates Foundation, Germany, India, United Kingdom, European Commission and Mexico among many others. Further information on CGIAR governance and funding can be found on the CGIAR Governance and CGIAR Dashboards sites on the CGIAR website. In addition to the governance role, provided to CGIAR by ACIAR, many Australian scientists contribute at the highest levels of leadership within the CGIAR and research centres.

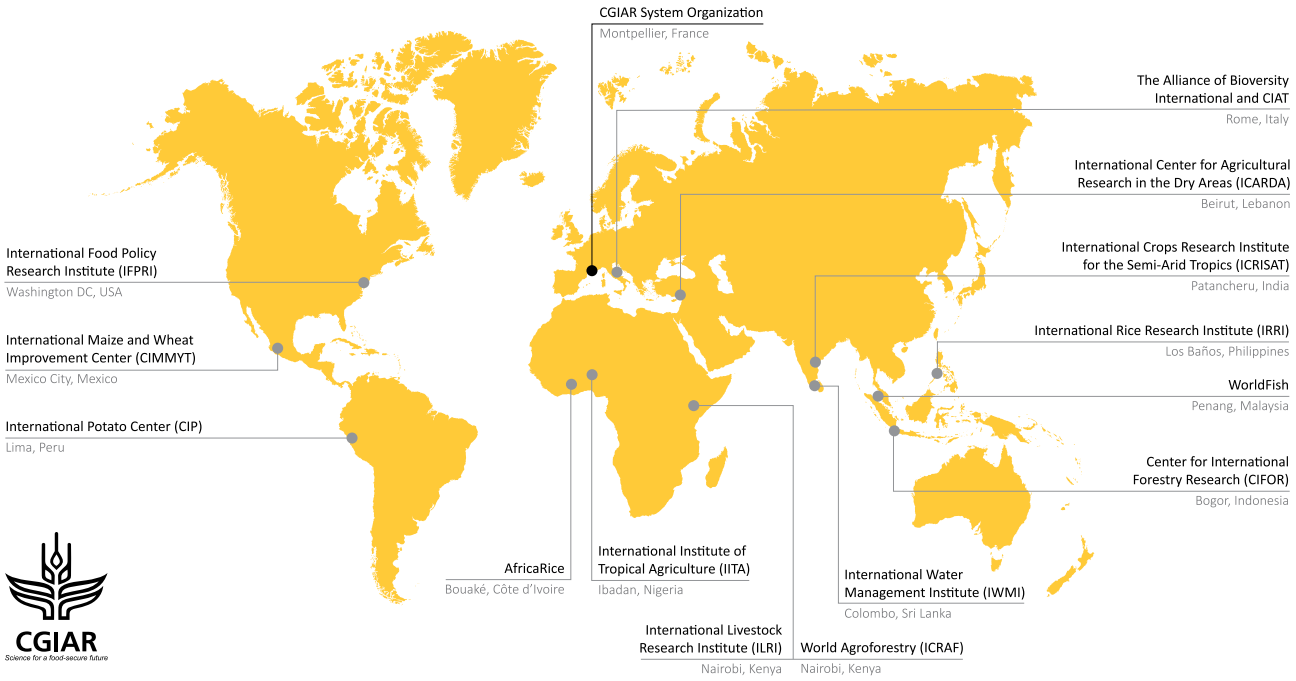


Figure 2.1 **Agricultural research centres of the CGIAR system. Source: CGIAR**

CGIAR investment 2022–23

ACIAR provides unrestricted core funds (designated and undesignated) and restricted project funds to CGIAR. More than half of the total funding is unrestricted, and this is reviewed annually. Restricted funding is delivered through specific research projects delivered by individual centres of the CGIAR network. Australian support of CGIAR in 2022–23, through ACIAR, is forecast to be approximately A$20 million (Table 1.3).

CGIAR implemented a new research portfolio, during 2021–22, that strives for global and regional impact by organising its work around 3 Action Areas:

- Systems Transformation
- Resilient Agrifood Systems
- Genetic Innovation.

These Action Areas fit the newly designed 2030 Research and Innovation Strategy, which aims to ensure that research provides real solutions for development. This is a substantial shift in the way CGIAR works, and will be achieved following 7 new implementation approaches:

1. embracing a systems transformation approach
2. leveraging ambitious partnerships for change
3. positioning regions, countries and landscapes as central dimensions of partnership, worldview and impact
4. generating scientific evidence on multiple transformation pathways
5. targeting risk-management and resilience as critical qualities for food, land and water systems
6. harnessing innovative finance to leverage and deliver research through new investment and funding models
7. making the digital revolution central to our way of working.

To ensure research excellence and value for investment in CGIAR for Australia, during 2022–23 ACIAR will:

- participate at the highest levels of governance of the CGIAR system, through membership and leadership on the CGIAR System Council, the Strategic Impact Monitoring and Evaluation Standing Committee and Investment Advisory Groups
- continue our collaboration with other donors to CGIAR through participation in multi-funder activities that align with ACIAR strategy and Australian interests
- coordinate Australian engagement with CGIAR, including consultation with Department of Foreign Affairs and Trade (DFAT) and other Australian organisations, primarily through the CGIAR Australian Leadership Group, established by ACIAR in 2015
- involve ACIAR Research Program Managers in the technical oversight of CGIAR Research Programs.

ACIAR hosts international ag research meeting

In November 2022, ACIAR, on behalf of Australia, hosted a meeting of the CGIAR System Council. The System Council is the vision, strategic direction and advocacy body of CGIAR and meets twice yearly, with approximately 70 delegates of high standing from across the globe.

The System Council Meeting was held in Brisbane, home of world-leading tropical and sub-tropical agricultural research. The meeting was timed to align with the TropAg International Agricultural Conference and a Food Diplomacy Dialogue hosted by the Commission for International Agricultural Research and the Policy Advisory Council.

Impressive return on investment

CGIAR delivers impressive economic, social and environmental returns on research investment. Over the past 5 decades, the benefits of CGIAR investment are tenfold for each dollar invested.

A 2020 study calculated a benefit-cost ratio of 10:1 for CGIAR investment since 1961, which is primarily due to enhancing the yields of staple food crops in developing countries. There are additional less-easily measured payoffs such as greater food abundance, cheaper food, reduced rates of hunger and poverty, and a smaller geographical footprint of agriculture.

CGIAR research outputs have helped keep Australian farmers competitive in world markets by increasing yields and reducing costs. CGIAR germplasm has been incorporated into, and has greatly improved, Australian plant and livestock breeding programs. For example, 98% of all wheat grown in Australia is derived from CGIAR wheat germplasm. CGIAR germplasm is also prominent in improved varieties of sorghum, maize and chickpea in Australia.

Source: The payoff to investing in CGIAR research (2020)

Partnering in global and regional programs

In addition to our partnership with CGIAR, ACIAR has formal multilateral partnership arrangements with a number of international agricultural research centres and networks.

During 2022–23, we will support global research collaborations with:

- The Pacific Community
- Asia–Pacific Association of Agricultural Research Institutions
- World Vegetable Center
- Centre for Agricultural Biosciences International.

The Pacific Community

The Pacific Community (SPC), previously known as the Secretariat of the Pacific Community, has been the principal scientific and technical organisation working to support development in the Pacific region since 1947. SPC is an international development organisation owned and governed by 26 country and territory participants.

SPC provides a regional specialist technical expertise to strengthen or, in some cases, supplement regional and national capacity. Of SPC's core functions, some are of particular interest to ACIAR:

- to strengthen sustainable management of natural resources (fisheries, forestry, land use, agriculture, minerals, water)
- to improve pathways to international markets
- to improve multi-sectoral responses to climate change and disasters
- to advance social development through the promotion of human rights, gender equality, cultural diversity and opportunities for young people
- to improve multi-sectoral responses to non-communicable diseases and food security.

Coastal fisheries is a very important sector in Fiji and other Pacific island countries as it contributes to food security, protein and micro-nutrient uptake, subsistence aquaculture and supports livelihoods and income generation. Photo: Lorima Vueti

SPC and ACIAR have worked in partnership for more than 30 years and SPC is a key partner of both ACIAR and DFAT. SPC helps deliver on Australia's strategies to support the production of strategic regional public goods with strong benefits for the region's agriculture, fisheries, forestry and biosecurity sectors.

ACIAR currently provides core and project funding to the Land Resources Division and the Fisheries Aquaculture and Marine Ecosystems Division. The current core strategic partnership agreement, associated with this funding, extends to December 2026.

The partnership between ACIAR and SPC supports the production and maintenance of scientific, technical and management capacities, and activities in agriculture and fisheries that provide shared benefits for agricultural development activities of Pacific island countries and territories. Our funding is also aimed at building stronger strategic relationships between our organisations, enhancing strategic management capacity in the Land Resources Division and strengthening capacity for coastal fisheries development in Fisheries Aquaculture and Marine Ecosystems Division.

SPC facilitates the participation and engagement of ACIAR in regional consultation processes such as Pacific Week of Agriculture and Forestry, Heads of Agriculture and Forestry Services, and Ministers of Agriculture and Forestry Services. During 2022–23, ACIAR and SPC will collaborate to progress strategic regional initiatives, particularly mitigating the impacts of current and future risks.

Asia-Pacific Association of Agricultural Research Institutions

The Asia-Pacific Association of Agricultural Research Institutions (APAARI) promotes and coordinates the national agricultural research institutes in the Asia-Pacific region, through inter-regional and inter-institutional cooperation. APAARI's Strategic Plan 2017–2022, Pathways to strengthened agrifood research and innovation systems in Asia and the Pacific, identifies strategic priorities that are used to inform our input into its wider regional consultation process.

ACIAR has a history of working with and supporting APAARI. We provide annual core funding for research communication, knowledge management, advocacy for agricultural biotechnology, support for capacity building, and participation in expert consultations with national agricultural research system leaders in the region.

World Vegetable Center

The World Vegetable Center (WorldVeg) is an international non-profit research and development institute committed to alleviating poverty and malnutrition in low-income and lower-middle-income countries through increased production and consumption of vegetables. It also manages the world's largest vegetable gene bank. WorldVeg undertakes research and development to realise the potential role of vegetables for healthier lives and more resilient livelihoods.

Through its extensive networks and research partnerships WorldVeg disseminates improved varieties of vegetable crops and promotes improved production methods to farmers. This results in higher vegetable harvests, higher incomes, more jobs and healthier, more nutritious diets.

Investment in WorldVeg is an investment in research into the nexus between agriculture, livelihoods, nutrition and health. ACIAR provides WorldVeg with both core funding and project-specific funding. ACIAR has a strategic partnership arrangement with WorldVeg, which supports breeding activities and capacity building in low-income and lower-middle-income countries in Asia and Sub-Saharan Africa. The partnership focuses on the development of improved vegetable varieties (49% funding allocation), introduction of agricultural practices (36%) and collaboration and capacity building of public and private seed sectors (15%).

ACIAR funding has enabled:

- better conservation of vegetable crop biodiversity and development of more resilient crops to address current and future biotic and abiotic constraints to vegetable production in the context of climate change
- development, evaluation and validation of good agricultural practices for vegetable production that are safe for consumers, profitable and sustainable for all value-chain stakeholders
- collaboration to strengthen the capacity of smallholder farmers and national partners from both the public and private sectors in vegetable production and commercialisation.

WorldVeg has brought significant benefits to Australian agriculture, particularly through its mungbean breeding program, which has provided the varieties grown across much of northern Australia for many years. WorldVeg also holds breeds of tomato with genetic resistance to tomato yellow leaf curl virus, which poses an ongoing threat to the Australian tomato industry.

WorldVeg has brought significant benefits to Australian agriculture as well as international partners through its mungbean breeding program.

Centre for Agricultural Biosciences International

The Centre for Agricultural Biosciences International (CABI) is an intergovernmental, not-for-profit organisation established by a UN treaty. Australia is a member country of CABI, along with 48 other member countries from Africa, Asia, the Americas and Europe.

CABI addresses issues of global concern through science, information and communication, with a focus on international development and research, publishing and microbial services. CABI works to improve global food security, combat threats to agriculture and the environment from pests and diseases, protect biodiversity from invasive species, and improve access to agricultural and environmental knowledge. CABI improves lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and the environment.

Australia's funding and membership, through ACIAR, enables CABI to address key issues of importance to both organisations. The 4-year partnership (2019–23) between ACIAR and CABI supports PlantwisePlus, the CABI Development Fund and Australia's CABI membership (services relating to CABI's scientific expertise, products and resources). The CABI Development Fund invests in pilot projects to enable the development of strategies for climate-change adaptation and mitigation actions in smallholder agriculture. Australia's investment in CABI has contributed to improved agricultural outcomes for low-income and lower-middle-income countries and delivered benefits to Australian agriculture.

Plantwise Plus program

The Plantwise program launched by CABI in 2011 is based on a network of plant clinics run by trained plant doctors to provide practical advice to smallholder farmers about plant health. The network also organises plant health rallies, mass extension campaigns and farmer-to-farmer sharing of information, and has helped more than 44 million smallholder farmers in 30 countries, and reduced the likelihood of a household falling into poverty by 5%.

In 2021, CABI launched PlantwisePlus, building on Plantwise, to support countries predict, prepare for and prevent potential plant pest and disease threats. The new program will give farmers the knowledge and services needed to improve crop production; raise awareness of agricultural best practice and nutritional information; provide access to affordable, more sustainable plant protection products; and create effective pest monitoring systems, enabling quick and effective responses to pest threats.

Ms Roseanne Mwangi is an entrepreneur under the icipe-implemented project, Insects for Feed (INSFEED). In 2022-23 ACIAR will strengthen its relationship with icipe, committing to the organisation as a strategic long-term funder and partner, in addition to existing research collaborations. Photo: Emmie Wachira

International Centre of Insect Physiology and Ecology

The International Centre of Insect Physiology and Ecology (icipe) plays an important role in agricultural research for development, and in producing and maintaining global public goods in entomology.

ACIAR has engaged icipe as an implementing partner on research projects since 2015. In 2022, icipe is leading an initiative, in partnership with ACIAR and AgriFutures Australia, to accelerate insect farming as an emerging industry in Africa and Australia. The Emerging Insect Technology Hub (EIT-Hub) will centralise engagement and knowledge sharing around insects as food, animal feed and fertiliser, and bring together industry stakeholders, scientists and investors to discuss issues related to emerging insect technologies.

In 2022–23 ACIAR will strengthen its relationship with icipe, committing to the organisation as a strategic long-term (core) funder and partner. Formal partnership arrangement will be established to reflect the strength of the relationship between ACIAR and icipe, the alignment of organisational aims, and the important role of icipe in the global agricultural research landscape.

Building strength through collaboration

Co-investment programs enable ACIAR to harness the complementary skills of partners, leverage ACIAR funds, and engage in larger and more ambitious programs.

Co-investment programs take many forms, from shared design and implementation of a suite of research, to programs designed to support industry and build capacity.

International Development Research Centre

Our most significant partner in terms of co-investment is Canada's International Development Research Centre (IDRC). IDRC was a model for ACIAR when Sir John Crawford submitted his recommendation to Prime Minister Fraser in 1981 to establish a centre for international agricultural development in Australia. Of all our partners, IDRC is most like ACIAR in that it is a specialist statutory agency investing in research as a form of strategic official development assistance.

IDRC has an agreement with ACIAR to build collaborations on a range of research initiatives of mutual interest until 2027. Current co-investments are 50:50 partnerships and include:

- Cultivating Africa's Future Fund (CultiAF2), CA$20 million in total, described on page 148,
- Food Loss Research Program, CA$5 million in total, described on this page
- ACIAR–IDRC Research Program on One Health (AIRPOH), CA$4 million in total, described on page 24.

The Food Loss Research Program established by ACIAR and IDRC aims to gain a deeper understanding of the drivers of food loss, from the farm through to the consumer.

Food loss program

The Food Loss Research Program aims to gain a deeper understanding of the drivers of food loss, from the farm through to the consumer. The program marks an important evolution in looking at food from a systems perspective. In some countries where ACIAR operates, there is a lack of post-harvest infrastructure for reducing food loss. While technology solutions exist, they have not been adopted or implemented at scale.

The Food Loss Research Program addresses value chain inefficiencies, poor communication systems and overall structural inequalities. Through 4 projects the program seeks to:

- examine agricultural value chains within food systems at a provincial or local level in 2 or more countries in which ACIAR and/or IDRC work
- conduct foresight exercises until 2050, stipulating how value chains are likely to change given trends in labour, technology, mechanisation, climate change, urban and rural density, and nutritional requirements
- engage private agribusinesses along the value chain to document their experiences of food loss and explore models of innovation to mitigate food loss in the long term
- assess interventions that are currently being used at a local scale across the value chain
- assess factors that enable or prevent the transfer of intervention strategies from one location to another.

Food Loss Research Program projects

- Adopting a gender-inclusive participatory approach to reducing horticultural food loss in the Pacific (CS/2020/191) - page 59
- Developing food loss reduction pathways through smart business practices in mango and tomato value chains in Pakistan and Sri Lanka (CS/2020/193) - page 133
- Food loss in the catfish value chain of the Mekong River Basin (CS/2020/209) - page 80
- Managing food value chains for improved nutrition for urban vulnerable populations in Africa (Africitiesfood) (CS/2020/210) - page 144

One Health program

One Health is a framework that recognises that the health of people, animals and the environment is interconnected. It provides an approach for developing more effective integration across the human and animal health systems in regard to regulations, surveillance, diagnostics and responses to disease outbreaks.

Globally, approximately 75% of newly emerging infectious diseases are zoonoses (diseases that can transmit from animals to humans). These diseases arise as a result of one or several factors that may be anthropogenic, genetic, ecological, socioeconomic or climatic in origin. Across the Indo-Pacific region, animal production systems are changing rapidly; however, local and regional capacity to diagnose, treat and control disease is generally weak and under-resourced.

Jointly funded for A$4.3 million, the ACIAR–IDRC Research Program on One Health (AIRPOH), will form a portfolio of interconnected projects supporting research that will have a transformative impact on human, animal and environmental health. The program aims to promote new ideas and thinking on One Health.

Research Program on One Health projects

- Timor-Leste: Developing strategies to reduce brucellosis transmission in Timor-Leste based on One Health collaboration (LS/2022/161) – page 107.
- Policy support to the Philippines' national surveillance and control programs for African swine fever, avian influenza and antimicrobial resistance: A One Health systems approach to animal food security, public health resiliency and environment sustainability (LS/2022/162) – page 103.
- Livestock enhancement through EcoHealth/ One Health assessment in South-East Asia (LS/2022/163) – page 103.
- The role of agricultural and forest landscapes on human and environmental health in Cambodia (SSS/2022/164) - page 82.

Alliance for Agricultural Research and Development for Food Security

The Alliance for Agricultural Research and Development for Food Security (Alliance) is a joint initiative between ACIAR, the Syngenta Foundation for Sustainable Agriculture and the Crawford Fund.

Alliance partners undertake complementary activities and/or co-fund innovative approaches to research-for-development activities and delivery, using the unique and diverse strengths and expertise of the parties to better promote and achieve food security.

The Alliance recognised the potential for demand-led plant variety design to transform plant breeding for small-scale agriculture and food security. In 2014 it established the project 'Demand led plant variety design for emerging markets in Africa' (FSC/2013/019) (page 146), which engages with plant-breeding and university sectors in many countries in southern and eastern Africa.

A new project in Bangladesh has evolved from a shared interest between ACIAR and the Syngenta Foundation, of wanting to improve the translation of scientific information on soil health into practical and useable information to support farmers in their decision making. Ultimately, the project aims to improve the resilience, sustainability and productivity of smallholder farmers (page 124).

Dr Julianne Biddle is the Director, Multilateral Engagement at ACIAR. Julianne has over 20 years' experience in plant science, working in research, science communication, education, policy and management. She has a keen interest in conservation biology, plant–pathogen interactions, ecology and plant physiology. Before joining ACIAR, Julianne worked at the University of Queensland where she focused on demand-led plant breeding in Africa and coconut physiology. Julianne grew up on a cattle farm in central Queensland and has a Bachelor of Science with advanced studies in biochemistry, molecular biology, cell biology and biological sciences from Griffith University, Honours in biochemistry and molecular biology and a PhD in ecology, evolution and genetics from the Australian National University.

Engagement in multilateral climate forums

ACIAR drives innovative international agricultural research and development through our strong engagement in multilateral forums, demonstrating Australia's commitment to global action to achieve the Sustainable Development Goals.

Adaptation Research Alliance

ACIAR worked with more than 30 organisations around the world to scope and develop a new global research alliance, the Adaptation Research Alliance. Launched at COP26 (2021), the Adaptation Research Alliance is now a global alliance of over 120 organisations dedicated to results-oriented adaptation research, particularly research that is locally led, driven by local needs, to support action that benefits people on the ground.

The Alliance seeks to facilitate collective learning across its members to improve the ability of research to support faster and more ambitious climate response. As a founding member of the Alliance, ACIAR is supporting the Secretariat (ACIAR project CLIM/2022/108) to turn a literature review of the latest methods for large-scale collective learning (completed by the International Institute for Environment and Development) into a practical platform for Alliance members to learn and improve outcomes from research together.

COP27

ACIAR will engage in events connected to the UN Conference of the Parties on Climate Change (COP27) in November 2022. The conference and associated events and dialogues aim to build on previous successes to define pathways and processes to effectively tackle the global challenge of climate change.

The endeavours of COP27 and the groups it brings together align with the objective of ACIAR, through its Climate Change Program, to progress the science and practice of how to transform food systems and livelihoods in our partner countries, to adapt to climate impacts and reduce greenhouse gas emissions.

At COP27, ACIAR will convene and participate in several pavilion sessions. One of these includes a panel session entitled 'Insights on implementation of food systems change in development'. In this session, ACIAR will share insights from our work on how food systems change can be practically implemented on the ground and invite discussion on others' experiences of barriers and enablers to food systems change.

The Global Research Alliance on Agricultural Greenhouse Gases

The Global Research Alliance on Agricultural Greenhouse Gases (GRA) is an organisation bringing together 66 member countries and 24 partner organisations. ACIAR is Australia's representative on the GRA Council. The GRA aims to share knowledge and increase cooperation on addressing the significant challenge of meeting a dramatic increase in global food demand, while reducing the contribution of the agriculture sector to greenhouse gas emissions.

Members of the GRA work together to deepen and broaden mitigation research efforts across the agricultural sub-sectors of paddy rice, cropping and livestock, and to coordinate cross-cutting activities in these areas, including promoting synergies between adaptation and mitigation efforts.

ACIAR Research Program Manager, Climate Change, Dr Veronica Doerr, and ACIAR Pacific Region Manager, Mai Alagcan (centre), with members of the Samoa Farmers Association (including former John Allwright Fellow Philip Tuivavalagi who is also the Samoa Assistant FAO Representative – furthest on the right). The Samoa Farmers Association has been working with ACIAR on sustainable intensification of taro-based production systems in Samoa.

3

Country partnerships

Photo: Jeoffrey Maitem

Country partnerships

To maximise our effectiveness as an agricultural research-for-development agency, ACIAR builds and maintains partnerships with in-country agencies and organisations.

ACIAR has 11 Country Offices throughout the Indo-Pacific region. Staff located throughout the region make up the ACIAR Country Network, which develops and maintains the strategic directions of our investments with in-country partner agencies. The network manages relationships, communication, coordination and administration of activities within the countries in which our offices are located, and in neighbouring countries where we have no representative office.

The Country Network also supports partner research institutions to develop, establish and administer activity related to research collaboration and capacity building. Our Country Network is a vital link between Australian and international researchers and the relevant in-country research agencies.

Many of our country partnerships are undergoing rapid change as local research capacity grows. At the same time, the COVID-19 pandemic has severely limited the participation of our partner agencies in research collaboration for 2 years. Both of these circumstances created an imperative for our Country Network to be ready to renegotiate relationships when partner agencies were ready. During the pandemic the network upskilled in partnership brokering and knowledge management, equipping our overseas staff with the necessary skills, tools and plans to re-engage with our partner agencies as quickly as possible. Re-engagement will be an important focus during 2022–23.

Over the next 2 years we plan to develop new long-term partnership strategies with Indonesia, Vietnam, Papua New Guinea, Indonesia, Timor-Leste, Laos, Bangladesh and Pakistan. This will, however, be influenced by prevailing circumstances in each country.

ACIAR Country Offices

ACIAR Country Network staff are located in the offices of Australian high commissions or embassies in the following countries:

- Pacific
  - Fiji (regional office)
  - Papua New Guinea
- East and South-East Asia
  - Laos (regional office)
  - China
  - Indonesia
  - Myanmar*
  - Philippines
  - Timor-Leste
  - Vietnam
- South Asia
  - India (regional office)
  - Pakistan
- Eastern and Southern Africa
  - Kenya (regional office).

* There is one ACIAR staff member located in Myanmar, but the location is a remote site of the regional office in Laos, not an ACIAR Country Office.

ACIAR regional and country managers

Pacific

Ms Mai (Gay Maureen) Alagcan
Regional Manager, Pacific and Papua New Guinea

Ms Mai Alagcan is based in Suva, Fiji. Before joining the Pacific Region Office in 2021, Mai was Country Manager for ACIAR in the Philippines for 5 years. Prior to joining ACIAR, she was a Senior Program Officer on the Climate Change, Disaster Risk Reduction and Humanitarian Program for DFAT at the Australian Embassy in Manila. Mai also has worked in the Philippine public sector and has extensive professional and management experience on program development, policy analysis and monitoring and evaluation in the agriculture and fisheries sector. Mai has a Bachelor of Science in agricultural economics from the University of the Philippines and a postgraduate certificate in regional development planning from the School of Urban and Regional Planning, University of the Philippines and Technical University of Dortmund in Germany.

Dr Norah Omot
Country Manager, Papua New Guinea

Dr Norah Omot is based in Port Moresby and joined ACIAR in 2022. She has worked with the Asia-Pacific Association of Agricultural Research Institutions (APAARI) in various roles since 2017, including as a coordinator of the ACIAR ASTI (Agricultural Science Technology Indicators) project, coordinating projects across Papua New Guinea, Fiji and 8 South-East Asia countries. Before working with APAARI, Norah worked with the Papua New Guinea National Agricultural Research Institute (NARI) in varying roles, from Senior Scientist to Program Director. Norah holds a bachelor degree in Agricultural Science (Papua New Guinea University of Technology), a Master of Agriculture, Agricultural Economics (University of Sydney) and a Doctor of Philosophy, Economics (University of Canberra). Norah was awarded a John Dillon Fellowship in 2004.

East and South-East Asia

Ms Dulce Carandang Simmanivong
Regional Manager, East and South-East Asia

Ms Dulce Carandang Simmanivong is based in Vientiane, Laos, and is responsible for strategic oversight of the Cambodia, Laos and Myanmar country programs. Before joining ACIAR in 2015, Dulce managed the rural development portfolio of AusAID/DFAT for 6 years, working across sectors including financial inclusion, social protection, non-government organisation cooperation, mine action and rural livelihoods. Previously, she worked in program management positions with the UN and civil society organisations, including a farmers' alliance. Dulce's past work took her across north and South-East Asia. She earned both her degrees – a Bachelor of Arts (Communications) and a Master of Industrial/Organisational Psychology – at Ateneo de Manila University.

Mr Wang Guanglin
Country Manager, China

Mr Wang Guanglin is based in Beijing. He joined ACIAR in 1998 and became ACIAR Country Manager for China in 2011. Before joining ACIAR, Guanglin worked for 2 years at the Defence Section of the Australian Embassy in Beijing. Guanglin has a background in business administration and more than 20 years experience working on agriculture development in China. In his current role, he is exploring opportunities for ACIAR and China to work trilaterally with other countries on common opportunities and challenges in agriculture.

Ms Mirah Nuryati PSM
Country Manager, Indonesia

Ms Mirah Nuryati is based in Jakarta and has worked with ACIAR for 30 years. In this time, she has worked in the Indonesia office as an administrative officer, Stakeholder Relationship Manager and Assistant Country Manager, before taking on the role of Country Manager in 2015. Prior to working with ACIAR, Mirah spent 12 months with AIDAB/AusAID, within DFAT. Mirah is a graduate of the Tarakanita Communication and Secretary Academy in Jakarta. In 2007, Mirah was awarded an Australian Public Service Medal (PSM) for her contribution to strengthening ACIAR collaboration with relevant Indonesian ministries.

Ms Hazel Aniceto
Country Manager, the Philippines

Ms Hazel Aniceto is based in Manila and leads the country office team in the Philippines. Before joining ACIAR, Hazel was a Senior Technical Adviser with the USAID Science, Technology, Research, Innovation for Development Program. Among other previous roles, Hazel spent a significant part of her career as Portfolio Manager with AusAID and DFAT and in senior management roles with the private sector and various Overseas Development Assistance programs. Hazel has an economics degree from the University of the Philippines and a Diploma in Government conferred by the Australian Public Service Commission.

Mr Luis de Almeida
Country Manager, Timor-Leste

Mr Luis de Almeida is based in Dili and became the first ACIAR Country Manager in Timor-Leste in May 2022. Before taking on this role, Luis has worked continuously on ACIAR projects in Timor-Leste since 2003, as a researcher and technical coordinator. He worked with ACIAR commissioned organisations and collaborators, and across a range of projects, including the Seeds of Life project, which ran from 2000 until 2016. Luis was awarded a John Allwright Fellowship in 2012 to complete a Master of Agricultural Science at the University of Western Australia, specialising in genetics and plant breeding.

Ms Nguyen Thi Thanh An PSM
Country Manager, Vietnam

Ms Nguyen Thi Thanh An is based in Hanoi. She joined ACIAR in December 2007 as an Assistant Country Manager and became Country Manager in 2014. An has extensive experience as a professional communicator, working in both private and public sectors. She completed her master degree at University of Queensland in 2013, with a major in communications for development. An was awarded the Australian Public Service Medal in 2020 for her contribution to the development of the Australia–Vietnam relationship in agricultural research.

South Asia

Dr Pratibha Singh
Regional Manager, South Asia

Dr Pratibha Singh is based in New Delhi. She has more than 20 years of experience in crop research and technology management, including more than 10 years of research experience in molecular plant pathology of crops, including wheat, rice, corn and potato. Before joining ACIAR in 2018, Pratibha was head of the Technology Advancement Unit of the Indo–Swiss Collaboration in Biotechnology for 8 years. Previously, she worked at the Indian Agricultural Research Institute, New Delhi; USDA – Dale Bumpers National Rice Research Center; Cornell University; and Agriculture and Agri-Food Canada. She also worked as a scientist and Coordinator of Research Management System in a corporate biotech industry (E.I. DuPont India). Pratibha holds a Bachelor of Agriculture and Animal Husbandry and a Master of Agriculture Biotechnology from G.B. Pant University of Agriculture and Technology, India, and a PhD in agriculture, with a major in plant pathology as a Monbusho Scholar, from Tottori University, Japan.

Dr Munawar Kazmi
Country Manager, Pakistan

Dr Munawar Kazmi is based in Islamabad. He joined ACIAR in 2010 and became Country Manager for Pakistan in 2015. Before joining ACIAR, he was a researcher at Pakistan's Agricultural Research Council. He completed his master's degree at the University of Agriculture, Faisalabad, and his PhD in plant pathology at Quaid- e-Azam University, Islamabad. Kazmi's studies specialised in mango disease and farmer training. During more than 15 years as a research scientist, he published more than 40 peer-reviewed science articles. He is a trained facilitator and has worked extensively on the Farmer Field School approach, collaborating with national organisations and international agencies in Vietnam, Bangladesh, China, Thailand and Kyrgyzstan.

Eastern and Southern Africa

Dr Leah Ndungu
Regional Manager, Eastern and Southern Africa

Dr Leah Ndungu is based in Nairobi and has more than 20 years of experience managing research programs. Before joining ACIAR in 2017, Leah worked at the Biosciences Eastern and Central Africa–International Livestock Research Institute Hub as a Partnership Coordinator, in a DFAT-funded research-for-development program focusing on food security. Previously, she was a Research Manager at the International Livestock Research Institute. Leah has also worked in the public sector as a research scientist in Kenya's national agricultural research system. She holds a Bachelor of Veterinary Medicine from the University of Nairobi, a master degree in veterinary science from Washington State University, USA, and a PhD in veterinary science with a specialisation in agricultural economics from the University of Pretoria, South Africa.

ACIAR Country Manager for Vietnam, Nguyen Thi Than An (left) leads Australia's Commission for International Agricultural Research and Policy Advisory Council during a tour of a mangrove forest in Soc Trang Province, as part of the annual In-Country meeting of the Commission, in Vietnam, June 2022. Photo: Patrick Cape

4

Bilateral and regional research

Photo: Conor Ashleigh

Bilateral and regional research

ACIAR works with scientists in Australia and partner countries to use science and technology to improve the livelihoods of smallholder farmers and the sustainability of food systems throughout the Indo-Pacific region.

Our work in each partner country and within our 4 regions is determined through dialogue and consultation between ACIAR, research partners and in-country partners. ACIAR-supported research addresses the specific challenges and opportunities arising in local environments and builds on established relationships.

Our research portfolio is organised into 10 programs:

- Agribusiness
- Climate Change
- Crops
- Fisheries
- Forestry
- Horticulture
- Livestock Systems
- Social Systems
- Soil and Land Management
- Water.

The development of projects within and across programs is guided by the objectives of the ACIAR 10-Year Strategy 2018–2027.

We identify research priorities collaboratively with partner countries, and broker research partnerships and projects to tackle those priorities. Once projects are established, we manage and monitor these investments throughout the research process to maximise impact and return on investment.

Research projects developed as bilateral and regional partnerships are led by a commissioned organisation (such as an Australian university, CSIRO, state government agency or private firm) or an international agricultural research centre. The projects are a collaboration between the commissioned organisation, other Australian or international research providers and in-country organisations. We work closely with collaborators to determine and monitor the achievement of project milestones.

We also work with other government agencies to implement programs and projects with shared goals. Since 2006, our largest and most important partnership with another government agency has been with our portfolio partner DFAT. A new partnership agreement (Record of Understanding) was established during 2019–20, under which ACIAR currently manages 11 activities and an investment of almost $11 million.

Relationships with our in-country partners change as partner countries develop more capability in research and change focus on their research priorities. Our approach to research prioritisation and partnership brokering adapts in order to deliver research projects that are consistent with jointly agreed priorities, needs and capabilities.

Our research portfolio evolves in response to new research opportunities enabled by new knowledge and technologies, and new research and development imperatives. For example, during 2022–23, we are developing areas of activity addressing:

- water security for smallholder communities, particularly where impacted by climate change
- building new value chains that include opportunities for women
- managing responses to new and emerging pests and diseases
- ‘circular economy’ approaches to improving the efficiency and resilience of smallholder production systems.

Project and partners

172
Research projects and small research activities

32
Countries where projects are located

71
Commissioned organisations

372
Collaborating institutions

Note: An organisation or institution may partner with ACIAR on more than one project. In this data, a partner is only counted once for its role as a commissioned organisation and/or collaborator. This data was compiled in August 2022 and may change during 2022–23.

Research portfolio

20
Agribusiness projects

9
Climate Change projects

17
Crops projects

22
Fisheries projects

15
Forestry projects

21
Horticulture projects

19
Livestock Systems projects

14
Social Systems projects

16
Soil and Land Management projects

14
Water projects

5
CultiAF projects

This data was compiled in August 2022. Additional projects may be commissioned during 2022–23.

Agribusiness

The Agribusiness Program focuses on research and adoption of innovations to improve business outcomes for smallholder farmers, their communities and their industries at all points along the agricultural, forestry and fisheries value chain. This includes input supply, production and harvest at the farm level, as well as post-harvest activities such as shipping, processing, packaging and marketing of farm products.

The program seeks to understand and identify skills and opportunities to help smallholders, communities and industries manage complex and interrelated factors, issues and tasks in the production chain to understand and link markets and adopt new enabling technologies. The program investigates the availability of finance for smallholders to participate in value chains, biosecurity, quality control and quality management of farm production, and compliance with market and government regulations. The program also works and co-invests with private firms to improve the effectiveness, efficiency and sustainability of commercial agrifood chains that link smallholder farmers and their private sector partners to markets.

Successful Agribusiness projects catalyse innovation and adaptation throughout the agrifood chain; facilitate adoption and impact among participating smallholder households, their communities and their chain partners; empower participants to continue the learning process after the project has completed; leverage and source funds for further adoption and impact beyond participant communities and chains; and leave a legacy of 'how to' guides and recommendations to foster greater uptake of innovations and adaptations beyond project participants and beyond the life of the project.

Mr Howard Hall is the Research Program Manager for Agribusiness. Before joining ACIAR, Howard founded and operated a specialist agribusiness consultancy for almost 30 years. He worked across tropical and temperate horticulture, intensive and extensive meat and seafood industries, grains, pulses and field crops, and food packing and processing. He has also worked as a senior manager in corporate agribusiness in the agricultural inputs sector, and in both food manufacturing and food and grocery distribution. Howard has worked across north and South-East Asia, Papua New Guinea and the Pacific. He has a Bachelor of Applied Science (Rural Technology) from the University of Queensland and a Graduate Diploma of Business Studies from the University of New England.

Climate Change

The Climate Change Program progresses the science and practice of how to transform food systems and livelihoods that are under the most pressure to adapt to climate impacts or where there are the greatest opportunities to reduce greenhouse gas emissions.

Systems transformation requires a strong focus on social and institutional change, supported by technical analyses, to create fundamentally new ways in which livelihoods are sustained and food is produced. The research strategy aims to progress the science and practice of 3 pillars that support transformation:

- co-governance of adaptation pathways – formal and informal ways to align and sequence the actions of governments, businesses and communities to collectively shift food and livelihood systems
- adaptive learning – equipping governments, businesses and communities with the tools and skills for anticipatory learning and for rapidly adjusting plans and actions
- institutional mechanisms for co-benefits – use of policy and market mechanisms to simultaneously achieve benefits through climate-resilient development, ensuring benefit to small-scale producers.

Emphasising locally led approaches, interdisciplinary research, gender and social equity, and building the capacity of Australian and partner country researchers and stakeholders to engage in systems thinking, the program aims to translate sciences that often seem conceptual into tangible projects and pathways for change. It also contributes to global, multilateral collaborations and dialogues on climate change. The program commenced in late 2020 and is building a full portfolio of projects.

Dr Veronica Doerr is the Research Program Manager for Climate Change. Her career has been characterised by integration of social and biophysical sciences to achieve sustainability goals, including research co-design with land managers and policymakers. Before joining ACIAR, Veronica spent 15 years at CSIRO researching multi-functional landscapes and how to support collaboration and learning in climate adaptation. She also managed research groups and external partnerships for climate adaptation and transition. She built and led the Climate Risks and Resilience Group and was Research Director for the Sustainability Pathways Program and a core member of the Land and Water Leadership Team. She has a Bachelor of Arts from Yale University and a PhD from the University of Nevada – Reno.

Crops

The Crops Program aims to increase the productivity, sustainability and use of major crops by applying genetic and agronomic innovations to cropping systems important for partner countries and relevant to ACIAR strategic goals. The program is built on 2 complementary and integrated themes of genetic improvement and sustainable intensification and diversification.

Projects within the genetic improvement theme address specific issues, such as incorporating tolerance or resistance to pests and diseases, or building skills and technological capacity of plant breeding programs (modernisation). ACIAR-supported projects are partnerships to enable the release of improved breeding germplasm, rather than directly disseminating new varieties. Current projects supported by the program identify genes for important traits and support their introduction into breeding lines. Variety release may also be a direct outcome of the gene discovery work.

Projects supported under the sustainable intensification and diversification theme consider the productivity, profitability and resilience of the whole cropping system. These projects design, test and disseminate cropping system innovations, using farming systems research methods, to increase productivity, returns and the sustainability of targeted systems, while exploring opportunities to reduce their climate change footprint. Concentration of poverty in rural areas, migration out of farming, the increasing gap between urban and rural incomes and lower growth for agriculture compared with the overall economy all challenge family farming as a viable, profitable and satisfying pursuit. The Crops Program explores sustainable intensification as one response to these issues.

Dr Eric Huttner is the Research Program Manager for Crops. He started his career in plant molecular genetics, working in the public research institute Institut National de la Recherche Agronomique in France. Before ACIAR, he worked for more than 20 years in private companies, including founding a start-up plant genetic analysis service company. Eric has also managed public–private research initiatives in both Australia and France. Eric was a founding partner and director of Australia's Cooperative Research Centre for Plant Science and a member of the Australian Biotechnology Advisory Council. He is a graduate of France's leading agricultural science school, Institut National Agronomique (AgroParisTech), and was a postdoctoral fellow at the Chinese Academy of Science in 1987.

Fisheries

The Fisheries Program brokers research partnerships that improve the livelihoods of fishers and their communities from productive aquatic farming systems and sustainable wild-catch fisheries. The program's focus is on small-scale artisanal fisheries and low-technology aquaculture methods that benefit both women and men and includes research on post-harvest processing and trade along the supply chain.

The Fisheries Program also invests in a small number of challenging and emerging-needs research initiatives that address important priorities for our partner countries. It aims to improve food security and human health by making food systems and policies more nutrition-sensitive through research on sustainable food systems and fish's contributions to human nutrition, health and wellbeing.

Another key goal of the program is improved sustainability of fish resources, providing environmental, economic and social benefits through research on viable fisheries management policies and practices, both for artisanal fishery communities and for national or export fisheries sectors.

Across the program there is a focus on improving gender equity through research on small businesses and collective enterprises to meet market demand for aquatic products. It also aims to include work to better understand the barriers to women's decision-making and empowerment. The program also strives to strengthen the capacity of fisheries researchers (both Australian and partners) and fisheries managers, through better knowledge of practice-based education and training.

Prof Ann Fleming is the Research Program Manager for Fisheries. Ann came to ACIAR from Monash University, where she was a research development specialist for 2 years. Before that, Ann was Manager of Aquaculture in Northern Territory Fisheries for 5 years, and for the 10 years prior she was Assistant Leader and then Leader of the Abalone Aquaculture Program for the Fisheries Research and Development Corporation. Ann has a PhD in aquaculture from the University of Melbourne, a Bachelor of Science (Honours) from Monash University and a Graduate Certificate in Public Sector Management from Flinders University. She holds an Adjunct Professor position at James Cook University and is currently undertaking a part-time Master of International Development at RMIT.

Forestry

Forests and trees provide social, economic and environmental benefits. The goal of the Forestry Program is to increase these benefits to the human community in the present while enhancing environmental integrity and natural assets for future generations. The program focuses on opportunities to support livelihoods of the rural poor in partner countries from enterprises associated with forests and agroforests. The densification of tree cover outside forests now occurring globally has heightened the economic opportunity associated with tree crops.

The Forestry Program portfolio includes projects that span the value chain from seedlings to processed timber products. During the period 2020 to 2025, the aim is to develop research projects in which the science is strong, prominent and broadly applicable across geographies and forest types while development outcomes are concentrated in focal countries.

ACIAR is participating in the UN Decade on Ecosystem Restoration (2021–2030) with research examining management actions to channel natural processes towards ecosystem aggradation – the building of carbon stores, water-holding capacities, trophic complexity and biodiversity. These projects aim to restore and expand forest cover and the benefits of forests for a diversity of stakeholders.

Horticulture

The Horticulture Program aims to improve the productivity, profitability and sustainability of fruit, vegetable, ornamental and beverage crop production in partner countries and Australia.

Research projects cover a broad scope. The program works along the whole supply chain and across a large variety of commodities, including banana, mango, pineapple, citrus, sweetpotato, coconut, cocoa, coffee and various indigenous and traditional vegetables. Research supported by the program increases on-farm productivity through integrated crop management, disease and pest control, and improved post-harvest storage and management. Beyond the farm, the focus is on market development and linking production improvement with improvements to nutrition and health.

The Horticulture Program takes a complete supply-chain approach to crop production, which considers consumer needs for safe, high-quality food, and works with the whole chain to deliver sustainable competitive advantages to smallholders in the countries where ACIAR works.

The challenge for horticulture research is to improve livelihoods in rural areas and deliver the food necessary for health and nutrition in both rural and urban regions. Higher intensity systems – such as protected-cropping and production systems that are resilient to climate effects and can withstand pest and disease pressure – are complemented by projects that effectively reduce loss along the chain.

Dr Nora Devoe is the Research Program Manager for Forestry. Before joining ACIAR, Nora worked in commercial hardwood production in Victoria and Western Australia, New Zealand and several tropical countries. She has also been employed in public policy, academia and forestry for rural development. Nora is a biophysical scientist with longstanding interest in the social dimensions of forestry, with prior research in community forestry and sustainability, including social, economic and ecological aspects. Nora holds a PhD (silviculture) and a Master of Forest Science (forest ecology) from Yale University, as well as a Bachelor of Science in environmental science from Antioch University, USA.

Ms Irene Kernot is the Research Program Manager for Horticulture. Irene started her career in 1978 as an agronomist with the Northern Territory Department of Primary Industries. Moving to north Queensland in 1990, Irene worked in education as a horticultural instructor and served on the board of the Australian College of Tropical Agriculture before she joined the Department of Primary Industries in Queensland as an extension horticulturist in tropical fruits, particularly mango and avocado. In 2003, Irene transferred to research management as the Director of Tropical Fruit and Value Chain Research Development and Extension, adding the post-harvest and market access research portfolios to her work in tropical fruit production systems.

Livestock Systems

The Livestock Systems Program brokers research partnerships that develop more productive, profitable and sustainable livestock systems for the benefit of humans, animals and the environment. The program takes a holistic view of livestock systems, considering animal health and production technologies within the broader sociocultural, policy and economic contexts. Animal welfare and gender-sensitive approaches are central to the research design.

The program has 3 key areas of focus:

- livestock and climate change – there is an urgent need to consolidate existing evidence (and identify gaps) in global research that demonstrates the greenhouse gas emissions reductions that occur with more efficient, climate-smart livestock production systems.
- trade and market access – research into the transition from low-input to more market-oriented livestock systems has been a key ACIAR theme for many years. A whole-system approach that focuses on livestock production and biosecurity improvements within the relevant sociocultural, gender, policy and market aspects of the value chains will continue to be a key focus of the program.
- the role of animal-sourced foods in nutrition and food security – understanding and enhancing animal-sourced food, particularly for women and children, is a key focus in environments more prone to food insecurity, such as those experiencing recurring drought or higher-than-average malnutrition and/or stunting.

Social Systems

The Social Systems Program takes a people-centred approach to agricultural research-for-development to reduce poverty. The program commissions research to address questions most effectively answered, or led primarily, by qualitative social scientists, with elements of quantitative social science where relevant to the issue under investigation. All projects endeavour to conduct trans-disciplinary research to deliver innovation and reduce poverty.

The program's 5 key research areas are:

- agricultural extension
- gendered social relations
- women's empowerment
- natural resource management
- climate adaptation.

Social science theories and methods can contribute significantly to systems research, particularly when considering systems as a descriptor of holistic approaches that encompass complex interactions. However, the contribution of social science extends beyond systems thinking. In both research for, and in, agriculture-for-development and development more broadly, empirical research and development practice have clearly shown that engaging with people as active agents, rather than passive recipients of research and aid, results in greater and better impact.

Dr Anna Okello is the Research Program Manager for Livestock Systems and oversees One Health investments for ACIAR. A registered veterinarian, Anna holds a postgraduate diploma in International Animal Health from the University of Edinburgh, and a PhD in public health policy from the University of Edinburgh's School of Social and Political Science (Centre for Africa Studies). Anna has almost 20 years international development experience, holding research, management and technical advisory roles for non-government organizations, academia, the World Health Organization and the Australian government, and maintains a key academic interest in issues at the research-policy interface. Anna is an Academic Teaching Fellow in Global Health and Infectious Disease at the University of Edinburgh Medical School and a Lancet Commissioner for One Health.

Dr Clemens Grünbühel is the Research Program Manager for Social Systems. Clemens is an ecological anthropologist with expertise in sustainable resource use and agricultural development. Before ACIAR, he was Research Leader with the Stockholm Environment Institute, based in Bangkok. He has 20 years experience in environmental public policy, participatory natural resources management, social impact assessment, institutional analysis and climate adaptation. His work has included stakeholder engagement and teaching and training. Clemens has worked in Australia, Myanmar, Laos, Thailand, Vietnam, Cambodia and Indonesia. His research expertise and publishing include climate adaptation, rural innovation, agroecological analysis and resource use systems.

Soil and Land Management

The Soil and Land Management Program aims to help smallholders boost productivity and resilience. At the same time, it strives to ensure that soil and food security are achieved, through sustainable use of limited resources in a changing climate. The program takes an integrated approach to identify promising practices within farming systems in specific agroecological zones. Intersecting with socioeconomic and cultural factors, it develops technologies that enable farmers to sustainably use resources and improve the productivity of their farming systems.

In some regions, research is focused on improving soil security and the resilience and sustainability of farming systems, in the context of climate change and changing socioeconomic circumstances. The focus is to improve the efficiency of resource use, while maintaining and enhancing ecological services. In other regions, the goal is to improve livelihoods by raising yields and increasing profitability of agricultural enterprises.

Scarcity of resources, increasing population growth and climate change place huge burdens on smallholder farmers. Inappropriate farming systems and overexploitation of resources are degrading land, affecting soil security, depleting nutrients and speeding up soil acidification, salinisation and desertification. Ensuring that agricultural production is sustainable – and benefits smallholder farmers – is a key challenge for long-term food security.

Water

The Water Program addresses the challenge of efficient, sustainable water use to support agricultural production in a context of increasingly uncertain climate, competition from other sectors and declining water quality. The program works to improve agricultural water management through innovative technical and policy approaches under 3 main themes:

- improving access to, and outcomes from, irrigation for smallholders
- sustainable use of groundwater in agriculture
- risks and opportunities for safe productive use of low-quality water, including adapting to and managing the impacts of salinity.

Projects brokered by the Water Program, across all themes, share the broad aims of supporting sustainable diversification and intensification of food production, working towards equitable access to and equitable returns from water within and between communities and regions, and working with decision- makers to inform policy development at local, regional and national levels.

Dr James Quilty is the Research Program Manager for Soil and Land Management. Before joining ACIAR, James worked at the International Rice Research Institute, based in the Philippines, for 7 years. He completed his PhD in soil science at the University of Sydney, studying the soil health implications of organic amendments in conventional irrigated cotton systems in central western New South Wales. After completing his PhD, James worked with Forests New South Wales, studying the impacts of managed pine forests on soil carbon and soil respiration in the central tablelands of New South Wales.

Dr Neil Lazarow is the Research Program Manager for Water. Before joining ACIAR in 2022, Neil was the Regional Water Lead at CSIRO and previously Research Director for the Water Program and Group Leader for International Water Practice. Neil led the development of CSIRO's water research in South America from 2015–2019, including delivery of Peru's first drought management plan. He led the DFAT–CSIRO Research for Development Alliance Phase 3 from 2013–2016, which included a diverse portfolio of work in South and South-East Asia. In Australia, Neil has been involved in water research programs focused on the Murray–Darling Basin and northern NSW. Neil formerly held roles at the Department of Climate Change and Energy Efficiency and Griffith University. Neil has a PhD from the Australian National University on managing and valuing coastal resources.

Planning for the ACIAR research portfolio includes consideration of economics and policy impacts, to support sustainable and inclusive economic development. Photo: Chris Maglangit

Economics and policy

Our economics and policy activities focus on research and initiatives that support sustainable and inclusive economic development. This addresses ways to manage profitable and sustainable food and resource systems from smallholders to policymakers.

Access to, and integration with, markets is essential to the development of these food and resource systems. Markets provide the means for smallholder communities to move from subsistence to commercial scales of production. Achieving sustainable development requires equipping managers at all levels with accessible information, digital technologies, decision-making tools and financial products to manage their systems effectively.

The Economics and Policy team works to understand the trade-offs involved in management and policy decisions, and the opportunities to find balanced pathways for development. Key examples include:

- markets that fail to provide participants with conditions for equitable access
- competing demands on resources among alternative uses, both over time and under uncertainty
- production activities with the potential to create negative environmental or social externalities.

Each requires carefully designed management and policy solutions. Our work in this area is concerned with the processes that support the translation of scientific, social and economic knowledge into policy for sustainable and inclusive economic development.

Dr Todd Sanderson is the Research Manager, Economics and Policy. Before joining ACIAR, Todd was a CSIRO research scientist working in the area of agriculture, digital economics and markets. Prior to this he was a lecturer in economics at the University of Sydney, with research covering agricultural trade, climate adaptation, and smallholder decision-making under uncertainty. Todd has worked with ACIAR projects in Papua New Guinea and Laos, providing economic insights and developing collaborative relationships with in-country research partners. He has a PhD in agricultural economics from the University of Sydney.

Planning and evaluation

Portfolio planning and impact evaluation helps us refine our priorities and learn lessons from current and past projects, as well as enabling accountability to our Minister, the Australian Government and the Australian public.

An important aspect of our work lies in strategically planning for, and measuring, the impact of our investments. Our Portfolio Planning and Impact Evaluation team is responsible for the ongoing development of organisation-wide performance frameworks and the evaluation of our investments in the medium and long-term. The team engages with emerging thinking on the design of effective research-for-development portfolios, and invests in developing methods to appropriately monitor and assess the contribution of our investment to development outcomes.

ACIAR investments are evaluated through a combination of medium-term outcome evaluations and longer-term impact assessments.

Adoption studies enable research teams to assess the extent to which research findings are taken up, and identify the effects of the project on the scientific community and next-users in partner countries and Australia. They also provide a deeper understanding about the pathways to change.

Impact assessments are done by independent consultants with specialist expertise in measuring the impact of agricultural research. They analyse economic return on investment, assess social and environmental impacts and understand the contribution that we have made to complex systems change processes.

These assessments apply various methods to quantify impacts and findings from all studies, and are published in the ACIAR impact assessment series.

Consistent with the ACIAR 10-Year Strategy 2018–2027, the Portfolio Planning and Impact Evaluation team has 2 key areas of focus during 2022–23:

- systematic portfolio planning, monitoring and reporting
- commissioning evaluation studies.

Systematic portfolio planning, monitoring and reporting

The systematic portfolio planning, monitoring and reporting system explicitly links our bilateral, multilateral and capacity-building investments to our strategic objectives. It enables us to clearly explain how, and to what scale, our current portfolio is anticipated to contribute to these objectives, provides a framework to demonstrate progress towards these, and facilitates adaptive management at the portfolio level in response to lessons learned and changing contexts.

We are continuing to revise our existing planning and reporting documents to ensure that projects are designed and budgeted in a way that enables effective project-level monitoring, evaluation and reflection throughout implementation, and longer-term impact assessment after project completion.

Commissioning evaluation studies

We will continue to commission studies that quantify our contribution and produce lessons relevant to the achievement of all ACIAR objectives. We will build on, and continue to develop, methods to understand and value the different contributions of agricultural research to human development and environmental sustainability. We will look for opportunities to undertake truly integrated impact assessments that explore the multiple values of our work. In response to the ACIAR Gender Equity Policy and Strategy 2017–2022, we will trial the application of both formative and ex-post gender-integrated assessment methods.

We will also commission studies that will inform how we design and commission future work to deliver our objectives. These studies will aim to understand how and why research is influencing the knowledge, attitudes, behaviour and practices that support the achievement of longer-term development outcomes. This will include cross-cutting reviews of common strategies for translating knowledge to impact, and developing and/or applying analytical frameworks for systematic pathway assessment. We will also seek to develop ways to more accurately analyse the contribution of our work, using methods that acknowledge the co-contributions of enabling innovation systems, policy environments and other aligned investments.

Ms Bethany Davies is Research Manager for Portfolio Planning and Impact Evaluation. Bethany has extensive experience of practical and applied approaches to project planning, participatory program design, theory of change, monitoring and evaluation framework development and implementation, evaluation training and capacity building. Before joining ACIAR, she worked for 5 years specifically in research-for-development programs, including as the Research to Impact Team Leader for the Center for International Forestry Research, and as the Forest Trees and Agroforestry Monitoring Evaluation, Learning and Impact Assessment Coordinator. Bethany holds a Bachelor of International Relations and a Master of International Development from RMIT.

5

ACIAR in the Indo-Pacific

Photo: Andrew Mununwa

ACIAR in the Indo-Pacific

Through longstanding partnerships with many countries in the Indo-Pacific region, ACIAR supports collaborative research on productivity, resilience, sustainability and equity in agriculture, forestry and fisheries systems to reduce poverty and improve livelihoods.

This work is dominated by bilateral and regional research projects underpinned by longstanding country partnerships. During 2022–23, 171 projects will be active in our operational area. These projects are collaborations between Australian and international scientists with in-country partners, and brokered by ACIAR research program managers, across 10 areas of research.

The projects are varied in design, execution and outcomes. Very broadly, projects range from research or investigations conducted by a group of partners across a number of field sites over several years to develop new knowledge, technology or methodology, through to small research activities where an individual agency or specialist may conduct a desktop or scoping study over 12 months.

When establishing research projects, our research program managers work closely with the ACIAR Country Network to ensure that the research aligns with in-country priorities, and to build connections and relationships with in-country organisations and institutions.

This chapter describes our research collaborations with each region and country in 2022–23. Our work is organised in 4 regions of operation in the Indo-Pacific, with 32 partner countries and guided by locally engaged staff in 11 Country Offices throughout the regions.

Within each region, we facilitate a varied program of research, reflecting the challenges and opportunities of a region and individual countries. In addition to bilateral and regional projects, we also conduct global research collaborations (Chapter 2) and scientific and policy capacity building (Chapter 6).

Pacific

52

projects

East and South-East Asia

75

projects

South Asia

28

projects

Eastern and Southern Africa

26

projects

This data was compiled in August 2022 and may change during 2022–23. Some projects occur in more than one region, therefore the total of projects in each region will exceed the total number of individual projects as listed on page 34.

5.1

Pacific

Photo: Cooper Schouten

Pacific

The countries of the western Pacific region are set apart from the rest of the world. Many are small and geographically isolated, have limited land mass and arable land, fragile natural environments and few resources. Increasingly, they are more vulnerable to natural disasters and climate change than many other regions of the world.

Each country in this region faces specific development and agricultural challenges including small formal economies, long distances from major markets, high costs and rapidly growing populations that hamper economic growth. Governance and capacity constraints in some countries also limit their ability to deliver services. These challenges make it difficult to respond and recover from disasters and climate change effects, which are prominent in the region.

In 2021–22, the region was confronted with a string of civil and natural disasters that included civil unrest and demonstrations in Solomon Islands, volcanic eruption and tsunami in Tonga, and flooding and landslides due to cyclones across several countries.

Pacific island countries also face the consequences of a triple burden of malnutrition – a situation where undernutrition, micronutrient deficiencies and obesity coexist. Unhealthy diets, lifestyles and environment are key risk factors contributing to these non-communicable diseases.

For the last 2 years, the COVID-19 pandemic has had devastating effects globally. Cities have been locked down, borders have closed, limiting international travel, and supply chains have been disrupted, upending economies. The Pacific region has been equally affected.

With the threat of inadequate health care to cope with COVID-19, Pacific countries were quick to close borders, establish isolation strategies and roll out protocols of social distancing. Many Pacific island countries have intensified their vaccination programs, including boosters to help manage the spread of the virus. Australia has assisted the region by providing donations of vaccines and support to local health systems.

In 2020 ACIAR published a report[1] that examined food systems in the Pacific region and the vulnerabilities that were exposed or amplified by the COVID-19 shock. Income and production by farmers and fishers were impacted by the movement restrictions; service delivery was disrupted, especially on small and medium islands; local markets closed reducing the availability of fresh produce, which was felt most by urban areas; tourism declined significantly reducing farm incomes that were reliant on supplying tourism establishments; and migration to rural areas increased food demand and pressure on agriculture. Lockdowns and border closures also resulted in employment and income losses, remittances declined and general household and business spending declined. In response to this analysis, ACIAR commissioned an assessment of agrifood systems transformation through circular migration between Pacific island countries and Australia[2]. This assessment concluded that the combination of continued labour demands in Australian agriculture, COVID-19 socioeconomic impacts in the Pacific, and future food systems risks in Pacific island countries, create an opportunity for greater agriculture-oriented research and training within agriculture-related labour mobility.

1 Robins L, Crimp S, van Wensveen M, Alders RG, Bourke RM, Butler J, Cosijn M, Davila F, Lal A, McCarthy JF, McWilliam A, Palo ASM, Thomson N, Warr P & Webb M (2020) *COVID-19 and food systems in the Indo-Pacific: An assessment of vulnerabilities, impacts and opportunities for action*, ACIAR Technical Report No. 96, Australian Centre for International Agricultural Research, Canberra.

2 Davila F, Dun O, Farbotko C, Jacobs B, Klocker N, Vueti E, Kaumaitotoya L, Birch A, Kaoh P, Pitakia T, Tu'itahi S (2022) Agrifood systems transformation through circular migration between Pacific island countries and Australia, ACIAR Technical Report No. 100, Australian Centre for International Agricultural Research, Canberra.

The impact of the pandemic continues to hit the Pacific region hard. Agriculture and fresh produce emerged as the foundation of the economy for the region and ensured food security for the population when the manufacturing sector, trade and services stalled.

To reduce and mitigate ongoing impacts of COVID-19 on economies, Pacific region countries adopted a variety of measures, including economic stimulus packages, home gardening programs through seed distribution, farm support packages and backyard aquaculture farms. Cash transfers to most vulnerable households were also implemented to augment loss of income.

While many Pacific region countries are still contending with and responding to the onshore surge of the Omicron variant of COVID-19, the region and governments are preparing to restart their economies and open borders. The past 2 years have resulted in renewed interest in, and support for, agriculture, fisheries and forestry; enthusiasm for innovation in food systems and value chains; and the creation of new domestic market opportunities.

Partner countries in the ACIAR Pacific region

- Fiji
- Kiribati
- Samoa
- Solomon Islands
- Tonga
- Tuvalu
- Vanuatu
- Papua New Guinea

Drivers of regional collaboration

While acknowledging the individual needs and unique research and development priorities of each partner country in the Pacific region, the scattered nature of the Pacific region nations and their small populations mean that many countries cannot address all their challenges and opportunities in agriculture alone.

The ACIAR program with the Pacific region has a strong focus on enabling regional collaboration, especially through our close relationship with The Pacific Community (SPC), which plays a key role in communicating research outcomes of relevance across the region. Regional research programs and projects are implemented through agencies with regional capability (including SPC, the University of the South Pacific and CGIAR centres) and bilateral research and extension agencies.

Papua New Guinea is a significant partner within our Pacific region program, and we have a specific strategy that highlights enabling collaboration with the small island states of the region on issues of common interest.

ACIAR research projects are designed with consideration for sustainable and inclusive economic development, such as projects in the highlands of Papua New Guinea where crop production and crop protection research enables growers to supply more product to local markets. ACIAR Research Program Manager, Horticulture, Irene Kernot (centre), visited a market with research team members to learn more about project impacts.

ACIAR alumnus and Senior Research Officer, Fiji Ministry of Agriculture, Dr Rohit Lal, leads soils training in Taveuni, Fiji. The soils training aims to help farmers learn to recognise soil nutrient deficiencies and ways to improve soil health. Photo: Sunayna Nandini

ACIAR Pacific region program

The 2017 Pacific Step-up highlighted in the Australian Government's 2017 Foreign Policy White Paper elevated Australia's partnerships with the Pacific region to a new level and focused on strategically secure and economically stable support for the region. This strong focus was re-emphasised by Australia's new government in 2022.

In 2022–23, we will continue to build on our long engagement with the Pacific region, through our regional office in Fiji. We will develop new 10-year strategies with the Pacific island states and Papua New Guinea.

We are developing our medium-term priorities under both 10-year strategies through consultation with national government partners and regional research and development agencies as the region enters the new normal. We will focus our efforts on re-building the agriculture sector post-pandemic and re-engaging with partners, including face to face discussions where possible. We are also supporting Pacific Week of Agriculture and Forestry, which Fiji will host in March 2023.

We continue to support alumni of ACIAR capacity building programs and fellowships to work hand-in-hand with Australian researchers to provide insights into how the pandemic is affecting local food security and to ensure future food security of the Pacific region. We also support the scaling up of new opportunities in COVID-19 relevant research areas such as One Health (the interface between human, animal and environmental health), biosecurity and improving resilience in food supply chains, both within partner countries and between Australia and partner countries.

A key focus of our program within the Pacific region will be enabling regional collaboration in research and capacity building to address common issues and opportunities. This regional approach includes various projects addressing biosecurity, climate-resilient livelihoods and opportunities for stronger agribusiness development. Multi-country projects and linked programs include:

- fisheries (pathways to change in Pacific coastal fisheries)
- forestry (domestication and breeding of sandalwood, agroforestry and catchment rehabilitation)
- crops (sweetpotato, indigenous vegetables, commercial vegetables, tropical fruits and cocoa)
- soil information and soil health.

Pacific region program 2022–23

Partner country	No. projects
Pacific island countries	34
Fiji	20
Kiribati	4
Samoa	13
Solomon Islands	14
Tonga	11
Vanuatu	9
Papua New Guinea	22

Note that a project may be conducted in several countries, therefore the total number of projects in this table will be greater than the number of projects in the region.

52 projects

37 research projects

15 small research activities

This data was compiled in August 2022. Additional projects may be commissioned during 2022–23.

Research portfolio

3 Agribusiness projects

5 Climate Change projects

1 Crops project

9 Fisheries projects

6 Forestry projects

11 Horticulture projects

6 Livestock Systems projects

7 Social Systems projects

4 Soil and Land Management projects

0 Water projects

Table 5.1 Current and proposed projects in the Pacific region, 2022–23

Project title	Project code	Country
Agribusiness		
Pacific Agribusiness Research in Development Initiative Phase 2 (PARDI 2)	AGB/2014/057	Fiji, Tonga, Vanuatu
Defining priority commercialisation pathways and potential private commercialisation partners for viable long-term commercialisation of products emerging from FST/2019/128	AGB/2021/172	Fiji
Landscape and opportunity analysis in the Pacific tuna sector: Foundation analysis to identify innovation pathways to enhance participation by the Pacific community and value retention in the region	AGB/2021/173	South Pacific general
Climate Change		
Transformation pathways for Pacific coastal food systems	CLIM/2020/178	Kiribati, Solomon Islands
Sustainable intensification for climate-resilient development in Pacific island countries	CLIM/2020/186	Samoa, Tonga
Institutional barriers to climate finance through a gendered lens in Fiji, Samoa and Solomon Islands	CLIM/2021/110	Fiji, Samoa, Solomon Islands
Supporting greenhouse gas inventories and livestock data development in Fiji	CLIM/2021/160	Fiji
Supporting the tracking sharing learning platform of the Adaptation Research Alliance	CLIM/2022/108	Global
Crops		
Finding a genetic basis for oil palm responses to basal stem rot in a long-term infected block	CROP/2021/130	Papua New Guinea, Solomon Islands
Fisheries		
Half-pearl industry development in Tonga and Vietnam	FIS/2016/126	Tonga, Vietnam
Improving peri-urban and remote inland fish farming in Papua New Guinea to benefit both community-based and commercial operators	FIS/2018/154	Papua New Guinea
Agriculture and fisheries for improved nutrition: integrated agrifood system analyses for the Pacific region	FIS/2018/155	Kiribati, Solomon Islands, South Pacific general, Vanuatu
Towards more profitable and sustainable mabé pearl and shell-based livelihoods in the western Pacific	FIS/2019/122	Fiji, Papua New Guinea, Samoa, Tonga
Innovating fish-based livelihoods in the community economies of Timor-Leste and Solomon Islands	FIS/2019/124	Solomon Islands, Timor-Leste
Improving nutrition through women's and men's engagement across the seaweed food chain in Kiribati and Samoa	FIS/2019/125	Kiribati, Samoa
Spatially integrated approach to support a portfolio of livelihoods	FIS/2020/111	Solomon Islands, South Pacific general
Coalitions for change in sustainable national community-based fisheries management programs in the Pacific	FIS/2020/172	Kiribati, Solomon Islands, South Pacific general, Vanuatu
Strengthening agricultural resilience in Western Province: Developing methods for strengths-based livelihoods approach	FIS/2021/113	Papua New Guinea
Strengthening agricultural resilience in Western Province: Mapping place-based strengths and assets	FIS/2021/122	Papua New Guinea

Project title	Project code	Country
Forestry		
Enabling community forestry in Papua New Guinea	FST/2016/153	Papua New Guinea
Enhancing private sector-led development of the canarium industry in Papua New Guinea - Phase 2	FST/2017/038	Papua New Guinea
Promoting smallholder teak and sandalwood plantations in Papua New Guinea and Australia	FST/2018/178	Papua New Guinea
Coconut and other non-traditional forest resources for the manufacture of engineered wood products	FST/2019/128	Fiji
Livelihoods in forest ecosystem recovery	FST/2020/135	Solomon Islands
Kava land use changes	FST/2021/146	Fiji, Vanuatu
Horticulture		
Adopting a gender-inclusive participatory approach to reducing horticultural food loss in the Pacific	CS/2020/191	Fiji, Samoa, Solomon Islands, Tonga
Aligning genetic resources, production and post-harvest systems to market opportunities for Pacific island and Australian cocoa	HORT/2014/078	Fiji, Samoa, Solomon Islands, Vanuatu
Developing the cocoa value chain in Bougainville	HORT/2014/094	Papua New Guinea
Responding to emerging pest and disease threats to horticulture in the Pacific islands	HORT/2016/185	Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga
Safeguarding and deploying coconut diversity for improving livelihoods in the Pacific islands	HORT/2017/025	Fiji, Papua New Guinea, Samoa, Solomon Islands, Vanuatu
Protecting the coffee industry from coffee berry borer in Papua New Guinea and Australia	HORT/2018/194	Papua New Guinea
Improving root crop resilience and biosecurity in Pacific island countries and Australia	HORT/2018/195	Fiji, Samoa, Solomon Islands, Tonga
Enhanced fruit systems for Tonga and Samoa (Phase 2): Community based citrus production	HORT/2019/165	Samoa, Tonga
PICfood: Driving vegetable food environments to promote healthy diets in Pacific island countries	HORT/2021/141	Fiji, Samoa
Biosecurity planning	HORT/2021/151	Cambodia, Papua New Guinea
Understanding school food provision in the Pacific: Scoping the potential of local food systems to improve diets, nutrition and livelihoods	HORT/2021/159	Fiji
Livestock Systems		
Increasing the productivity and profitability of smallholder beekeeping enterprises in Papua New Guinea and Fiji	LS/2014/042	Fiji, Papua New Guinea
Improving small ruminant production and supply in Fiji and Samoa	LS/2017/033	Fiji, Samoa
A farm planning approach to increase productivity and profitability of smallholder cattle systems in Vanuatu	LS/2018/185	Vanuatu
Drug sensitive and resistant tuberculosis and zoonotic infections as causes of lymphadenitis in 3 provinces in Papua New Guinea	LS/2018/217	Papua New Guinea
Development of a third party verified voluntary sustainable certification program for beef and other key commodities in Vanuatu	LS/2020/155	Vanuatu
Strengthened surveillance for vector-borne zoonotic and livestock diseases in Papua New Guinea	LS/2021/158	Papua New Guinea

Project title	Project code	Country
Social Systems		
Improving livelihoods of smallholder coffee communities in Papua New Guinea	ASEM/2016/100	Papua New Guinea
Climate-smart landscapes for promoting sustainability of Pacific island agricultural systems	ASEM/2016/101	Fiji, Tonga
Climate-smart agriculture opportunities for enhanced food production in Papua New Guinea	ASEM/2017/026	Papua New Guinea
Improving agricultural development opportunities for female smallholders in rural Solomon Islands	SSS/2018/136	Solomon Islands
Gender equitable agricultural extension through institutions and youth engagement in Papua New Guinea	SSS/2018/137	Papua New Guinea
Landcare: An agricultural extension and community development model at district and national scale in Fiji	SSS/2019/140	Fiji
Climate-smart coastal landscapes for sustaining fisheries-based livelihoods and food security in the Pacific	SSS/2021/120	Fiji, Tonga
Soil and Land Management		
Better soil information for improving Papua New Guinea agricultural production and land use planning: Building on PNGRIS and linking to the Pacific Regional Soil Partnership	SLAM/2019/106	Papua New Guinea
Optimising soil management and health in Papua New Guinea integrated cocoa farming systems - Phase 2	SLAM/2019/109	Papua New Guinea
Soil management in Pacific island countries Phase 2: Investigating nutrient dynamics and the utility of soil information for better soil and crop management	SLAM/2020/139	Fiji, Samoa, Tonga, Vanuatu
Sustaining soil fertility in support of intensification of sweetpotato cropping systems	SMCN/2012/105	Papua New Guinea

Pacific island countries

A$11.85 million
Budgeted funding

26
Bilateral and regional research projects

9
Small projects and research activities

Agriculture, fisheries and forestry are vital sectors for the majority of Pacific island communities and countries, because of their contributions to rural livelihoods, gross domestic product (GDP) and food security, as well as increasing opportunities for local regional and international markets.

The Multi-Country Programming Framework for the Pacific Islands 2018–2022, developed in partnership with the Food and Agriculture Organization of the United Nations (FAO), identified the following common challenges across the Pacific island countries:

- limited land mass and dispersed population
- fragile natural environments and lack of arable land
- narrow resource bases and reliance on ocean resources
- high vulnerability to climate change, external economic shocks, and natural disasters
- exposure to increasingly frequent and more intense severe weather and climate events, including droughts, floods and tropical storms
- high dependence on food imports
- dependence on a limited number of economic sectors
- remoteness and distance from global markets
- high costs for energy, transportation and communication.

These constraints interact with one another and contribute to increased vulnerability to shocks – both economic shocks (such as abrupt changes in food and fuel prices) and natural disasters (such as cyclones, floods and droughts, earthquakes and tsunamis). These vulnerabilities have limited the development of commercially oriented agriculture, fisheries, and forestry sectors and left many Pacific island countries heavily dependent on imports of food and other commodities.

The vulnerability of Pacific island countries is increased by their narrow resource base, which implies the economic dependence of many islands on exports of a single commodity or limited range of commodities.

For much of the twentieth century, most Pacific island economies were heavily dependent on copra as their principal source of export income; however, with the falling value of coconut oil, this previous source of wealth has become a ‘poverty trap’ for many communities and countries that lack the resources to diversify into higher value products (which could support the rejuvenation of the industry) or into other crops and commodities.

Other countries are heavily dependent on marine resources, especially tuna, for their export earnings. In this case, significant vulnerability arises from the limited control that each country has over the management of this resource. An emerging threat is that rising sea temperatures, especially when accentuated by El Niño cycles, may affect the migration of some tuna species, potentially taking fish populations out of the waters of Pacific island countries that depend heavily on them economically.

Dependence on logging – and especially the export of round logs – is a challenge in western Melanesian countries (Papua New Guinea, Solomon Islands and, to a lesser extent, Vanuatu). The natural forest resource is declining rapidly, often accompanied by serious environmental degradation, and exploitation brings little lasting benefit to landowners or to the national economy. Partner countries wish to move towards more sustainable management of forest resources and local processing to add value to the timber but lack the economic resources and skills to make this transition.

This context is not static but evolves on a number of scales, in time and space. Changing demographics are one key factor, with populations increasing at more than 2% per annum in Solomon Islands and Vanuatu (as well as Papua New Guinea), leading to mounting concerns about local food security and increasing pressure on the natural resource base. Elsewhere in the Pacific region, populations are either stable (increasing at less than 1% per year) or falling (due to emigration), leading to labour shortages and making it harder to develop profitable enterprises. Additionally, there is a strong move towards urbanisation across the Pacific region, with more than one-third of the total population now living in cities. This has disrupted traditional food systems and diets and is leaving some rural areas and outlying islands with declining populations, hampering economic development and making it hard for governments to assure basic services.

Another widespread vulnerability of Pacific islands agriculture – though with different impacts in each country and island – is to invasive pests and diseases. Island environments have inherently limited natural resilience in the face of aggressive invasive species due to the limited local diversity of 'natural enemies'. Recent years have been marked with rapidly spreading outbreaks of, for instance, invasive ant species, the destructive 'Guam strain' of the familiar coconut rhinoceros beetle, and the giant African snail. Emerging diseases of livestock (and potentially fisheries) may be equally destructive, even if less visible to the general public.

Pacific region leaders have repeatedly identified 2 overriding threats to the economic development and wellbeing of people in the region:

1. **Climate change and its impact on food systems**

   Pacific island countries are disproportionately affected by climate change, while having little scope to influence the drivers of climate change. All countries in the Pacific region are concerned about the potential impacts of climate change on rising sea levels (given that much of the population and most of the productive agriculture in the Pacific islands is in coastal areas or coastal plains), food systems (including new threats from invasive pest species) and on their fragile marine resources.

2. **Rapid rise in non-communicable diseases, associated with declining diet quality**

   While under-nutrition remains a problem in some poorer, rural areas of Pacific island countries, changes in diets and lifestyles associated with increasing incomes and urbanisation have led to Pacific island countries having some of the highest levels of obesity in the world, along with record levels of Type II diabetes and heart disease. As well as taking a tragic toll in terms of human wellbeing, this rise in the incidence of non-communicable diseases imposes a huge burden on health services and the economy of Pacific region countries in general.

Fijian farmer, Mr Emosi Ravato, uses a high tunnel (a plastic covered structure) to increase production of certain crops, increase the length of the growing season and grow crops that otherwise could not be grown in his area. Photo: Central Queensland University

Given these challenges, Pacific leaders have strongly emphasised the need for greater resilience in Pacific region food and agriculture systems as a means to counteract vulnerabilities and to increase food and nutritional security. While investing in agriculture fisheries and forestry has been widely recognised as one of the most effective ways of stimulating broad-based economic growth, the effort to increase resilience, rather than focusing primarily on increasing productivity, has become a theme that underpins the entire agricultural development agenda in the Pacific region. Given the scale and complexity of the problems faced by Pacific island partner countries, it is fortunate that the Pacific region has a strong tradition of multilateral and bilateral institutions and partnerships that have supported many decades of collaboration and concerted action, to address a wide range of issues.

The Pacific Islands Forum provides the overall framework for policy development and action, while the technical agencies, especially the Pacific Community (SPC) and the Secretariat of the Pacific Regional Environment Programme (SPREP), provide support to member countries in taking action across a range of sectors and development issues, including health, education, the environment, biosecurity, trade, communications and infrastructure.

ACIAR has been a leading supporter of regional and bilateral research collaboration in the region with SPC, partner countries and other agencies, in agriculture, forestry and fisheries. These existing relationships provide a vital foundation for a portfolio of integrated and cross-sectoral research that will be needed to tackle the 2 high level challenges outlined above. ACIAR started working with partners in the Pacific region in 1983 and, for the next 2 decades, the majority of projects were sectorally and technically focused.

Country priorities

The ACIAR 10-Year Strategy 2018–2027 positions the agency's support to the Indo-Pacific region. Following the 2017 White Paper Pacific Step-up. Stepping up Australia's engagement with our Pacific family, ACIAR placed greater emphasis on supporting Australia's 'near neighbours' in the Pacific region. This was in response to the significant long-term challenges faced by our partners in the Pacific region, including: climate change and responding to natural disasters; sustaining economic growth and boosting education, developing skills and jobs for growing populations; pursuing gender equality and recognising the essential role of women in achieving better development outcomes; preventing major disease outbreak and tackling transnational crime.

Our regional partner SPC emphasises integrated approaches to increasing resilience, including:

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

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

ACIAR currently works with 7 Pacific island countries: Fiji, Kiribati, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

2022–23 research program

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

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

Agribusiness

The viability of the coconut sector in the Pacific region is being challenged by the increasing proportion of coconut palms becoming senile. Many farmers are reluctant to renew palms due to the initial cost and reduced income until the newly planted palms yield fruit. A current ACIAR-supported forestry project is exploring the sale of senile stems by farmers to the timber industry, with revenue from sales expected to act as an incentive for farmers to remove the senile palms and offset the costs of replanting. A small research activity led by Mr Ian Buck of Buck Advisory will develop a framework for directly engaging private sector partners in the project to ensure new value chains for coconut veneer timber products are connected to viable markets via committed and capable processing and marketing entities. This framework will be applicable to other projects where understanding the business operating environment and engagement of suitably qualified private sector partners are essential to maximising the adoption and uptake of project lessons and outcomes.[1]

The Pacific Agribusiness Research and Development Initiative (PARDI) has been a significant program of work supported by ACIAR and DFAT. Starting in 2010, it promoted sustainable livelihood outcomes for Pacific islands households through research and innovation, with the regional goal of catalysing and informing a more vibrant, diverse and viable agribusiness sector. Phase 2 of PARDI, led by Professor Steven Underhill of the University of the Sunshine Coast, studied benefits to community livelihoods from successful agribusiness developments and ways to make economic benefits more inclusive and sustainable. Concluding in 2022, the project will finalise the delivery and evaluation of mentoring programs tailored to the honey, tilapia and agritourism sectors, provide technical and supervisory support to master students at partner universities, and develop and trial a profitability and accounting tool for smallholder beekeepers.[2]

Tuna is recognised as one of the greatest shared natural resources of Pacific island countries, providing jobs, government revenue and contributing to meeting the nutritional needs of the Pacific island communities. However, population growth, climate change and overfishing have placed increasing pressure on the sustainability of tuna resources. A small research activity led by Ms Deb Doan of Business for Development will identify innovation pathways and assess the commercial feasibility for improving returns (defined as sustainable resource management, maximum catch utilisation and increased retention of value) for Pacific island countries' tuna sectors and economies more broadly. Researchers will analyse previous projects to identify key barriers to success and critical success factors.[3]

Climate Change

Australia is a world leader in greenhouse gas mitigation research in agriculture. A new project in 2022–23 works with Fiji to strengthen its national greenhouse gas accounting systems for livestock towards the same high standard used by Australia and to use these systems to support the identification and implementation of on-farm management options that reduce emissions. The project supports the implementation of Fiji's Low Emission Development Strategy. Led by Dr Natalie Doran-Browne of Riverine Plains Inc, the project team will work with government institutions in Fiji and will help grow capability in the data management, analyses and reporting needed to support current and future emissions reduction commitments under the Paris Agreement. The project team will also collaborate within Fiji and across the region to support Pacific greenhouse gas inventory systems.[4]

Evidence suggests that responding to climate change requires collaboration, learning and community-based participatory processes – all 'softer' types of response that are rarely formally supported through institutional mechanisms. A small research activity, led by Dr Rowena Maguire of Queensland University of Technology, is exploring whether the relative lack of institutional support for 'softer' types of climate response, and the underrepresentation of women and particular cultures, are linked, acting as both causes and consequences of the insufficient action on climate change. The team will conclude the research with a multi-country workshop and the production of 3 country case studies. The research team will present their findings at COP27.[5]

The impacts of climate change and population growth are projected to lead to the collapse of coastal livelihoods dependent on coral reef-based fish and nearshore fish throughout Pacific island countries. Different food and livelihood options need to be progressed in ways that are owned and driven by local communities, facilitated by governments and civil society groups. Led by Dr James Butler of the Cawthron Institute, a new project will combine scientific analysis and local knowledge about pathways toward novel and transformative circular food production options, and develop the transformative capacity needed in local communities to identify leverage points and create transformative change.[6]

Smallholder farmers in Pacific island countries are vulnerable to reductions in the availability of fresh water under climate change and increasing demands from growing populations. Co-led by Professor Timothy Reeves and Dr Dorin Gupta of the University of Melbourne, the project will explore opportunities for sustainable intensification systems in smallholder farming systems in Samoa and Tonga. In other parts of the world, these systems which combine multiple interventions for benefits that may be 'more than a sum of the parts' have been successful in intensifying agricultural production while providing climate adaptation and mitigation benefits. This project will investigate whether such integrated management changes may help Pacific island countries in similar ways.[7]

Basal stem rot is a fungal disease that kills oil palm in plantations across South-East Asia and the Pacific region. An ACIAR-supported project is studying the eggectiveness of removing infected dead trees to reduce inoculum pressure (CROP/2021/130).

Crops

Basal stem rot is a fungal disease that kills oil palm in plantations across South-East Asia and the Pacific region. Growers have limited options to manage the disease. New trees are planted after the death of the infected trees but experience suggests that the incidence of the fungus seems to increase with each successive planting. Removing infected dead trees may reduce inoculum pressure but is costly and the benefit has not yet been demonstrated. A new research activity in 2022, led by Dr Agnieszka Mudge of the University of Queensland will continue monthly monitoring of an experimental plot established 11 years ago. Data will be analysed to determine if infection dynamics and impact differ between genetically characterised families of trees and if there is a difference between lots where infected stem bases and roots of dead trees are removed compared with plot where they are left in place.[8]

Fisheries

Unique among Pacific island countries is the production of half-pearls, or mabé, in Tonga from the winged pearl oyster. Although half-pearls are generally less valuable than round pearls, an individual oyster can produce multiple half-pearls (unlike round pearls). With appropriate training, pearl production can be accomplished by community members over a 10-month culture period, compared to approximately 2 years for round pearls. Professor Paul Southgate of the University of the Sunshine Coast completes a project in 2023 that is supporting further expansion of community-based pearl farming and handicraft production in Tonga and demonstrating the feasibility of similar development in Vietnam.[9]

Mabé (half-pearl) jewellery and shell handicraft industries provide income opportunities for coastal communities and women's social enterprises in the western Pacific. Previous projects have increased the technical skills of communities in producing juvenile oysters, farming mabé shell in Fiji and Tonga, and producing 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.[10]

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

In Pacific island countries, the paradox of apparently abundant fish, vegetables and root crops but poor public health outcomes presents a significant challenge for policymakers. Professor Neil Andrew of the University of Wollongong leads a project that has analysed regional agrifood systems using newly integrated data sources that allow mapping and analysis of what food is being produced, distributed, traded and sold. During 2022–23, the analysis results will continue to inform regional and national policy. Diagnostic tools developed by the project will be linked to methods that pertain to different nodes of the agrifood system to form an overarching 'agrifood system diagnostic' that can highlight the key challenges and opportunities in the Pacific agrifood system.[12]

Securing the sustainable supply of coastal fish is a development priority for Pacific countries and regional organisations, as coastal fisheries are important for food and nutrition security and economic development. A project led by Dr Dirk Steenbergen of the University of Wollongong aims to scale up the proven approach of community-based fisheries management in Kiribati, Solomon Islands and Vanuatu to self-sustaining national programs that support resilient coastal communities. The project also aims to drive the spread of community-based fisheries management throughout the Pacific region. In 2022–23 the project team will implement an awareness raising strategy, assess food and nutrition security in the scaling of community-based fisheries management and develop a centralised information management system to monitor the impact of information dissemination activities.[13]

Livelihood improvement projects for small-scale fishing communities are increasingly promoted in the Pacific region to build resilience to global change and dwindling fisheries resources. Often these projects focus on a single sector and individual communities and households, failing to acknowledge the complexity of people's livelihoods. Such projects also risk obscuring broader-scale economic development trends, such as the establishment of extractive industries or technological innovations. Dr Amy Diedrich of James Cook University leads a small research activity to establish an integrated livelihoods approach to guide scientists, practitioners and decision-makers engaged in livelihood improvement project planning and assessment. The improved approach aims to achieve 3 desired outcomes in Pacific coastal communities: a fair and just society, sustainable natural resource use and resilient livelihoods.[14]

Fish-based livelihoods play a critical role in the economies of coastal communities in Solomon Islands and Timor-Leste, and participation in catching, processing or trading of fish is an important pathway to poverty reduction. A project led by Dr Hampus Eriksson of the University of Wollongong will identify and support community-identified opportunities for innovation within the coastal fisheries post-harvest sector, focusing on income benefits. This new approach addresses the historic lack of success at the community level of large state-led investments in fisheries sector infrastructure and advanced technologies. It seeks to influence policy on how fisheries institutions can support remote communities through appropriate community-led infrastructure and skill development investments. In 2022–23 activities will include monitoring fish distribution and marketing, documenting livelihood experiences and building the capacity of women in safe aquatic food handling practices.[15]

Coastal fisheries are critical for providing food security and local employment across the Pacific region. Increasingly ACIAR-supported projects are focused on building resilience to global change and dwindling fisheries resources. Photo: Conor Ashleigh

Forestry

Renewal of the coconut estate is a priority for governments, development agencies and researchers throughout the Pacific region. In Fiji, a project led by Dr Rob McGavin of the Queensland Department of Agriculture and Fisheries strives to create market pull for senile coconut stems by converting them to high-value engineered wood products. A market for old palms will encourage coconut growers to remove them, reducing phytosanitary risk and incentivising new, more productive planting. The project will deliver and validate wood-processing technologies to transform coconut and other low-value forest resources into high-value products suitable for local and international markets. In 2022–23, the project team will focus on mapping senile coconut stands and identifying opportunities to promote gender equity within the value chain.[16]

Kava is a major cash crop in the Pacific region and a revered, traditional crop, grown for at least 3,000 years. Using time series geospatial data and ground truthing, this project will examine changes in the area and methods of kava cultivation in leading Pacific region producer countries, Vanuatu and Fiji. Kava is becoming big business, with the number of producers, production, sales, revenue and exports climbing. Governments and aid agencies are promoting the kava industry, but kava cultivation has resulted in deforestation. Researchers aim to assess land cover change from kava cultivation and to consider whether environmental harm is resulting and can be mitigated.[17]

Although primary forest reduction is significant, Solomon Islands economy and livelihoods remain dependent on forests. Logging royalties account for 60% of government revenue and 92% of the population are subsistence cultivators who supplement their material economy with forest-derived building materials, food, fuel, medicines, tools and household items. Professor Helen Wallace of Griffith University leads a new project with the central aim of learning how to efficiently restore forests to meet critical needs of rural Solomon Islanders, accelerating and channelling forest development to support livelihoods. The project also strives to support positive leadership in forest governance to secure remaining forests and those restored. Starting in 2022 are activities to foster community ownership and enhance women's participation, as well as a review of restoration methods for logged forests and establishment of field sites to measure the impact of interventions.[18]

Horticulture

School meals programs based on home-grown models can serve as platforms for transforming food systems while improving education quality. A small research activity led by Dr Sarah Burkhart of the University of the Sunshine Coast aims to understand the current extent and status of school food provision and environments in Pacific island countries. The research will identify and enhance nutrition-sensitive institutional food procurement opportunities, including school feeding programs, to provide reliable markets for small-scale producers in Fiji. It will also investigate the potential to scale-up school feeding initiatives in the Pacific region.[19]

Developing 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 2022–23, the project will focus on providing technical training for extension staff and conducting in-country plant health clinics and pesticide awareness workshops. The project will continue to build surveillance and diagnostic capacity for managing emerging pests and diseases, including fall armyworm. The project will generate new knowledge, resources and opportunities to encourage the adoption of integrated management strategies.[20]

Coconuts contribute, directly and indirectly, to the livelihoods of coastal communities throughout the Pacific region. 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. In 2022–23 researchers will focus on training staff in field transfer of plantlets derived from embryo culture and identifying key varieties for preservation in the new cryopreservation facility that will be built and commissioned.[21]

Increasing vegetable consumption is a key food system change required in the Pacific region to address malnourishment. Mrs Aradhana Deesh (right) is pictured with vegetable seedlings, she has grown as part of an ACIAR-funded research project for ACIAR alumni. Photo: Sunayna Nandini

In the Pacific region, vulnerability of horticultural produce to post-harvest losses is often more dependent on where and how a product is grown, transported and sold, rather than on the commodity-type. A new project in Samoa, Fiji, Solomon Islands, Tonga and Vanuatu aims to reduce food losses through a market-based and gender-inclusive approach to identify where food loss is greatest. Dr Seeseei Molimau-Samasoni of the Scientific Research Organisation of Samoa will lead a project team to identify value chains of fruits, vegetables and root crops that are most critical to improving nutrition and livelihoods of farmers and vendors. The team will then engage with farmers and vendors to trial interventions to address these drivers of food loss, with the ultimate goal of reducing food losses. This project is part of the ACIAR–IDRC Food Loss Research Program (page 23).[22]

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

Cocoa is an important agricultural export for more than 50,000 households in Papua New Guinea, Solomon Islands and Vanuatu. Significant domestic and potentially useful export opportunities also exist in Samoa and Fiji. A project led by Mr Yan Diczbalis of the Queensland Department of Agriculture and Fisheries is strengthening cocoa value chains in Pacific island countries, as well as in Australia. In 2022–23, the project will complete activities that deliver market-oriented strategies for the exchange and dissemination of superior cocoa genetic resources, methods for intensifying production systems to meet market opportunities and systems for improved post-harvest handling.[24]

Pacific island countries are some of the most malnourished in the world, with among the lowest vegetable availability and consumption globally. Increasing vegetable consumption is a key food system change, but the barriers and opportunities to vegetable consumption are not currently well understood. The PICfood project aims to assess food environments in Fiji and Samoa, strengthen links between agriculture and health and identify the most important entry points for food system change towards increasing the diversity of vegetables consumed. Research findings and citizen food forums will inform agriculture, food and nutrition policy and practice for healthy diets in the Pacific.[25]

Fruit industry development in the Pacific region enhances food security, rural economies and healthy eating initiatives. A previous project in Fiji, Samoa and Tonga worked towards these benefits by supporting the development of resilient value chains for 5 regionally significant fruit crops: papaya, pineapple, mango, breadfruit and citrus. A new project led by Professor Steven Underhill of the University of the Sunshine Coast will build on the community and school-based citrus orchards established in the first project using introduced improved planting stock. The project will develop viable and sustainable fruit value chains, enhance the local capacity to support these chains, and gain wider human health impacts by piloting school and community healthy eating gardens.[26]

Livestock Systems

Strong domestic demand for honey and the potential to export honey and its by-products offers an opportunity to smallholder farmers in Fiji and Papua New Guinea. A project, led by Dr Cooper Schouten 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 2022–23, the project will continue to develop best-practice pest and disease management programs, particularly in readiness for incursions of varroa and tropilaelaps mites. Development of post-harvest quality management programs for producers and packers will continue, for standards, certification and testing processes for export grade honey. The project will also provide capacity building opportunities for beekeeping associations to support smallholder industry development.[27]

The productivity and profitability of sheep and goat production in Pacific island countries could be improved if domestic production was better aligned with national market requirements and smallholder farmers could more easily participate in value chains. Dr Frances Cowley of the University of New England leads a project addressing the constraints to production efficiency for smallholder and semi-commercial sheep and goat production systems in Fiji and Samoa. During 2022–23, the project will continue the on-farm monitoring program to understand the use and costs of feed resources on farms and reproductive productivity and stock losses, across the course of a year. Innovative feed systems, such as fodder banks and creep feeding, will be demonstrated and trialled.[28]

Increasing smallholder cattle productivity and income from cattle sales is a priority of the Vanuatu Government. A project led by Dr Simon Quigley of the Central Queensland University aims to integrate recommendations from previous and new research on cattle production and marketing. A set of best-bet production options will be formulated, from which smallholder farmers can develop their own cattle farming business plan using the Cattle Farm Planning Tool (a decision-tree framework). Local support agency staff will be trained to mentor farmers in the implementation of cattle farming plans. The project will also start studies to determine low-input interventions, such as improved grazing management, introduction of legumes and improved animal management, to increase productivity and farm-gate prices for smallholder cattle.[29]

In Vanuatu, meat exports are processed through 3 vertically integrated abattoirs. Smallholder beef producers in Vanuatu are largely excluded from these high-value export markets because of poor quality, insufficient quantity, poor organisation and high transport costs. Dr Cherise Addinsall of Southern Cross University will undertake a feasibility analysis to determine if greater equity and inclusivity between smallholders and large cattle producers could occur through an agritourism approach, linking a high-value, sustainable beef brand to Vanuatu's tourism industry. The project concludes in 2022, with the development of a proposed design, recognised standards and governance structure of a third party verified voluntary sustainable certification program for key commodities (beef, cocoa, coffee and agritourism).[30]

ACIAR-supported projects have enabled cattle farmers in Vanuatu to increase on-farm productivity and cattle sales through accredited abattoirs, which is a critical step to increase national beef production and meet expanding market opportunities. Photo: Jean Pierre Niptik

Social Systems

The Livelihood Improvement through Facilitated Extension (LIFE) model of improved extension, based on a Landcare approach, was developed through research in the Philippines. It rapidly enhanced agricultural livelihoods by improving farmer-based learning networks and community social capital. Dr Mary Johnson of RMIT University, in partnership with Filipino collaborators, will contribute to understanding the adaptability and adoptability of the Landcare–LIFE combination by trialling the LIFE model for livelihood improvement within a Fijian smallholder farmer context. The project will broker an escalation of the Landcare approach to deliver sustainable land management outcomes with government and civic partners. In 2022–23, the project team will visit Fiji to conduct a review and implement capacity building activities with community-based research staff. The project will also focus on developing the research partnership between the Philippines, Fiji and Australia.[31]

The agriculture sector has been identified as a sector for growth to support economic development and poverty alleviation in Fiji and Tonga. Livelihoods and landscapes in these countries are highly interconnected, so the populations are acutely vulnerable to the impacts of climate change and variability as well as the impacts of policy-driven intervention. With a vision of climate-smart landscapes, Dr Eleanor Bruce of the University of Sydney and Dr Bryan Boruff of the University of Western Australia lead a team to develop a collaborative geospatial platform that will identify responses to climate-smart landscape adaptation. In the project's final year, researchers will evaluate the effectiveness of the platform for promoting community and multi-stakeholder exchange and engagement with landscape knowledge. The project will also identify adaptation objectives for communities within the landscape to foster climate resilience and enhance environmental livelihood security.[32]

Integrated 'Reef to Ridge' management means protecting and sustainably utilising connected environments to promote co-benefits of biodiversity and natural and cultural resources. Dr Cherise Addinsall of Southern Cross University will lead a new project, working with Vanuatuan communities in developing 'Community Conservation Area' agreements between communities and the government to establish sustainable agricultural livelihoods alongside existing formalised land tenure and conservation goals. The project also aims to investigate models of inclusive and evidence-informed decision-making processes under climate change. In 2022–23 the project will be engaged in partnership building with local communities, government bodies and potential scaling institutions.[33]

Family Farm Teams is a peer education model of agricultural extension that has benefited the economic development of women smallholders in 9 areas of Papua New Guinea. Dr Deborah Hill of the University of Canberra leads a project to improve agricultural development opportunities for women smallholders in rural Solomon Islands. The project will investigate the adaptability of the Family Farm Teams approach in Solomon Islands, and provide comparative learning to apply it to other Pacific island countries to help communities move from semi-subsistence to planned farming in a gender-equitable way. In 2022–23, researchers will continue adapting the Family Farm Teams manual and identify individuals to undertake Family Farm Teams training and other capacity building activities. These peer educators will deliver training modules for participating smallholder men and women.[34]

Soil and Land Management

Agriculture in the Pacific region is generally confined to smallholder farms and household gardens. Its sustainability is threatened by nutrient imbalances, erosion, declining soil fertility and soil carbon loss, and climate change. A new project in 2023 expands on previous research to build farming systems resilience in Fiji, Samoa, Tonga and Vanuatu. Led by Dr Ben Macdonald of CSIRO, the project will address knowledge gaps in understanding soil organic carbon and crop nutrition management and develop the next generation of agronomic advisors and appropriate networks for collaboration. The project will continue the development and extend the reach of the Pacific Soils Portal. Researchers will introduce cost-effective technologies for rapid soil and plant analysis and real-time data capture to agricultural extension services. The project seeks to improve linkages along the export value chain by developing information pathways between the grower, extension agent and exporter, focusing on soil nutrient and carbon management.[35]

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See page 186 for contact details.

Current and proposed projects

1. Defining priority commercialisation pathways and potential private commercialisation partners for viable long-term commercialisation of products emerging from FST/2019/128 [Fiji] (AGB/2021/172)
2. Pacific Agribusiness Research in Development Initiative Phase 2 (PARDI 2) [Fiji, Tonga, Vanuatu] (AGB/2014/057)
3. Landscape and opportunity analysis in the Pacific tuna sector: Foundation analysis to identify innovation pathways to enhance participation by the Pacific community and value retention in the region [South Pacific general] (AGB/2021/173)
4. Supporting greenhouse gas inventories and livestock data development in Fiji (CLIM/2021/160)
5. Institutional barriers to climate finance through a gendered lens in Fiji, Samoa and Solomon Islands (CLIM/2021/110)
6. Transformation pathways for Pacific coastal food systems [Kiribati, Solomon Islands] (CLIM/2020/178)
7. Sustainable intensification for climate-resilient development in Pacific island countries [Samoa, Tonga] (CLIM/2020/186)
8. Finding a genetic basis for oil palm responses to basal stem rot in a long-term infected block [Papua New Guinea, Solomon Islands] (CROP/2021/130)
9. Half-pearl industry development in Tonga and Vietnam (FIS/2016/126)
10. Towards more profitable and sustainable mabé pearl and shell-based livelihoods in the western Pacific [Fiji, Papua New Guinea, Samoa, Tonga] (FIS/2019/122)
11. Improving nutrition through women's and men's engagement across the seaweed food chain in Kiribati and Samoa (FIS/2019/125)
12. Agriculture and fisheries for improved nutrition: integrated agri-food system analyses for the Pacific region [Kiribati, Solomon Islands, South Pacific general, Vanuatu] (FIS/2018/155)
13. Coalitions for change in sustainable national community-based fisheries management programs in the Pacific [Kiribati, Solomon Islands, South Pacific general, Vanuatu] (FIS/2020/172)
14. Spatially integrated approach to support a portfolio of livelihoods [Solomon Islands, South Pacific general] (FIS/2020/111)
15. Innovating fish-based livelihoods in the community economies of Timor-Leste and Solomon Islands (FIS/2019/124)
16. Coconut and other non-traditional forest resources for the manufacture of engineered wood products [Fiji] (FST/2019/128)
17. Kava land use changes [Fiji, Vanuatu] (FST/2021/146)
18. Livelihoods in forest ecosystem recovery [Solomon Islands] (FST/2020/135)
19. Understanding school food provision in the Pacific: Scoping the potential of local food systems to improve diets, nutrition and livelihoods [Fiji] (HORT/2021/159)
20. Responding to emerging pest and disease threats to horticulture in the Pacific Islands [Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga] (HORT/2016/185)
21. Safeguarding and deploying coconut diversity for improving livelihoods in the Pacific islands [Fiji, Papua New Guinea, Samoa, Solomon Islands, Vanuatu] (HORT/2017/025)
22. Adopting a gender-inclusive participatory approach to reducing horticultural food loss in the Pacific [Fiji, Samoa, Solomon Islands, Tonga] (CS/2020/191)
23. Improving root crop resilience and biosecurity in Pacific island countries and Australia [Fiji, Samoa, Solomon Islands, Tonga] (HORT/2018/195)
24. Aligning genetic resources, production and post-harvest systems to market opportunities for Pacific island and Australian cocoa [Fiji, Samoa, Solomon Islands, Vanuatu] (HORT/2014/078)
25. PICfood: Driving vegetable food environments to promote healthy diets in Pacific island countries [Fiji, Samoa] (HORT/2021/141)
26. Enhanced fruit systems for Tonga and Samoa (Phase 2): Community based citrus production (HORT/2019/165)
27. Increasing the productivity and profitability of smallholder beekeeping enterprises in Papua New Guinea and Fiji (LS/2014/042)
28. Improving small ruminant production and supply in Fiji and Samoa (LS/2017/033)
29. A farm planning approach to increase productivity and profitability of smallholder cattle systems in Vanuatu (LS/2018/185)
30. Development of a third party verified voluntary sustainable certification program for beef and other key commodities in Vanuatu (LS/2020/155)
31. Climate-smart landscapes for promoting sustainability of Pacific Island agricultural systems (ASEM/2016/101)
32. Landcare - an agricultural extension and community development model at district and national scale in Fiji (SSS/2019/140)
33. Climate-smart coastal landscapes for sustaining fisheries-based livelihoods and food security in the Pacific [Fiji, Tonga] (SSS/2021/120)
34. Improving agricultural development opportunities for female smallholders in rural Solomon Islands (SSS/2018/136)
35. Soil management in Pacific island countries Phase 2: Investigating nutrient dynamics and the utility of soil information for better soil and crop management [Fiji, Samoa, Tonga, Vanuatu] (SLAM/2020/139)

Papua New Guinea

A$6.79 million
Budgeted funding

16
Bilateral and regional research projects

6
Small projects and research activities

Papua New Guinea's economy is made up of 2 main industries: the labour-intensive agriculture, fisheries and forestry sectors, and the mineral and energy extraction sector, which accounts for most of the country's export earnings.

The agriculture, fisheries and forestry sectors are incredibly diverse, from remote subsistence crop production in the highlands to emerging freshwater aquaculture systems to commercially oriented export crops such as cocoa and coffee. These mixed subsistence and market systems support the livelihoods of more than 6.8 million people (85% of the population of Papua New Guinea). This immense diversity of livelihood systems brings significant challenges for Papua New Guinea policymakers, including limited infrastructure for delivering inputs and products to markets, high rates of inadequate nutrition, vulnerability to weather variability and climate change, and widespread lack of off-farm employment for youth. On-farm productivity is consequently and typically low. Improving returns from agriculture, fisheries and forestry and strengthening food nutritional security remain critical to improving the livelihoods of the majority of households in Papua New Guinea.

Direction for development for the country is currently provided by the Papua New Guinea Vision 2050, Papua New Guinea Development Strategic Plan 2010–2030 and 4 Medium Term Development Plans. The government emphasises that by 2050, renewable sectors including agriculture, fisheries and forestry, must account for 70% of GDP compared with the current 26%. Complementing these plans, 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. Of particular interest to ACIAR is the PNG Agriculture Medium Term Development Plan, which lapses this year. This plan defines the specific areas for investment in agriculture.

Over the past 40 years, ACIAR has supported projects throughout Papua New Guinea across its diversity of the rural livelihoods systems. While we continue to work across the country, areas of particular focus are the the Autonomous Region of Bougainville and the Western Province. Through the South Fly Resilience Plan, Australia is looking to assist communities in the South Fly District to transition out of food insecurity and develop resilient, sustainable livelihoods and inclusive governance.

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.

In 2022–23, ACIAR will refresh its partnership with Papua New Guinea establishing a long-term intent to underpin both research and capacity building collaboration. 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.

As women make up more than 50% of the labour force engaged in agriculture and 35% of women are actively involved in economic agriculture, gender equity will remain integral to all our projects in Papua New Guinea. Women in rural communities play a significant role in subsistence food production, household food nutritional security and agricultural value chains.

2022–23 research program

- **22 ACIAR-supported projects in Papua New Guinea**
- **16 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

Basal stem rot is a fungal disease that kills oil palm in plantations across South-East Asia and the Pacific region. Growers have limited options to manage the disease. New trees are planted after the death of the infected trees but experience suggests that the incidence of the fungus seems to increase with each successive planting. Removing infected dead trees may reduce inoculum pressure but is costly and the benefit has not been demonstrated. A new research activity in 2022, led by Dr Agnieszka Mudge of the University of Queensland, will continue monthly monitoring of an experimental plot established 11 years ago. Data will be analysed to determine if infection dynamics and impact differ between genetically characterised families of trees and if there is a difference between lots where infected stem bases and roots of dead trees are removed compared with plot where they are left in place.[1]

Fisheries

Mabé (half-pearl) jewellery and shell handicraft industries provide income opportunities for coastal communities and women's social enterprises in the western Pacific. Previous projects have increased communities' technical skills of communities in producing juvenile oysters, farming mabé shell in Fiji and Tonga, and producing 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.[2]

For 10 years, ACIAR and the National Fisheries Authority of Papua New Guinea have co-invested in R&D for inland fish aquaculture. Research has focused on increasing the production efficiency of small-scale fish ponds (for tilapia) 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. The project will support the National Fisheries Authority to develop commercial tilapia businesses in peri-urban areas and reservoirs, and support villages in remote regions to gain access to reliable and affordable farming inputs and culturally appropriate training services.[3]

The Western province is the largest province in Papua New Guinea. It encompasses great regional diversity in place-based economies, cultures and ecologies. After 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. A small research activity led by Associate Professor Katharine McKinnon of the University of Canberra offers an alternative, strengths-based approach, building on the strengths and assets of individuals, communities and places as a starting point for thinking collectively about solutions. The study funded by DFAT 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 region to support new approaches.[4]

A small research activity funded by DFAT is led by Professor Katherine Gibson of Western Sydney University. It 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. The primary objective is to map (conceptually and geographically) the place-based strengths and assets of Western Province, thus producing a knowledge base to inform agricultural resilience-building strategies.[5]

Women from Kaviananga village, along the Fly River in Western Province, sell fish at a local market. Market access is a major challenge for communities living along the Fly River. Photo: Aaron English

Forestry

In East New Britain Province, Papua New Guinea, 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 private and public sector stakeholders. 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. In 2022–23 the project will deliver training for 300 women in key processes of the galip value chain and pilot decentralised systems for galip nut initial processing, purchasing, consolidation and collection.[6]

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 2022 and aims 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 research questions address social and legal structures to facilitate planting on customary land to allow larger, more commercial woodlots.[7]

A project in the Eastern Highlands province, the Ramu and Markham valleys and the Lae region of Papua New Guinea 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 and reviewed institutional arrangements and policies that improve access to formal timber markets. The project concludes in 2022 with the delivery of a proposed improved ecoforestry management system for inclusion in national policy and alternative marketing and financial models to evaluate harvesting and marketing operations of small-scale, clan-based operators.[8]

Horticulture

High-value vegetable crops are essential to improving livelihoods in the Pacific region and Cambodia. Extension services are not well equipped to assist farmers in dealing with pests and diseases, with insufficient staff training resulting in crop losses of up to 30–40%, primarily due to pests and diseases. Plant health clinics offer a solution to this problem. A new project led by Dr Michael Furlong of the University of Queensland will establish an effective information system supported by research on key emerging pests in these regions to better prepare farmers to detect, respond to and continue to manage their farming businesses, all the while contributing to regional biosecurity preparedness.[9]

Improved germplasm and silvicultural systems for teak production, developed in an earlier ACIAR project, will underpin a new project aiming to scale out the smallholder forest estate.

Developing 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 2022–23, the project will focus on providing technical training for extension staff and conducting in-country plant health clinics and pesticide awareness workshops. The project will continue to build surveillance and diagnostic capacity for managing emerging pests and diseases, including fall armyworm. The project will generate new knowledge, resources and opportunities to encourage the adoption of integrated management strategies.[10]

Coconuts contribute, directly and indirectly, to the livelihoods of coastal communities throughout the Pacific region. 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. In 2022–23 researchers will focus on training staff in field transfer of plantlets derived from embryo culture and identifying key varieties for preservation in the new cryopreservation facility that will be built and commissioned.[11]

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 the project's final year, researchers will focus on completing village gardens and nurseries, evaluating soil quality, and finalising the establishment of support networks, research hubs and farmer training for cocoa production and other potential enterprises.[12]

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 2022–23, activities will include evaluation and updating of a best-practice integrated pest management (IPM) package and testing of biological and chemical control solutions.[13]

Livestock Systems

Strong domestic demand for honey and the potential to export honey and its by-products offers an opportunity to smallholder farmers in Fiji and Papua New Guinea. A project, led by Dr Cooper Schouten 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 2022–23, the project will continue to develop best-practice pest and disease management programs, particularly in readiness for incursions of varroa and tropilaelaps mites. Development of post-harvest quality management programs for producers and packers will continue, for standards, certification and testing processes for export grade honey. The project will also provide capacity building opportunities for beekeeping associations to support smallholder industry development.[14]

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 extrapulmonary tuberculosis in the Pacific region, which requires 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 focus on risk factors associated with exposure to animals. The study aims to define the proportion of clinically diagnosed tuberculosis lymphadenitis that is attributable to drug-sensitive and drug-resistant *Mycobacterium* spp. The results will be important for the development of clinical and program management of tuberculosis.[15]

Dr Julianne Biddle (ACIAR) and Quang Nguyen (PhD candidate, University of Queensland) inspect coconut varieties grown through somatic embryogenesis in the microbiological and plant containment facility at Gatton Campus (HORT/2017/025) Photo: Andrew Sillis

Japanese encephalitis is one of the most important causes of viral encephalitis in humans in South-East Asia. In Papua New Guinea, the disease primarily affects rural communities, with the highest rates of disease occurring in children. Although an effective vaccine is available, more than 100,000 cases occur annually, and Japanese encephalitis remains a potentially important zoonotic risk for the PNG population. A small research activity, led by Dr David Williams of CSIRO, brings together partners with a strong track record in human, animal and vector surveillance and aims to consolidate and build on the previous research activity to expand a One Health surveillance approach for Japanese encephalitis and other arthropod-borne viruses in Papua New Guinea.[16]

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, through the adoption of culturally acceptable and nutrient-efficient coffee–vegetable intercropping systems. In the project's final year, researchers will hold meetings in participating villages outlining the results of the trials and the potential benefits for farmer families and industry.[17]

Communities 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 2022–23, activities focused on field sites will continue to demonstrate the potential value of integrating scientific and Indigenous knowledge. Results from the first-round field trials will be analysed and used to inform the design of second-round trials.[18]

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. In 2022–23 the project team will deliver activities to build the capacity of youth change agents while developing Family Farm Teams resources specifically for young people.[19]

Soil and Land Management

In Papua New Guinea, sweetpotato is being grown with a shorter fallow period, more rotations with alternative crops and shorter cropping periods to cope with increasing population pressure. Sustainable intensification of production is needed. A project led by Professor Neal Menzies of the University of Queensland focuses on addressing soil fertility decline with smallholder farmers with the aim of improving yields and increasing household income through sweetpotato production. Concluding in 2023, the project will determine the optimum rates of mineral fertilisers and opportunities to use organic nutrient sources to avoid soil fertility decline, increase production, and improve the benefit:cost ratio of inputs.[20]

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 and Dr Mark Thomas of CSIRO, will provide useful and targeted information about the natural resource base in support of agriculture, forestry and infrastructure 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 the agriculture and forestry sectors.[21]

The successful Family Farm Training model has been adpated to empower youth, especially females, to ensure they become an integral part of the family farming team. Pictured are youths in East New Britain, learning how to budget their funds. Photo: Aaron English

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 incomes and improving the livelihoods of smallholder cocoa farming households. A 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. In 2022–23, activities include training a cohort of local staff as mentors for smallholder farmers, assessing a family farm teams approach to learning about soil management and studying the influence of composts and crop diversification on soil and plant health and the quality of cocoa.[22]

Country Manager
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Soil and Land Management: Dr James Quilty

See page 186 for contact details.

Current and proposed projects

1. Finding a genetic basis for oil palm responses to basal stem rot in a long-term infected block [Papua New Guinea, Solomon Islands] (CROP/2021/130)
2. Towards more profitable and sustainable mabé pearl and shell-based livelihoods in the western Pacific [Fiji, Papua New Guinea, Samoa, Tonga] (FIS/2019/122)
3. Improving peri-urban and remote inland fish farming in Papua New Guinea to benefit both community-based and commercial operators (FIS/2018/154)
4. Strengthening agricultural resilience in Western Province: Developing methods for strengths-based livelihoods approach [Papua New Guinea] (FIS/2021/113)
5. Strengthening agricultural resilience in Western Province: Mapping place-based strengths and assets [Papua New Guinea] (FIS/2021/122)
6. Enhancing private sector-led development of the canarium industry in Papua New Guinea - phase 2 (FST/2017/038)
7. Promoting smallholder teak and sandalwood plantations in Papua New Guinea and Australia (FST/2018/178)
8. Enabling community forestry in Papua New Guinea (FST/2016/153)
9. Biosecurity planning [Cambodia, Papua New Guinea] (HORT/2021/151)
10. Responding to emerging pest and disease threats to horticulture in the Pacific Islands [Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga] (HORT/2016/185)
11. Safeguarding and deploying coconut diversity for improving livelihoods in the Pacific islands [Fiji, Papua New Guinea, Samoa, Solomon Islands, Vanuatu] (HORT/2017/025)
12. Developing the cocoa value chain in Bougainville [Papua New Guinea] (HORT/2014/094)
13. Protecting the coffee industry from coffee berry borer in Papua New Guinea and Australia (HORT/2018/194)
14. Increasing the productivity and profitability of smallholder beekeeping enterprises in Papua New Guinea and Fiji (LS/2014/042)
15. Drug sensitive and resistant tuberculosis and zoonotic infections as causes of lymphadenitis in 3 provinces in Papua New Guinea (LS/2018/217)
16. Strengthened surveillance for vector-borne zoonotic and livestock diseases in Papua New Guinea (LS/2021/158)
17. Improving livelihoods of smallholder coffee communities in Papua New Guinea (ASEM/2016/100)
18. Climate-smart agriculture opportunities for enhanced food production in Papua New Guinea (ASEM/2017/026)
19. Gender equitable agricultural extension through institutions and youth engagement in Papua New Guinea (SSS/2018/137)
20. Sustaining soil fertility in support of intensification of sweetpotato cropping systems [Papua New Guinea] (SMCN/2012/105)
21. Better soil information for improving PNG's agricultural production and land use planning: Building on PNGRIS and linking to the Pacific Regional Soil Partnership [Papua New Guinea] (SLAM/2019/106)
22. Optimising soil management and health in Papua New Guinea integrated cocoa farming systems - Phase 2 (SLAM/2019/109)

5.2

East and South-East Asia

Photo: Chris Maglangit

East and South-East Asia

Collectively, the countries of East and South-East Asia are the most populous in the world and an economic powerhouse. Ten of these countries are members of the Association of Southeast Asian Nations (ASEAN) and engage closely in terms of trade and investment with east Asian countries, including China and South Korea.

Before the COVID-19 pandemic, ASEAN economies were forecast to have some of the highest growth rates in the world over the next 5 years. The IMF and OECD had forecast an average of 5% growth per annum, a higher rate than some of the more developed economies of Europe and North America. The ASEAN economy has consistently outperformed the global economy and is the fifth largest economy in the world, with a combined GDP of A$4.8 trillion in 2018.

As a result of the pandemic, 4.7 million people in South-East Asia were living in extreme poverty in 2021. According to a new Asian Development Bank report presented at the Southeast Asia Development Symposium, 9.3 million jobs disappeared, the region's GDP shrank by 3.3% and foreign direct investment inflows declined by 33.2%.

Throughout 2020, the number of cases and death rate due to COVID-19 were relatively low in ASEAN countries. However, during 2021, the region experienced substantially higher rates of COVID-19 infection, hindering recovery and economic growth. With only 59% of the region's population fully vaccinated (as of February 2022), there remains a major risk of widespread unemployment, worsening inequality, and rising poverty levels, especially among women, youth and the elderly, in South-East Asia.

With more than 100 million hectares of agricultural land, the ASEAN countries collectively are a major producer, supplier and exporter of various crops, grains (including rice) and livestock products. Although agriculture only contributes around 10% of total ASEAN GDP, it is the main sector for employment in most member states, accounting for approximately one-third of total ASEAN employment. Given its significant role, the development of the food, agriculture and forestry sectors in ASEAN countries is vital to ensuring equitable and inclusive growth in the region.

The COVID-19 pandemic exposed the vulnerabilities of food supply chains in the region, prompting calls for the region to become food resilient and sustainable by shortening existing food supply chains and strengthening food systems. The pandemic also heightened the pressure on countries to reverse the trend of underinvesting in the food and agriculture sector. This includes investing in rural logistics, upskilling, research and development, in addition to harnessing the use of digital technology to benefit the farming community.

Food security, food safety and better nutrition remain priority concerns within the region. These priorities align with ASEAN's goals of agricultural cooperation. Support for women's economic empowerment, which has become a prominent approach to addressing gender gaps in economic spheres, including agriculture, continues to grow.

Partner countries in the ACIAR East and South-East Asia region

- Cambodia
- China
- Indonesia
- Laos
- Malaysia
- Myanmar
- Philippines
- Thailand
- Timor-Leste
- Vietnam

Drivers of regional collaboration

The principal driver of regional collaboration in the East and South-East Asia region is the ASEAN, which for more than 50 years has addressed shared challenges and engaged trade and development partners, including Australia and China. Recently, regional collaboration has been driven by critical factors such as the COVID-19 pandemic, geopolitics, and transboundary concerns.

Trade and investment are the major drivers of economic growth in the region, aided by overseas development assistance. The ASEAN-led Regional Comprehensive Economic Partnership (RCEP) Agreement came into force in January 2022 and is expected to help strengthen regional economic integration and provide access to a larger market, which will assist the post-pandemic recovery of the ASEAN economies.

In the agricultural research sector, ACIAR is supporting regional collaboration through support to Asia–Pacific Association of Agricultural Research Institutions (APAARI). Cross-border challenges such as plant and animal biosecurity remain prominent and also drive regional integration. In the Mekong region, plant diseases have recently spread across borders, destroying crops of cassava and banana. African swine fever has taken a tremendous economic toll on countries such as Vietnam, the Philippines, Laos and Cambodia. The COVID-19 pandemic has raised biosecurity and One Health (the interface between human, animal and environmental health) as priorities in the region.

Shared concerns about imminent and increasing threats posed by climate change have resulted in ASEAN creating a 'framework of ASEAN community building, with strategies and actions to enhance regional and international cooperation in supporting adaptation'. In the field of agricultural research and development, regional cooperation plays a significant role, particularly regarding increasing resilience and adaptation to climate change, natural disasters and other shocks.

The South-East Asia region is one of the most natural disaster-prone in the world. Natural disasters threaten food security and rural livelihoods and have economic consequences for the whole region, so disaster mitigation is a common interest among neighbouring countries. The ASEAN Declaration on 'One ASEAN, One Response' aims to increase the speed, scale and solidarity of disaster response in the region.

ACIAR East and South-East Asia region program

Our program in East and South-East Asia remains the largest across the 4 regions in which ACIAR operates. The nature of our engagement within the region is strongly bilateral, based on robust partnerships with national research systems, long-standing diplomatic connections, and sustained development collaboration with Australia. However, there is a growing trend towards regional collaboration between countries facing shared challenges. This is consistent with the research partnerships under ASEAN, which acknowledge that collaboration among member states is a sensible path towards addressing common challenges in the region.

Region-wide cooperation on forest biosecurity

Our on-the-ground work in South-East Asia primarily occurs with 7 partner countries. However, we do work with development and coordinating organisations based in other countries in the region on issues and programs of regional significance.

For example, in recent decades Thailand has transitioned from aid recipient to aid donor. Thailand hosts regional organisations of relevance to ACIAR programs, including APAARI (page 20), the Asian Institute of Technology and the FAO regional office. We also include Thai expertise on projects of regional significance when opportunities arise.

In 2022–23, we have a regional project, 'Building effective forest health and biosecurity networks in South-East Asia' (FST/2020/123), that includes partners from Thailand and Malaysia, as well as partners from Cambodia, Indonesia, Laos and Vietnam. A description of this project can be found on page 93 in the Cambodia chapter.

The ASEAN drive towards regional economic integration and connectivity will increase demand from individual countries and regional bodies for research support that harmonises approaches to some agricultural issues across countries, including biosecurity, food safety and climate resilience. We contribute to this by funding regional research collaboration and through our support and chairing of APAARI.

Among our newer regional collaborations in the East and South-East Asia region are efforts to identify efficient biosecurity risk-management systems in the region to respond to prominent outbreaks affecting plant and animal health. For example, Indonesia, the Philippines and Laos are involved in regional research focusing on an integrated system to manage *Fusarium* wilt (Panama disease) in banana crops with components of biosecurity and disease management.

Another research collaboration focusing on plant biosecurity engages the whole of the Mekong region and China. The research will address serious diseases of cassava through a multipronged strategy involving breeding, surveillance, agronomy and seed systems interventions, coupled with engagement with government institutions and agribusiness.

The incursion of African swine fever to the region in 2019 also provided a strong context for regional collaboration in One Health. An ACIAR regional research collaboration that involves Cambodia, Vietnam and Laos seeks to understand how veterinary service markets might be better managed and governed by agents of government interested in human health, in cooperation with agents interested in agriculture and animal health.

During 2022–23, a series of project will be implemented throughout the region under the ACIAR–IDRC Research Program on One Health (AIRPOH). Cambodia, Indonesia, Laos, The Phillippines and Timor-Leste will host a portfolio of interconnected projects supporting research that aims to promote new ideas and thinking on the relationship and management of human, animal and environmental health (page 24).

Trilateral collaboration and new partnership models are emerging for ACIAR in the East and South-East Asia region. Driving these new partnership models are greater capacities that can be achieved when resources are pooled. This is translating into substantial co-investment from partners such as Vietnam, Indonesia and the Philippines. While bilateral relationships remain the predominant model for development cooperation in the region, trilateral collaboration is increasingly possible and desired by partner countries.

Opportunities for trilateral research collaboration with Australia in the region include varietal development to manage devastating new diseases in banana, cassava and citrus; machinery innovation for conservation agriculture among smallholder farmers; and research to develop perennial rice varieties.

Securing the future of coconut

Grown in more than 90 tropical countries, on more than 12 million hectares, coconut is important to millions of smallholder households. The future of coconut production and livelihoods is threatened by senile plantings, which face further decline from pest and disease, climate change and poor conservation and management of genetic resources. Access to coconut genetic diversity is vital to sustaining the livelihoods of millions of smallholders and their communities around the world, particularly in the Asia-Pacific region.

During 2022–23, ACIAR, DFAT and the International Coconut Community will continue their collaboration to reinvigorate and sustain the Coconut Genetic Resources Network (COGENT). The program will focus on better coconut science, through a global coconut strategy to address the challenges outlined above. The program will work with other organisations to ensure a viable COGENT secretariat to safeguard coconut genetic resources and better address disease threats. The network is active throughout the Asia-Pacific region and led by Dr Jelfina Alouw, Executive Director of the International Coconut Community, who is based in Jakarta, Indonesia.

ACIAR project GP/2018/193

East and South-East Asia region program 2022–23

Partner country	No. projects
Cambodia	17
Indonesia	20
Laos	19
Myanmar	3
Philippines	11
Timor-Leste	5
Vietnam	24

Note that a project may be conducted in several countries, therefore the total number of projects in this table will be greater than the number of projects in the region.

75 projects

58 research projects

17 small research activities

This data was compiled in August 2022. Additional projects may be commissioned during 2022–23.

Research portfolio

12 Agribusiness projects

3 Climate Change projects

3 Crops projects

13 Fisheries projects

6 Forestry projects

8 Horticulture projects

11 Livestock Systems projects

7 Social Systems projects

11 Soil and Land Management projects

1 Water project

Table 5.2 **Current and proposed projects in the East and South-East Asia region, 2022–23**

Project title	Project code	Country
Agribusiness		
Agricultural policy research to support natural resource management in Indonesia's upland landscapes	ADP/2015/043	Indonesia
Understanding the drivers of successful and inclusive rural regional transformation: Sharing experiences and policy advice in Bangladesh, China, Indonesia and Pakistan	ADP/2017/024	Bangladesh, China, Indonesia, Pakistan
Inclusive agriculture value chain financing	AGB/2016/163	Indonesia, Myanmar, Vietnam
Establishing sustainable solutions to cassava diseases in mainland South-East Asia	AGB/2018/172	Cambodia, Laos, Myanmar, Vietnam
Increasing the sustainability, productivity and economic value of coffee and black pepper farming systems and value chains in the Central Highlands Region of Vietnam	AGB/2018/175	Vietnam
Agribusiness-led inclusive value chain development for smallholder farming systems in the Philippines	AGB/2018/196	Philippines
Planning and establishing a sustainable smallholder rice chain in the Mekong Delta	AGB/2019/153	Vietnam
Integrating smallholder households and farm production systems into commercial beef supply chains in Vietnam	AGB/2020/189	Vietnam
Evaluating supply chain interventions and partnerships to sustainably grow the smallholder dairy sectors of Indonesia and the Philippines	AGB/2021/124	Indonesia, Philippines
Creating resilient communities through smallholder-inclusive tourism markets in Indonesia	AGB/2021/125	Indonesia
Piloting digital monitoring of VietGAP compliance and quality in Vietnam vegetable value chains	AGB/2021/153	Vietnam
Food loss in the *Pangasius* catfish value chain of the Mekong River Basin (Food Loss Program)	CS/2020/209	Cambodia, Laos, Vietnam
Climate Change		
Supporting greenhouse gas inventories and targeted rice mitigation options for Vietnam	CLIM/2019/150	Vietnam
Preparing for mangrove-based climate and agribusiness transformation in the Mekong Delta	CLIM/2021/138	Vietnam
Supporting the tracking sharing learning platform of the Adaptation Research Alliance	CLIM/2022/108	Global
Crops		
International Mungbean Improvement Network 2	CROP/2019/144	Bangladesh, India, Indonesia, Kenya, Myanmar
Weed management techniques for mechanised and broadcast lowland crop production systems in Cambodia and Laos	CROP/2019/145	Cambodia, Laos
Agricultural Innovations for Communities: Intensified and diverse farming systems for Timor-Leste (AI-Comm 2)	CROP/2021/131	Timor-Leste
Fisheries		
Harvest strategies for Indonesian tropical tuna fisheries to increase sustainable benefits	FIS/2016/116	Indonesia
Increasing technical skills supporting community-based sea cucumber production in Vietnam and the Philippines	FIS/2016/122	Philippines, Vietnam
Half-pearl industry development in Tonga and Vietnam	FIS/2016/126	Tonga, Vietnam
Assessing upstream fish migration measures at Xayaburi Dam in Laos	FIS/2017/017	Laos
A nutrition-sensitive approach to fisheries management and development in Timor-Leste and Nusa Tenggara Timur Province, Indonesia	FIS/2017/032	Indonesia, Timor-Leste
Baseline monitoring and evaluation of long-term impacts on fish stocks from coral restoration	FIS/2018/128	Philippines
FishTech: Integrating technical fisheries solutions into river development programs across South-East Asia	FIS/2018/153	Cambodia, Indonesia, Laos, Vietnam, Thailand

Project title	Project code	Country
Regional coral restoration networks and appropriate technologies for larger-scale coral and fish habitat restoration in the Philippines and Australia	FIS/2019/123	Philippines
Innovating fish-based livelihoods in the community economies of Timor-Leste and Solomon Islands	FIS/2019/124	Solomon Islands, Timor-Leste
Developing social and economic monitoring and evaluation systems in Indonesian tuna fisheries to assess potential impacts of alternative management measures on vulnerable communities	FIS/2020/109	Indonesia
Blue economy: Valuing the carbon sequestration potential in oyster aquaculture	FIS/2020/175	Vietnam
Institutional effectiveness and political economy of coral reef restoration in the Philippines	FIS/2021/112	Philippines
Supporting grouper-farming smallholders in Vietnam to improve their SME businesses by engaging with aquafeed companies to produce commercial feeds	FIS/2021/121	Vietnam
Forestry		
Advancing enhanced wood manufacturing industries in Laos and Australia	FST/2016/151	Laos
Managing risk in South-East Asian forest biosecurity	FST/2018/179	Indonesia, Vietnam
Building an effective forest health and biosecurity network in South-East Asia	FST/2020/123	Cambodia, Laos, Vietnam
Vietnamese native tree species for improved livelihoods	FST/2020/134	Vietnam
Forest restoration for economic outcomes	FST/2020/137	Laos
Retaining the jewels in the crown: Kalimantan peat forest remnants	FST/2021/145	Indonesia
Horticulture		
Supporting an international initiative to maintain the coconut genetic resources network (COGENT)	GP/2018/193	Indonesia
Development of area-wide management approaches for fruit flies in mango for Indonesia, Philippines, Australia and the Asia-Pacific region	HORT/2015/042	Indonesia, Philippines
Developing vegetable value chains to meet evolving market expectations in the Philippines	HORT/2016/188	Philippines
Improving mango crop management in Cambodia, the Philippines and Australia to meet market expectations	HORT/2016/190	Cambodia, Philippines
An integrated management response to the spread of *Fusarium* wilt of banana in South-East Asia	HORT/2018/192	Indonesia, Laos, Philippines
Preparedness and management of huánglóngbìng (citrus greening disease) to safeguard the future of citrus industry in Australia, China and Indonesia	HORT/2019/164	Indonesia
Safe, fresh, year-round vegetables in Cambodia and Laos through research and development support of whole supply chain agribusiness networks	HORT/2021/143	Cambodia, Laos
Biosecurity planning	HORT/2021/151	Cambodia, Papua New Guinea
Livestock Systems		
Intensification of beef cattle production in upland cropping systems in Northwest Vietnam	LPS/2015/037	Vietnam
Investigating and developing interventions to mitigate food borne parasitic disease in production animals in Laos	LS/2014/055	Laos
Goat production systems and marketing in Laos and Vietnam	LS/2017/034	Laos, Vietnam
Asian chicken genetic gains: A platform for exploring, testing, delivering, and improving chickens for enhanced livelihood outcomes in South East Asia	LS/2019/142	Cambodia, Vietnam
Global burden of animal disease initiative: Indonesia case study	LS/2020/156	Indonesia
Bacterial enteropathy and nutrition study in poultry	LS/2021/126	Timor-Leste
Rapid transformation of Lao beef sector – biosecurity, trade and smallholders	LS/2021/128	Cambodia, Laos

Project title	Project code	Country
Global animal health governance: High-level consortium	LS/2021/157	Vietnam
Developing strategies to reduce brucellosis transmission in Timor-Leste based on One Health collaboration (ACIAR–IRDC One Health Research Program)	LS/2022/161	Timor-Leste
Policy support to the Philippines' national surveillance and control programs for African swine fever, avian influenza and antimicrobial resistance: A One Health systems approach (ACIAR–IRDC One Health Research Program)	LS/2022/162	Philippines
Livestock enhancement through ecohealth/One Health assessment in South-East Asia (ACIAR–IRDC One Health Research Program)	LS/2022/163	Indonesia, Laos, Philippines
Social Systems		
Uptake of agricultural technologies amongst farmers in Battambang and Pailin provinces, Cambodia	ASEM/2013/003	Cambodia
Enhancing livelihoods through forest and landscape restoration	ASEM/2016/103	Philippines
Analysing gender transformative approaches to agricultural development with ethnic minority communities in Vietnam	SSS/2018/139	Vietnam
Next generation agricultural extension: Social relations for practice change	SSS/2019/138	Cambodia
Policy impact in Laos: From research to practice	SSS/2020/142	Laos
Building the evidence base on the impacts of mobile financial services for women and men in farming households in Laos and Cambodia	SSS/2020/160	Cambodia, Laos
The role of agricultural and forest landscapes on human and environmental health in Cambodia (ACIAR–IRDC One Health Research Program)	SSS/2022/164	Cambodia
Soil and Land Management		
Improving community fire management and peatland restoration in Indonesia	FST/2016/144	Indonesia
Land management of diverse rubber-based systems in the southern Philippines	SLAM/2017/040	Philippines
Farmer options for crops under saline conditions in the Mekong River Delta, Vietnam	SLAM/2018/144	Vietnam
Crop health and nutrient management of shallot-chilli-rice cropping systems in coastal Indonesia	SLAM/2018/145	Indonesia
Managing heavy metals and soil contaminants in vegetable production to ensure food safety and environmental health in the Philippines	SLAM/2020/117	Philippines
Validating technologies for assessing and monitoring the impacts of re-wetting of peatland Indonesia using eddy flux towers coupled with the Chameleon sensors	SLAM/2020/118	Indonesia
Evaluation of livelihood zones, rural household trajectories, research and development partners and initiatives in Timor-Leste	SLAM/2021/108	Timor-Leste
Embedding knowledge and exploring future research opportunities in sloping land agricultural systems in northern Laos and Northwest Vietnam	SLAM/2021/152	Laos, Vietnam
Management practices for profitable crop livestock systems for Cambodia and Laos	SMCN/2012/075	Cambodia, Laos
Improving maize-based farming systems on sloping lands in Vietnam and Laos	SMCN/2014/049	Laos, Vietnam
Land suitability assessment and site-specific soil management for Cambodian uplands	SMCN/2016/237	Cambodia
Water		
Water for fish and irrigation in the Mekong	WAC/2021/135	Cambodia, Laos

Cambodia

A$3.66 million
Budgeted funding

14
Bilateral and regional research projects

3
Small projects and activities

In late 2021, the Kingdom of Cambodia declared it would live with COVID-19, and reopened the country to business and tourism. While health measures remain in place, Cambodia has initiated its economic recovery plan.

Cambodia has suffered critical shocks triggered by the global pandemic, and the economic impacts have been as severe as the health impacts. The GDP is however predicted to recover with growth of greater than 6% anticipated for 2023.

Poverty remains higher than pre-pandemic levels, with the lowest rate in Phnom Penh (4.2%) and the highest rate in rural areas (22.8%). About 76% of Cambodia's population lives in rural areas.

Cambodia's agricultural sector remains a key source of employment and accounted for approximately a quarter of the country's GDP in 2021. More than 60% of poverty reduction from 2007 to 2011 was attributed to positive developments in the agriculture sector and in 2020 the World Bank reported that it is the sector least affected by the global pandemic.

Recently, the Cambodian Minister of Agriculture, Forestry and Fisheries stated that 2 of the challenges Cambodia faces include the impact of severe droughts and floods, which increasingly threaten yields and incomes each year. According to the Global Climate Risk Index for 2000–2019, Cambodia ranked 14th in the world for countries most affected by climate-related extreme weather events.

Cambodia's agricultural production increased slightly in 2021, despite less favourable weather conditions. Wet season rice cultivation reached 2.6 million hectares, a 5.4% year-on-year increase. Wet season rice yield increased to 4.1 tonnes per hectare, up from 3.5 tonnes per hectare in 2020. Throughout the pandemic, the agriculture sector has benefited from increased labour availability due to layoffs in the services and industry sectors and the return of migrant workers from cities and abroad.

The Cambodia–China Free Trade Agreement came into effect in January 2022 and will likely provide a further boost to Cambodia's agricultural production and exports, especially to the Chinese market. The country's agricultural production and exports have expanded during the pandemic as demand increases.

The Ministry of Agriculture, Forestry and Fisheries is in the midst of implementing its 2019–25 Agriculture Sector Development Strategy, which aims at modernising the agriculture sector. This is an important step towards accelerating the transformation from subsistence farming to commercial agriculture.

Country priorities

ACIAR and the Royal Government of Cambodia (represented by the Ministry of Agriculture, Forestry and Fisheries) have an ongoing 10-year agreement on the strategic priorities for research collaboration. From 2019 to 2029, research collaborations will focus on 3 domains to support the development of Cambodian agriculture:

- sustainable intensification and diversification of agriculture, focusing on non-rice crops in traditional crop-rice systems and alternative cropping systems
- sustainable intensification of market-oriented smallholder livestock production systems
- sustainable intensification of freshwater aquaculture production systems for nutrition-rich species.

Research priorities over this time will also take into consideration cross-cutting themes that address challenges across the agriculture sector. These are:

- gender equity, women's empowerment and nutrition – these are particularly important in the context of increasing labour migration that impacts women and children in rural Cambodia, and high rates of stunting and poor nutrition among women and children
- climate variability mitigation and adaptation to climate change, taking into consideration climate variability and enabling climate-resilient farming systems
- food safety and standards.

2022–23 research program

- **17 ACIAR-supported projects in Cambodia**
- **4 projects are specific to this country**
- **13 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 Cambodia. The projects are grouped according to research program. Each project description is referenced in a list at the end of this section, which provides the project title and code.

Agribusiness

Cassava witches' broom disease and Sri Lanka cassava mosaic virus are spreading rapidly in South-East Asia. A project led by Dr Jonathan Newby of the International Center for Tropical Agriculture is developing technically viable and economically and socially sustainable ways to improve the resilience of cassava production systems and value chains in Cambodia, Laos, Myanmar and Vietnam. The project will conclude in 2023 with researchers continuing on-farm testing of new agronomic practices and training of farmers and extension officers. The project team will also finalise their investigation of alternative models for public-private funding for core activities.[1]

Ms Pou Chanthea is a cassava farmer in Tboung Khmum province in central Cambodia. ACIAR-supported projects are working with farmers and agencies to identify and introduce agronomic practices and value chain management to reduce the impact of disease in cassava crops. Photo: Majken Soegaard

Catfish (*Pangasius* sp) farming and wild-caught catfish are important income generating activities for smallholder farmers in the Mekong River Basin and are a vital source of dietary protein for those countries' populations. The continued availability of catfish for human consumption is influenced by many factors including climate change, the COVID-19 pandemic, consumer perceptions on food and health safety provenance, and environmental and political changes. Dr Van Kien Nguyen of the Health and Agricultural Policy Research Institute leads a new project in Cambodia, Laos and Vietnam to identify food loss and waste along the catfish value chain; conduct foresight exercises to determine the uncertainties of catfish production for food systems; and develop solutions to reduce food loss in catfish production. This project is part of the ACIAR–IDRC Food Loss Research Program (page 23).[2]

Crops

New crop establishment practices for rice, such as broadcasting and direct seeding (manually or mechanically), offer significant labour savings for growers. However, changed field conditions compared with traditional crop establishment methods, such as transplanting, increase the risk of weed infestations. A project in Cambodia and Laos, led by Dr Jaquie Mitchell of the University of Queensland, is developing weed management packages to address labour constraints and reduce the reliance on chemical control. The project is engaging with farmer groups and their advisers to determine knowledge gaps in weed management, and identify practical solutions to develop integrated weed management packages suitable for rainfed lowland rice production systems, specific to locations.[3]

Fisheries

Floodplain development and the regulation of river flows for rice production across South-East Asia are affecting fisheries and fish migration, and the livelihoods of communities that depend on fish for protein and trade. Previous ACIAR-supported research showed that integrating fishways into water regulator designs, allowing passage of migratory fish up and down regulated rivers, can have lasting economic and social benefits for river communities. Professor Lee Baumgartner of Charles Sturt University leads a project to establish a stakeholder network to facilitate sound, cross-sector decision-making on fish passage construction programs across South-East Asia. During 2022–23, researchers will continue gathering data on fish migration and undertake an international review of draft guidelines and curriculum for a specially designed Graduate Certificate in Fisheries. An additional DFAT investment aims to broaden the projects outcomes to include scaling of fish passage technologies across Mekong countries.[4]

Forestry

Increased trade, global movement and a changing climate increase the threat of emerging pests and diseases. The capability to detect and respond to forest pest and disease incursions is crucial to minimising their impacts. In South-East Asia, this capacity varies widely, but there is a general lack of preparedness. A project co-led by Dr Madaline Healey and Associate Professor Simon Lawson of the University of the Sunshine Coast will establish an effective and sustainable forest biosecurity network to improve risk management for invasive forest pests and diseases. The project will use shared field protocols and data as an entry point and foundation for coordinated biosecurity response. In 2022–23 activities will include launching resources to assist with in-country identification of pests and pathogens and delivering biosecurity awareness training.[5]

University of Queensland researchers are working with farmer groups and their advisers to develop integrated weed management packages suitable for rainfed lowland rice production systems. Photo: Sarina McFadyen

ACIAR-funded cattle research in Cambodia and Laos since the early 2000s will be reviewed to understand its relevance and application to the rapidly changing beef sector in the Mekong region. Photo: Harry Campbell-Ross

Horticulture

Appropriate low-cost protected cropping provides an opportunity to develop inclusive economies around vegetable production using collaborative supply chains to grow and market traceable, safe, fresh vegetables. A new project led by Mr Jeremy Badgery-Parker of the University of Adelaide will address the technical and social challenges of year-round safe, reliable vegetable production through understanding the inputs and outputs of these production systems. The project will support smallholder farmers in Cambodia and Laos to be climate-resilient, sustain natural landscapes, minimise waste and emissions, and significantly increase yields leading to increased income.[6]

Mango production in the Asia-Pacific region accounts for about two-thirds of global production. Much of the crop is produced by smallholders, who achieve relatively modest yields and participate in traditional value-chain arrangements that offer little incentive to innovate or pursue higher quality. Some producers seek better returns by supplying higher-value export markets (such as Korea), but struggle to deliver fruit that meets market or regulatory standards. Dr Muhammad Sohail Mahzar of the Northern Territory Department of Primary Industry and Fisheries Industry, Tourism and Trade will lead a new project in Cambodia and the Philippines that aims to improve the ability of selected mango supply chains to deliver fruit that better meets consumer expectations of quality and value, and provide smallholder growers with a better return on investment.[7]

High-value vegetable crops are essential to improving livelihoods in the Pacific region and Cambodia. Extension services are not well equipped to assist farmers in dealing with pests and diseases, with insufficient staff training resulting in losses of up to 30–40%, primarily due to pests and diseases. Plant health clinics offer a solution to this problem. A new project led by Dr Michael Furlong of the University of Queensland will establish an effective information system supported by research on key emerging pests in these regions to better prepare farmers to detect, respond to and continue to manage their farming businesses, all the while contributing to regional biosecurity preparedness.[8]

Livestock Systems

ACIAR has funded cattle research in Cambodia and Laos since the early 2000s. Despite this significant investment, the research outcomes have not been reflected in more significant development initiatives or government programs, which is a potential wasted opportunity for research impact. Furthermore, in the case of Laos, the Mekong beef sector has changed dramatically in the last 5 years, requiring an assessment of where existing research is relevant and what new research is needed. A new project led by Dr Rodd Dyer of FocusGroupGo Asia Pacific aims to assist in understanding the rapidly evolving situation in northern Laos beef markets. Researchers will identify areas where previous ACIAR-supported research could be valuable and future research areas in broader livestock investments.[9]

Poultry enterprises offer opportunities to improve the nutrition of households and economically empower women, who are the key custodians of smallholder poultry in South-East Asia. However, low-producing chicken genotypes typically dominate smallholder or family production systems. Dr Tadelle Dessie of the International Livestock Research Institute leads a project to test and make available high-producing, farmer-preferred genotypes of chickens to increase smallholder productivity as a pathway out of poverty in Cambodia and Vietnam. During 2022–23, the project continues activities to quantify smallholder chicken production systems and investigate promising breeds for the region. The project is also designing a breed improvement program in Cambodia.[10]

Social Systems

A farmer's decision to adopt an agricultural technology or practice involves technical, local, financial, contextual and personal factors. Therefore, efforts to encourage adoption must prioritise farmers' perceptions of problems and solutions. A project led by Dr Brian Cook of the University of Melbourne has investigated the adoption of technologies and best practice for sustainable cassava production in north-western Cambodia, where the crop area is expanding rapidly and market returns are high. The final stage of the project will be completed in 2022 with the analysis of household interviews and village engagement activities. This will inform understanding of why some groups adopt new technologies, and identify barriers specific to poor, marginalised and female-headed households.[11]

The previous project found that extension does not overcome powerful social relations, especially credit and debit. Dr Brian Cook of the University of Melbourne leads a new project to analyse the social relations that farmers actively avoid, wish to avoid, or prefer and wish to strengthen as part of self-determined efforts to improve their livelihoods. Ultimately, the project seeks to define pathways that support farmers to benefit from agricultural development. In 2022–23, the project team will collect qualitative data by engaging with 2,100 households across 30 villages.[12]

In Laos and Cambodia, access to formal financial services is low. It is substantially lower among rural and remote communities, and lower again for women. Dr Erin Taylor of Western Sydney University leads a project that will review theoretical frameworks to understand how the approach to digital financial services in Laos and Cambodia compares with global trends, and what global lessons can be applied. The project will assess theories of change and impact methodologies that have been used around the world to introduce digital financial services to reduce poverty in rural areas and improve gender equality. In 2022–23 the project team will begin gathering qualitative data through focus groups and in-depth interviews with key informants.[13]

A new project will be established in Cambodia during 2022–23, as part of the ACIAR–IDRC Research Program on One Health. Led by the Royal University of Agriculture (Cambodia), the project will investigate the role of agricultural and forest landscapes on human and environmental health in Cambodia (page 24).[14]

Soil and Land Management

Continued expansion of cultivation into unused or degraded land has been recognised as environmentally unsustainable by the Royal Government of Cambodia. Sustainable intensification, improved yields and diversification of cropping are priorities in areas where upland farming is being developed. A project led by Dr Wendy Vance of Murdoch University focuses on understanding Indigenous soil knowledge and suitable land use to develop site-specific soil management practices. The project concludes in 2022 with the delivery of simple tools to help farmers identify soil types and constraints, and soil data will be added to the Cambodian Agronomic Soils Classification system and the FAO World Reference Base for Soil Resources.[15]

The Cambodian upland landscape suffers from periods of drought, making rice farming difficult. ACIAR-supported research is enabling farmers to grow profitable crops with less water, such as rice farmer Phoun Phall, who is experimenting with growing forages instead of rice on his land. Photo: Majken Soegaard

Agricultural production in the lowlands of Cambodia and Laos is characterised by a high proportion of each nation's poorest and most food-insecure people. Their livelihoods generally rely on rainfed, low-input rice production and limited livestock keeping. A project led by Dr Matthew Denton of the University of Adelaide aims to strengthen and scale out knowledge that supports smallholder farmers in lowland areas to develop integrated forage systems on sandy soils. In 2022–23, the project team will translate their research results and information on best management practices for forages into easily understood and adoptable guidelines. They will seek to extend the knowledge gained through this project to farmers, extension agents and other stakeholders in livestock production value chains in Laos and Cambodia.[16]

Water

Inland fisheries in South-East Asia have declined significantly in recent years due to the cumulative impacts of development on freshwater ecosystems. Solutions to integrate fisheries and irrigation need to consider engineering, agronomic, environmental and social interventions, and operate across scales from field to river basin. A scoping study, led by Mr Tarek Ketelsen of the Australia Mekong Partnership for Environmental Resources and Energy Systems, aims to establish an approach for communities in the Mekong region of Cambodia and Laos to co-design interventions and systems to integrate fisheries and irrigation for more sustainable and equitable outcomes. The study forms the basis for a major project to examine integration of fisheries and irrigation in a wide range of farming systems and social contexts across South-East Asia (Cambodia, Laos, Myanmar); linking with current work on fishways and broadening the focus to include threats beyond water control infrastructure.[17]

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See page 186 for contact details.

Current and proposed projects

1. Establishing sustainable solutions to cassava diseases in mainland South-East Asia [Cambodia, Laos, Myanmar, Vietnam] (AGB/2018/172)
2. Food loss in the *Pangasius* catfish value chain of the Mekong River Basin (Food Loss Program) [Cambodia, Laos, Vietnam] (CS/2020/209)
3. Weed management techniques for mechanised and broadcast lowland crop production systems in Cambodia and Laos (CROP/2019/145)
4. FishTech: Integrating technical fisheries solutions into river development programs across South-East Asia [Cambodia, Indonesia, Laos, Vietnam, Thailand] (FIS/2018/153)
5. Building an effective forest health and biosecurity network in South-East Asia [Cambodia, Indonesia, Laos, Vietnam] (FST/2020/123)
6. Safe, fresh, year-round vegetables in Cambodia and Laos through research and development support of whole supply chain agribusiness networks (HORT/2021/143)
7. Improving mango crop management in Cambodia, the Philippines and Australia to meet market expectations (HORT/2016/190)
8. Biosecurity planning [Cambodia, Papua New Guinea] (HORT/2021/151)
9. Rapid transformation of Lao beef sector - biosecurity, trade and smallholders [Cambodia, Laos] (LS/2021/128)
10. Asian chicken genetic gains: A platform for exploring, testing, delivering, and improving chickens for enhanced livelihood outcomes in South East Asia [Cambodia, Vietnam] (LS/2019/142)
11. Uptake of agricultural technologies amongst farmers in Battambang and Pailin provinces, Cambodia (ASEM/2013/003)
12. Next generation agricultural extension: social relations for practice change [Cambodia] (SSS/2019/138)
13. Building the evidence base on the impacts of mobile financial services for women and men in farming households in Laos and Cambodia (SSS/2020/160)
14. The role of agricultural and forest landscapes on human and environmental health in Cambodia (ACIAR–IRDC One Health Research Program) (SSS/2022/164)
15. Land suitability assessment and site-specific soil management for Cambodian uplands (SMCN/2016/237)
16. Management practices for profitable crop livestock systems for Cambodia and Laos (SMCN/2012/075)
17. Water for fish and irrigation in the Mekong [Cambodia, Laos] (WAC/2021/135)

Indonesia

A$5.05 million
Budgeted funding

19
Bilateral and regional research projects

3
Small projects and activities

Indonesia's economy demonstrates impressive growth throughout 2022, recording of 5.44% (year on year) in the second quarter of 2022. This result aligns well with trends in economic recovery trends and is expected to continue in the years to come. The main strategy and relevant policies applied by the Government of Indonesia include reducing restrictions on movement of people, preparing the economy to move to a 'new normal' era, and driving affordability by providing better-targeted subsidies and social welfare supports.

Indonesia's agriculture, fisheries and forestry sectors have long been an integral part of the economy, with millions of hectares of arable land and extensive marine resources across the diverse archipelago. Although their contribution to Indonesia's GDP has declined in the past years, these sectors remain critical as they employ about one-third of the workforce. Smallholder farmers throughout rural Indonesia have proven to be the backbone of the sector, particularly during the prolonged COVID-19 crisis.

Agriculture has been one of Indonesia's most resilient sectors amidst the COVID-19 pandemic. During the COVID-19 recovery period in 2021, Indonesia's economy has started to recover gradually but unevenly across sectors. The positive performance of plantation commodities has supported the growth of the processing industry, especially the food and beverage industry. The global economic recovery is expected to boost Indonesia's agricultural exports.

Digital transformation and infrastructure development are a focus for future economic growth, driven by the increasing middle-class population, the agenda for human capital development, geographic position and positive progress in free trade agreements.

Indonesia has implemented strategies to achieve the goals of the UN 2030 Agenda for Sustainable Development, especially Sustainable Development Goal 2: Zero Hunger. The 2020–2024 National Medium-Term Development Plan includes a renewed focus on enhancement of small and medium-size enterprises and improving economic investment climate, agricultural digital transformation, land and irrigated water management and improving the governance of the national food system.

Under its nationally determined contributions submitted to the Paris Agreement, Indonesia committed to reducing greenhouse gas emissions by up to 29% with national efforts, and up to 41% with international support. A significant amount of the reductions is to come from land-based systems. To meet these commitments, Indonesia is working to enhance the use of new technologies in land management, increasing renewable technologies for energy generation, and restoring degraded peatlands. All of these initiatives have been raised with ACIAR as areas of potential collaboration.

The Indonesian Government recently established a super agency, the National Institute for Research and Innovation, which is an autonomous entity that will be responsible for R&D in all sectors. This massive reorganisation will transform the way we collaborate with Indonesia well into the future.

Country priorities

Feeding a nation of around 270 million people, especially in the context of the COVID-19 pandemic, has been reasserted as a critical priority by the Indonesian Government. The prolonged pandemic has had severe economic and non-economic impacts on the population and economy, including the agriculture, fisheries and forestry sectors. As most communities still rely on these sectors, Indonesia faces a complicated situation as the pandemic continues, with impacts on both food production and livelihoods. This is also a high-risk situation for food security due to the decrease in purchasing power and food supply chains.

In the second term of President Widodo's administration (2019–24), agriculture has attained a higher strategic position, with line agencies tasked to achieve an advanced, modern and independent agricultural system. This has strong implications for ACIAR, as it is the first major reorientation of agricultural research priorities in Indonesia for a decade, and it is focused on both market linkages and alleviating poverty through improved family farming. While Indonesia retains a strong desire to sustain current research collaboration with us in the forestry, agriculture and fisheries sectors, our new short-term and medium-term priorities of significance include:

- creating a single integrated data system to district level
- strengthening agricultural financing facilities
- improving corporate-based food crop production
- strengthening the competitiveness of dedicated horticultural zones
- improving the production, value-add and competitiveness of export crops (especially cocoa, coffee, rubber, palm oil and tea)
- strengthening biosecurity
- driving the productivity and genetic quality of livestock
- the conservation and management of forestry agroecosystems (including peatland restoration and waste management)
- improving seed systems.

Indonesia is working towards an advanced, modern and independent agricultural system, with a focus on both market linkages and alleviating poverty through improved family farming. Research priorities for collaboration with ACIAR will include driving the productivity and genetic quality of livestock in the beef and dairy sectors. Photo: Fitri Apriliyani

In 2021, a rapid assessment framework of Indonesia's Agricultural Innovation System was undertaken. The study was designed to support the Indonesian National Development Planning Ministry (BAPPENAS) in identifying policy options whereby the efficiency, effectiveness and impact of Indonesia's agricultural innovation system could be improved.

Another study is underway in 2022, which will provide key Indonesian Government agencies with a high-level 'roadmap' of high-impact initiatives and policies that could maximise the impact of digital technologies in agricultural value chains in Indonesia.

The priorities of the Ministry of Marine Affairs and Fisheries for 2021–24 are to maximise the revenue from the capture fisheries for small fishers' welfare; improve the productivity of some export-oriented commodities, especially shrimp, lobster and seaweed, supported by appropriate R&D programs; and develop aquaculture villages across Indonesia.

The integration process of R&D Agencies into the National Research and Innovation Agency (BRIN) is progressing. It provides the opportunity for ACIAR to re-calibrate its existing collaboration and explore potential areas for future partnership with technical ministries, universities, NGOs and BRIN. ACIAR will explore a new partnership model in line with Indonesia's improved economy and identify how Australia can contribute to improving Indonesia's agricultural sector.

The collaboration is identifying policy opportunities to support a major transformation of Indonesia's research, innovation and delivery systems to better support the transition of some sections of smallholder agriculture to more profitable small business enterprises, while sustaining food security for Indonesia's growing population. This collaboration is the first step towards setting new priorities and finding different ways of working together, once the constraints of the COVID-19 pandemic ease.

2022–23 research program

- **22 ACIAR-supported projects in Indonesia**
- **11 projects are specific to this country**
- **11 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 Indonesia. The projects are grouped according to research program. Each project description is referenced in a list at the end of this section, which provides the project title and code.

Agribusiness

Research agencies in Indonesia and the international development community have focused on promoting innovative farm technologies to sustain and improve agricultural productivity in upland catchments. However, literature reviews and evaluations suggest that adoption rates of these conservation-oriented land use practices are low. Professor Randy Stringer of the University of Adelaide leads a project that aims that aims to advise the Indonesian Government on policy interventions that would enhance long-term agricultural productivity, reduce negative environmental externalities and improve household welfare in Indonesia's upland catchments. The project concludes in 2022 with an evaluation of the results of niche market interventions by sampling participating households and delivering final policy dialogue workshops with national-level stakeholders.[1]

Agriculture and tourism are interdependent sectors in Indonesia, yet there is a general absence of collaboration as they compete for local resources, including labour, land and water. Weak value chain integration limits the ability of agriculture, tourism, policy and planning entities to plan and respond to changing conditions and opportunities. A new project led by Mr Jeremy Badgery-Parker of Primary Principles Pty Ltd aims to improve the value creation of smallholders by using a network approach to understand the local agribusiness-tourism ecosystems, test consumer-based mechanisms as drivers of change and distil learnings into a transferable model. The project will lead to more resilient and economically stable communities.[2]

Smallholder farmers in South-East Asia often cannot access credit to invest in new crops or technologies, deal with risks and shocks, and safely carry wealth from harvest to planting. To help smallholders reach their production potential, a project led by Dr Alan de Brauw of the International Food Policy Research Institute aims to increase knowledge about how to design and implement innovative and inclusive agricultural value chain financing models in South-East Asia. During 2022–23, the project will analyse data to determine the impact of the project in each country and produce initial scientific reports and policy papers.[3]

Success in rural transformation is measured not only by income growth in the rural population, but also by the degree of inclusiveness in the society. A project in China, Bangladesh, Indonesia and Pakistan, led by Dr Chunlai Chen of the Australian National University, endeavours to understand the nature and drivers of rural transformation in order to provide better policy advice to underpin the success of transformation. During 2022–23, researchers will analyse and report on the results of their study into the components of success and the different impacts of rural transformation on women and men.[4]

Economic growth across South-East Asia has resulted in a growing urban middle class. This growth in affluence is driving demand for dairy-based products, and national dairy markets are growing rapidly. The increase in domestic dairy consumption in Indonesia and the Philippines presents an opportunity for significant growth in domestic dairy farming sectors, particularly for smallholder dairy farmers. A new project led by Dr Brad Granzin of Australasian Dairy Consultants aims to develop and pilot commercially viable, sustainable smallholder-inclusive dairy value chains. The project will capitalise on the growing domestic demand for short shelf-life dairy products and collaborate with partners to develop interventions to improve farm productivity, product quality and availability, and supply chain efficiencies.[5]

Crops

Mungbean is an ideal rotation crop for smallholder farmers throughout the Indian Ocean Rim region. The International Mungbean Improvement Network, established through a project led by Dr Ramakrishnan Nair of the World Vegetable Center, helped realise the potential of mungbean to improve cropping system productivity and livelihoods by improving researchers' access to genetic material, and coordinating and providing technical support to variety development in Bangladesh, India, Myanmar and Australia. Phase 2 of the project extends the network to Kenya and Indonesia, expanding the source of germplasm to develop new mungbean varieties, as well as strengthening the capacity of more national mungbean breeding programs.[6]

Fisheries

Floodplain development and the regulation of river flows for rice production across South-East Asia are affecting fisheries and fish migration, and the livelihoods of communities that depend on fish for protein and trade. Previous ACIAR-supported research showed that integrating fishways into water regulator designs, allowing passage of migratory fish up and down regulated rivers, can have lasting economic and social benefits for river communities. Professor Lee Baumgartner of Charles Sturt University leads a project to establish a stakeholder network to facilitate sound, cross-sector decision-making on fish passage construction programs across South-East Asia. During 2022–23, researchers will continue gathering data on fish migration and undertake an international review of draft guidelines and curriculum for a specially designed Graduate Certificate in Fisheries. An additional DFAT investment aims to broaden the projects outcomes to include scaling of fish passage technologies across Mekong countries.[7]

Indonesia is the world's largest producer of tuna, accounting for approximately 20% of global production. Its fishing fleet spans the eastern Indian Ocean and the western and central Pacific Ocean, and ranges from small-scale to industrial vessels. A project led by Dr Campbell Davies of CSIRO contributes to Indonesia's longer-term goal of improving the economic and social benefits of tuna fisheries, while reducing the conservation risks to regionally important fish stock. During the final year of the project, researchers will complete work with Indonesian fisheries scientists, industry and managers to evaluate harvest strategies and develop management capability for Indonesian tuna fisheries.[8]

Dependency on the tuna fishing industry is high in eastern Indonesia. Jobs in the tuna industry provide substantial sources of income and food, but many also carry significant safety risks and income insecurity. Conventional methods are typically not suitable for assessing how fisheries perform in terms of social welfare. A small research activity led by Dr Nick McClean of the University of Technology Sydney will develop and test methods for assessing harvest strategies for sustainable tuna fisheries in Indonesia, focusing on their impacts on the welfare of dependent communities. Findings will be integrated into the tuna harvest strategy being developed by the Government of Indonesia.[9]

Globally, growing momentum for nutrition-sensitive agricultural policy and development assistance is yet to have any impact on the small-scale artisanal fishery sector. To address this, the role and contribution of fish to livelihoods and nutrition security must be supported by rigorous data and communicated at global, national and local scales. A project in Timor-Leste and the East Nusa Tenggara province of Indonesia aims to identify the livelihood and nutrition benefits of fisheries and test nutrition-sensitive co-management systems for inshore fisheries. Led by Dr David Mills of the WorldFish Center, the project will evaluate the nutritional value of fisheries to households, identify the factors enabling or limiting fish consumption, and highlight the potential of fish to reduce malnutrition, particularly during early childhood. In 2022–23 activities will include data collection to understand household livelihood structures and decision-making and community training in healthy diets and child nutrition.[10]

Forestry

Tropical peatlands are a critical global ecosystem; their environmental services provide important carbon storage. Indonesia hosts the greatest global extent of tropical peatlands, yet less than 7% of its natural-state peat swamp forest is classified as intact. Without focused management, these remnants will be lost. A new project led by Dr Laura Linda Bozena Graham of The Borneo Orangutan Survival Foundation will assess the internal, edge and external threats facing a large, intact peat swamp forest area in Central Kalimantan. Researchers will develop a quantitative and qualitative threat analysis, facilitating the development of a targeted conservation strategy for the area, and a methodological report to facilitate transfer to other sites.[11]

A project with activities in Indonesia and Vietnam will underpin good plant biosecurity practices in forestry. Led by Dr Caroline Mohammed of the University of Tasmania, researchers will work with government and industry partners to extend screening approaches developed for the fungus *Ceratocystis* in acacia to eucalypts, which have replaced acacias in plantations in areas of the wet tropics. Researchers will develop remote-sensing software applications for cheap and rapid forest health surveillance and, through geospatial modelling, deliver risk maps under current and future climates at a regional level for the highest-priority pests and pathogens. In 2022–23 activities will include building the capacity of local partners to access climate data and run distribution models, and identifying eucalypt parents for hybridisation.[12]

Increased trade, global movement and a changing climate increase the threat of emerging pests and diseases. The capability to detect and respond to forest pest and disease incursions is crucial to minimising their impacts. In South-East Asia, this capacity varies widely, but there is a general lack of preparedness. A project co-led by Dr Madaline Healey and Associate Professor Simon Lawson of the University of the Sunshine Coast will establish an effective and sustainable forest biosecurity network to improve risk management for invasive forest pests and diseases. The project will use shared field protocols and data as an entry point and foundation for coordinated biosecurity response. In 2022–23 activities will include launching resources to assist with in-country identification of pests and pathogens and delivering biosecurity awareness training.[13]

Horticulture

Huánglóngbìng, or citrus greening disease, is a destructive bacterial disease of citrus. It is spread mainly by the Asian citrus psyllid and infected propagation material. All commercially cultivated citrus varieties are susceptible to the disease and, currently, there is no cure. Effective management of the disease is the largest challenge ever faced by citrus industries worldwide. A project led by Dr Jianhua Mo of the NSW Department of Primary Industries will leverage international expertise to tackle the deficiencies in current huánglóngbìng management practices. The trilateral project will enhance the sustainable management of huánglóngbìng and the Asian citrus psyllid in Indonesia and China, and increase the preparedness of the Australian citrus industry for an incursion of both the disease and the vector. In 2022–23 activities will include the evaluation of huánglóngbìng-tolerant rootstocks and transplanting of grafted seedlings to trial sites for evaluation.[14]

Fusarium wilt tropical race 4 (TR4), or Panama disease, has become widespread throughout South-East Asia. The disease is threatening smallholder banana production in Indonesia, the Philippines and, more recently, Laos. A project led by Dr Anthony Pattison of the Queensland Department of Agriculture and Fisheries aims to develop an integrated management response to the spread of the disease. The research will investigate the effects on banana production of altering the banana microbiome to suppress disease and increase plant resistance. During 2022–23, the project team will analyse completed field surveys of production systems and natural environments, and there will be ongoing development and training in statistics and experimental procedures for glasshouse and field experiments.[15]

The NSW Department of Primary Industries leads a trilateral project to enhance the sustainable management of huánglóngbìng and the Asian citrus psyllid in Indonesia and China, as well as increasing the preparedness of the Australian citrus industry for an incursion of both the disease and the vector. Photo: Fitri Apriliyani

About 40 tropical fruit fly species damage horticultural crops and impede trade throughout South-East Asia. A project in Indonesia and the Philippines builds on the success of previous ACIAR projects, and links to fruit-fly work in other ACIAR partner countries and Australia. The project, led by Mr Stefano De Faveri of the Queensland Department of Agriculture and Fisheries, aims to reduce fruit-fly infestation of mango crops through area-wide management of the pest, and improve pre-harvest and post-harvest practices. The ultimate aim is to improve the yield and quality of crops in order to improve livelihoods and trade opportunities. During 2022–23, focus areas for the project include training farmers and other stakeholders in area-wide management techniques, evaluation of techniques implemented in the field, and integration of techniques into best management practice.[16]

Livestock Systems

The Global Burden of Animal Diseases program is an ambitious 10-year initiative funded by the Bill & Melinda Gates Foundation to develop a global metrics system for animal disease burden. The program will guide public and private investments in animal health and welfare to improve our understanding of the broader societal contributions of animals at global, national, sector and farm levels. Providing improved equability for livestock and aquatic producers on the margins, particularly women, is a key driving principle. Using the conceptual framework of the program, Dr Dianne Mayberry of CSIRO will lead an ACIAR-supported project team to conduct a Global Burden of Animal Diseases case study in Indonesia to prepare a resource for prioritisation and evaluation of investments related to animal health in Indonesia.[17]

A new project will be established in Indonesia, Laos and the Philippines during 2022–23, as part of the ACIAR–IDRC Research Program on One Health. Led by the University of the Philippines (Los Banos), the project will investigate the potential to enhance livestock production systems in South-East Asia using an EcoHealth/One Health approach (page 24).[18]

Soil and Land Management

The smoke haze from indiscriminate burning of peatlands has become a major issue in South-East Asia in recent decades. Smoke haze negatively affects public health and the economy within Indonesia and other countries in the region. A multidisciplinary research program led by Dr Daniel Mendham of CSIRO supports Indonesia's commitment to restoring large areas of degraded peat and achieving sustainable livelihoods for communities living on peatland. The project concludes in 2023 with analysis, evaluation and dissemination of new knowledge to prevent fires in peatlands and improve peatland restoration practices, while enabling meaningful, profitable and sustainable alternative livelihoods.[19]

Peatland restoration efforts in Indonesia are progressing rapidly, but the success of these efforts is often low or undocumented. Two techniques trialled in previous ACIAR projects – eddy covariance flux towers and chameleon sensors – demonstrated their strong potential as tools to empower government and communities to monitor and help manage peatland restoration. These techniques monitor changes in the ecosystem's peat moisture levels and carbon and methane flux. A small research activity led by Dr Samantha Grover of RMIT University is using this data to work with communities, government agencies and other stakeholders to provide valuable information that supports decision-making in peatland restoration and fire management. Stakeholder engagement, which has commenced, is a major focus of this project.[20]

Coastal agricultural systems support the livelihoods of many people in Indonesia. These systems vary in intensity, from predominantly low-value rice production to highly intensive mixed rotations that include rice, shallot and chilli. Shallot and chilli are Indonesia's most significant vegetable commodities and are integral components of Indonesia's unique cuisine. A project led by Dr Stephen Harper of the University of Queensland addresses key soil and human health issues and challenges associated with the safe and sustainable production of high-value shallot and chilli cropping systems in coastal agroecosystems. In 2022–23 researchers will conduct experiments to compare crop productivity under different agronomic conditions and develop focused surveys to evaluate the use of pesticides in these systems and the impacts of salinity on vegetable production.[21]

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See page 186 for contact details.

Current and proposed projects

1. Agricultural policy research to support natural resource management in Indonesia's upland landscapes (ADP/2015/043)
2. Creating resilient communities through smallholder-inclusive tourism markets in Indonesia (AGB/2021/125)
3. Inclusive agriculture value chain financing [Indonesia, Myanmar, Vietnam] (AGB/2016/163)
4. Understanding the drivers of successful and inclusive rural regional transformation: Sharing experiences and policy advice in Bangladesh, China, Indonesia and Pakistan (ADP/2017/024)
5. Evaluating supply chain interventions and partnerships to sustainably grow the smallholder dairy sectors of Indonesia and the Philippines (AGB/2021/124)
6. International Mungbean Improvement Network 2 [Bangladesh, India, Indonesia, Kenya, Myanmar] (CROP/2019/144)
7. FishTech: Integrating technical fisheries solutions into river development programs across South-East Asia [Cambodia, Indonesia, Laos, Vietnam, Thailand] (FIS/2018/153)
8. Harvest strategies for Indonesian tropical tuna fisheries to increase sustainable benefits (FIS/2016/116)
9. Developing social and economic monitoring and evaluation systems in Indonesian tuna fisheries to assess potential impacts of alternative management measures on vulnerable communities (FIS/2020/109)
10. A nutrition-sensitive approach to fisheries management and development in Timor-Leste and Nusa Tenggara Timur Province, Indonesia (FIS/2017/032)
11. Retaining the jewels in the crown: Kalimantan peat forest remnants [Indonesia] (FST/2021/145)
12. Managing risk in South-East Asian forest biosecurity [Indonesia, Vietnam] (FST/2018/179)
13. Building an effective forest health and biosecurity network in South-East Asia [Cambodia, Indonesia, Laos, Vietnam] (FST/2020/123)
14. Preparedness and management of huánglóngbìng (citrus greening disease) to safeguard the future of citrus industry in Australia, China and Indonesia (HORT/2019/164)
15. An integrated management response to the spread of *Fusarium* wilt of banana in South-East Asia [Indonesia, Laos, Philippines] (HORT/2018/192)
16. Development of area-wide management approaches for fruit flies in mango for Indonesia, Philippines, Australia and the Asia-Pacific region (HORT/2015/042)
17. Global burden of animal disease initiative: Indonesia case study (LS/2020/156)
18. Livestock enhancement through EcoHealth/One Health assessment in South-East Asia (ACIAR–IRDC One Health Research Program) [Indonesia, Laos, Philippines] (LS/2022/163)
19. Improving community fire management and peatland restoration in Indonesia (FST/2016/144)
20. Crop health and nutrient management of shallot-chilli-rice cropping systems in coastal Indonesia (SLAM/2018/145)
21. Validating technologies for assessing and monitoring the impacts of re-wetting of peatland Indonesia using eddy flux towers coupled with the Chameleon sensors (SLAM/2020/118)

A project led by the University of Queensland addresses the key soil and human health issues and challenges of shallot and chilli cropping systems.
Photo: Adi Rahmatullah

Laos

A$4.2 million
Budgeted funding

16
Bilateral and regional research projects

4
Small projects and activities

The Lao economy has been slowed by containment measures introduced to address a second wave of COVID-19. The economic consequences of the pandemic exposed existing vulnerabilities and the country slumped into recession for the first time in more than 20 years.

Up until mid-April 2021, Laos had one of the region's lowest rates of COVID-19 cases. However, the second outbreak led to the re-introduction of containment measures that have lasted longer than those introduced in 2020. These measures restrained mobility and affected economic activities. According to the World Bank, livelihood recovery in Laos had been robust, but largely imbalanced, before the second wave of COVID-19 hit.

In its August 2021 Economic Monitor, the World Bank cited that the Lao labour market had recovered from the first wave of COVID-19, primarily driven by the ability of the agriculture sector to absorb the surplus workforce affected by pandemic shocks. Agriculture proved more resilient to pandemic shocks compared to other sectors. However, the restrictions on mobility disrupted farming activities among 14% of farming households. Because of this, more than 25% of households were very concerned about food insecurity for people in their community, an increase from 16% before the second wave began.

The World Bank expects growth in agriculture to be strong due to external demands from neighbouring countries, including China. Agricultural output was projected to grow by 3.9% in 2021, relatively higher than the 3.2% in 2020. Expanded production and export of primary agricultural products such as banana, cassava, coffee beans, live animals and rubber will drive growth. These products accounted for nearly 90% of agricultural exports in January–May 2021.

Crops and livestock farming are key drivers for future agricultural growth. In addition, the agriculture sector will continue to absorb labour that left other sectors due to the pandemic. In late 2021, the Lao–China Railway started operating. The 414 km railway is part of the Belt and Road Initiative and is expected to increase trade flows (with estimates of almost 4 million tonnes of transit trade per year by 2030), attract more foreign investors, create new jobs, and accelerate economic growth in Laos. There are high expectations that the railway will contribute to improved transportation of farm products from Laos to China.

After the 2021 UN Food Systems Summit, the Ministry of Agriculture and Forestry launched a report, Pathways to Sustainable Food Systems, which identifies 4 critical thematic areas on which the Ministry will focus. One of these is related to boosting nature-positive production, which revolves around balancing sustainable agricultural practices, people's livelihoods, and economic competitiveness with neighbouring countries. This is consistent with earlier statements of the Ministry on building its reputation for having relatively green and clean agriculture products free from the chemicals used to produce many farm products in the region.

Country priorities

In 2022–23, ACIAR will recalibrate its long-term strategic program priorities based on consultation with Lao stakeholders. The strategic priority outcomes that currently guide our investments in Laos are:

- efficient and sustainable forestry industries, including non-timber products, with suitable climate-change resilience
- innovative livestock systems that allow for intensification and land-use requirements, while raising animal health and biosecurity levels
- increased fish habitat restoration and protection of fish migration routes
- cost-effective and sustainable rice-based farming systems, through mechanisation, diversification and intensification, along with better crop quality, quarantine standards and value-adding for domestic and export markets
- improved natural resource management that benefits livelihoods and food security by delivering land-use options to smallholders, with attention to both water and nutrient management within climate-change adaptation
- improved institutional training and communication frameworks that enable smallholders to adopt and adapt new technologies, and increase the capacity development of researchers and educators.

ACIAR funds several projects to improve the productivity and resilience of cassava production systems and value chains, as cassava mosaic virus continues to affect crops across South-East Asia.

2022–23 research program

- **20 ACIAR-supported projects in Laos**
- **5 projects are specific to this country**
- **15 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 Laos. The projects are grouped according to research program. Each project description is referenced in a list at the end of this section, which provides the project title and code.

Agribusiness

Cassava witches' broom disease and Sri Lanka cassava mosaic virus are spreading rapidly in South-East Asia. A project led by Dr Jonathan Newby of the International Center for Tropical Agriculture is developing technically viable and economically and socially sustainable ways to improve the resilience of cassava production systems and value chains in Cambodia, Laos, Myanmar and Vietnam. The project will conclude in 2023 with researchers continuing on-farm testing of new agronomic practices and training of farmers and extension officers. The project team will also finalise their investigation of alternative models for public-private funding for core activities.[1]

Catfish (*Pangasius* sp) farming and wild-caught catfish are important income generating activities for smallholder farmers in the Mekong River Basin and are a vital source of dietary protein for those countries' populations. The continued availability of catfish for human consumption is influenced by many factors including climate change, the COVID-19 pandemic, consumer perceptions on food and health safety provenance, and environmental and political changes. Dr Van Kien Nguyen of the Health and Agricultural Policy Research Institute leads a new project in Cambodia, Laos and Vietnam to identify food loss and waste along the catfish value chain; conduct foresight exercises to determine the uncertainties of catfish production for food systems; and develop solutions to reduce food loss in catfish production. This project is part of the ACIAR–IDRC Food Loss Research Program (page 23).[2]

Crops

New crop establishment practices for rice, such as broadcasting and direct seeding (manually or mechanically), offer significant labour savings for growers. However, changed field conditions compared with traditional crop establishment methods, such as transplanting, increase the risk of weed infestations. A project in Cambodia and Laos, led by Dr Jaquie Mitchell of the University of Queensland, is developing weed management packages to address labour constraints and reduce the reliance on chemical control. The project is engaging with farmer groups and their advisers to determine knowledge gaps in weed management, and identify practical solutions to develop integrated weed management packages suitable for rainfed lowland rice production systems, specific to locations.[3]

ACIAR-supported research has showed that integrating fishways into water regulator designs, allowing passage of migratory fish up and down regulated rivers, can have lasting economic and social benefits for river communities.

Fisheries

Floodplain development and the regulation of river flows for rice production across South-East Asia are affecting fisheries and fish migration, and the livelihoods of communities that depend on fish for protein and trade. Previous ACIAR-supported research showed that integrating fishways into water regulator designs, allowing passage of migratory fish up and down regulated rivers, can have lasting economic and social benefits for river communities. Professor Lee Baumgartner of Charles Sturt University leads a project to establish a stakeholder network to facilitate sound, cross-sector decision-making on fish passage construction programs across South-East Asia. During 2022–23, researchers will continue gathering data on fish migration and undertake an international review of draft guidelines and curriculum for a specially designed Graduate Certificate in Fisheries. An additional DFAT investment aims to broaden the projects outcomes to include scaling of fish passage technologies across Mekong countries.[4]

The Xayaburi Power Company, responsible for designing and constructing the Xayaburi hydro-electric dam across the Mekong River in Laos, built a complex fishway system designed to enable the upstream and downstream passage of migratory fish. There are hundreds of species of fish in the Mekong River, varying in size from a few centimetres to more than one metre. A project team led by Professor Lee Baumgartner of Charles Sturt University is working with the Xayaburi Power Company to develop robust tools and techniques to assess the effectiveness of the Xayaburi Dam fish passage facilities and provide a standard for other hydro-electric dams planned for the mainstem Mekong River.[5]

Forestry

Increased trade, global movement and a changing climate increase the threat of emerging pests and diseases. The capability to detect and respond to forest pest and disease incursions is crucial to minimising their impacts. In South-East Asia, this capacity varies widely, but there is a general lack of preparedness. A project co-led by Dr Madaline Healey and Associate Professor Simon Lawson of the University of the Sunshine Coast will establish an effective and sustainable forest biosecurity network to improve risk management for invasive forest pests and diseases. The project will use shared field protocols and data as an entry point and foundation for coordinated biosecurity response. In 2022–23 activities will include launching resources to assist with in-country identification of pests and pathogens and delivering biosecurity awareness training.[6]

Lao wood manufacturing industries are yet to adopt contemporary processing technologies used in neighbouring countries. Research led by Dr Hilary Smith of the University of Melbourne will complete the development of new processing capability and engineered wood products from small-diameter timbers. This research benefits wood manufacturing industries in Laos by increasing capacity and growing markets for timber from new plantations, and in Australia by increasing the use of underused plantation resources. During 2022–23, reports will be completed on the characterisation of the current plantation resource and options for modelling future wood supply, as well as prospective pathways for influence and change in relevant policy, governance and administrative environments.[7]

Laos has an ambitious target of 70% forest cover by 2030, but currently nearly half of the country is degraded or unstocked forest. The Government of Laos seeks to restore native forest while providing benefits to resident and neighbouring communities. A new project addresses the opportunity to shape reforestation policy and practice, determining how to fulfil the government requirements. Professor Patrick Baker of the University of Melbourne leads this project, which will test post-disturbance treatments to accelerate and channel forest recovery towards desired economic, social, and ecological outcomes. By testing ecosystem assembly theory, the project will advance the state of the art in forest restoration.[8]

Horticulture

Appropriate low-cost protected cropping provides an opportunity to develop inclusive economies around vegetable production using collaborative supply chains to grow and market traceable, safe, fresh vegetables. A new project led by Mr Jeremy Badgery-Parker of the University of Adelaide will address the technical and social challenges of year-round safe, reliable vegetable production through understanding the inputs and outputs of these production systems. The project will support smallholder farmers in Cambodia and Laos to be climate-resilient, sustain natural landscapes, minimise waste and emissions, and significantly increase yields leading to increased income.[9]

Fusarium wilt tropical race 4 (TR4), or Panama disease, has become widespread throughout South- East Asia. The disease is threatening smallholder banana production in Indonesia, the Philippines and, more recently, Laos. A project led by Dr Anthony Pattison of the Queensland Department of Agriculture and Fisheries aims to develop an integrated management response to the spread of the disease. The research will investigate the effects on banana production of altering the banana microbiome to suppress disease and increase plant resistance. During 2022–23, the project team will analyse completed field surveys of production systems and natural environments, and there will be ongoing development and training in statistics and experimental procedures for glasshouse and field experiments.[10]

Livestock Systems

ACIAR has funded cattle research in Cambodia and Laos since the early 2000s. Despite this significant investment, the research outcomes have not been reflected in more significant development initiatives or government programs, which is a potential wasted opportunity for research impact. Furthermore, in the case of Laos, the Mekong beef sector has changed dramatically in the last 5 years, requiring an assessment of where existing research is relevant and what new research is needed. A new project led by Dr Rodd Dyer of FocusGroupGo Asia Pacific aims to assist in understanding the rapidly evolving situation in northern Laos beef markets. Researchers will identify areas where previous ACIAR-supported research could be valuable and future research areas in broader livestock investments.[11]

Laos is a comparatively small producer of pork compared with Vietnam and China, but pork production has grown significantly in recent years. Improved safety of animal source foods that is free from zoonotic parasites such as *Taenia solium*, or pork tapeworm, is gaining greater attention in the region. Dr Amanda Ash of Murdoch University leads a project to identify and recommend interventions to mitigate the risk of disease from food-borne parasites in pigs, adding value to the growing cross-border pig trade between northern Laos and Vietnam. During 2022–23, the project will implement protocols to manage food-borne parasitic disease at the farm level, such as deworming and subsequent monitoring of livestock and human health; and determine the effectiveness of engagement and communication packages for education of people in high-risk villages.[12]

Goat production in Laos has more than doubled over the past 10 years, largely driven by high demand for goat meat from Vietnam. Traditional extensive goat-raising methods can result in overgrazing of feed resources, negative consequences for the environment and higher incidence of diseases and parasites in livestock. A project led by Professor Stephen Walkden-Brown of the University of New England is aiming to enhance income-generating opportunities for goats in Lao farming systems, while identifying sustainable production practices. Additionally, the project is seeking greater understanding of consumer preferences for goats in Vietnam to further develop market specifications, especially for premium meat. During 2022–23, the project will develop performance benchmarks and define best practice for smallholders, larger goat farmers and agroforestry systems. The project will also conduct market surveys to ascertain past, current and likely future demand for goats and goat meat, and factors affecting pricing and demand.[13]

A new project will be established in Indonesia, Laos and the Philippines during 2022–23, as part of the ACIAR–IDRC Research Program on One Health. Led by the University of the Philippines (Los Banos), the project will investigate the potential to enhance livestock production systems in South-East Asia using an EcoHealth/One Health approach (page 24).[14]

Social Systems

In Laos and Cambodia, access to formal financial services is low. It is substantially lower among rural and remote communities, and lower again for women. Dr Erin Taylor of Western Sydney University leads a project that will review theoretical frameworks to understand how the approach to digital financial services in Laos and Cambodia compares with global trends, and what global lessons can be applied. The project will assess theories of change and impact methodologies that have been used around the world to introduce digital financial services to reduce poverty in rural areas and improve gender equality. In 2022–23 the project team will begin gathering qualitative data through focus groups and in-depth interviews with key informants.[15]

The Lao Government increasingly demands evidence to support policy development. The relationship between research-for-development and policy has not been clear-cut and there is an identified need for ACIAR projects to adopt more effective research-to-policy approaches in the Lao context. Dr Hilary Smith and Professor Peter Kanowski from the Australian National University will report on their analysis case studies and in-depth interviews with key stakeholders to identify the processes, practices and circumstances that facilitate or hinder the influence and uptake of ACIAR-commissioned research within Lao policy contexts.[16]

Soil and Land Management

Agricultural production in the lowlands of Cambodia and Laos is characterised by a high proportion of each nation's poorest and most food-insecure people. Their livelihoods generally rely on rainfed, low-input rice production and limited livestock keeping. A project led by Dr Matthew Denton of the University of Adelaide aims to strengthen and scale out knowledge that supports smallholder farmers in lowland areas to develop integrated forage systems on sandy soils. In 2022–23, the project team will translate their research results and information on best management practices for forages into easily understood and adoptable guidelines. They will seek to extend the knowledge gained through this project to farmers, extension agents and other stakeholders in livestock production value chains in Laos and Cambodia.[17]

Strong market demand for concentrated livestock feeds to support livestock industries resulted in a maize boom in Vietnam and Laos and a rapid shift to annual cropping. Fluctuations in maize price, soil erosion and declining soil fertility have pressured governments and communities into looking for alternative land use options. A small research activity led by Professor Michael Bell of the University of Queensland proposes to use an established network of researchers, extension agents and traders as the basis for developing a Theory of Change focused on maize production areas in Vietnam and Laos. It will explore opportunities to link institutional research and private sector development capacity in these regions to stimulate and support the development of economically and environmentally sustainable, climate change resilient agricultural systems.[18]

Increasing numbers of smallholder farmers in Laos and northern Vietnam are growing maize on sloping land to meet demand for livestock feeds by poultry, pig and cattle industries in China and South-East Asia. A project led by Professor Michael Bell of the University of Queensland is helping farmers adopt maize-based farming systems that reduce soil degradation and improve smallholder livelihoods and economic viability. The project concludes in 2022 with the delivery of outreach models to support the adoption of more diversified maize-based farming systems and bioeconomic frameworks to structure the assessment of the sustainability and productivity of different crop and forage options.[19]

Water

Inland fisheries in South-East Asia have declined significantly in recent years due to the cumulative impacts of development on freshwater ecosystems. Solutions to integrate fisheries and irrigation need to consider engineering, agronomic, environmental and social interventions, and operate across scales from field to river basin. A scoping study, led by Mr Tarek Ketelsen of the Australia Mekong Partnership for Environmental Resources and Energy Systems, aims to establish an approach for communities in the Mekong region of Cambodia and Laos to co-design interventions and systems to integrate fisheries and irrigation for more sustainable and equitable outcomes. The study forms the basis for a major project to examine integration of fisheries and irrigation in a wide range of farming systems and social contexts across South-East Asia (Cambodia, Laos, Myanmar); linking with current work on fishways and broadening the focus to include threats beyond water control infrastructure.[20]

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Forestry: Dr Nora Devoe
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Social Systems: Dr Clemens Grünbühel
Soil and Land Management: Dr James Quilty
Water: Dr Neil Lazarow

See page 186 for contact details.

A project led by the University of Adelaide aims to strengthen and scale out knowledge that supports smallholder farmers in lowland areas to develop integrated forage systems on sandy soils.

Current and proposed projects

1. Establishing sustainable solutions to cassava diseases in mainland South-East Asia [Cambodia, Laos, Myanmar, Vietnam] (AGB/2018/172)
2. Food loss in the *Pangasius* catfish value chain of the Mekong River Basin (Food Loss Program) [Cambodia, Laos, Vietnam] (CS/2020/209)
3. Weed management techniques for mechanised and broadcast lowland crop production systems in Cambodia and Laos (CROP/2019/145)
4. FishTech: Integrating technical fisheries solutions into river development programs across South-East Asia [Cambodia, Indonesia, Laos, Vietnam, Thailand] (FIS/2018/153)
5. Assessing upstream fish migration measures at Xayaburi Dam in Laos (FIS/2017/017)
6. Building an effective forest health and biosecurity network in South-East Asia [Cambodia, Indonesia, Laos, Vietnam] (FST/2020/123)
7. Advancing enhanced wood manufacturing industries in Laos and Australia (FST/2016/151)
8. Forest restoration for economic outcomes (FST/2020/137)
9. Safe, fresh, year-round vegetables in Cambodia and Laos through research and development support of whole supply chain agribusiness networks (HORT/2021/143)
10. An integrated management response to the spread of *Fusarium* wilt of banana in South-East Asia [Indonesia, Laos, Philippines] (HORT/2018/192)
11. Rapid transformation of Lao beef sector - biosecurity, trade and smallholders [Cambodia, Laos] (LS/2021/128)
12. Investigating and developing interventions to mitigate food borne parasitic disease in production animals in Laos (LS/2014/055)
13. Goat production systems and marketing in Laos and Vietnam (LS/2017/034)
14. Livestock enhancement through EcoHealth/One Health assessment in South-East Asia (ACIAR–IRDC One Health Research Program) [Indonesia, Laos, Philippines] (LS/2022/163)
15. Building the evidence base on the impacts of mobile financial services for women and men in farming households in Laos and Cambodia (SSS/2020/160)
16. Policy impact in Laos: From research to practice (SSS/2020/142)
17. Management practices for profitable crop livestock systems for Cambodia and Laos (SMCN/2012/075)
18. Embedding knowledge and exploring future research opportunities in sloping land agricultural systems in northern Laos and northwest Vietnam (SLAM/2021/152)
19. Improving maize-based farming systems on sloping lands in Vietnam and Laos (SMCN/2014/049)
20. Water for fish and irrigation in the Mekong [Cambodia, Laos] (WAC/2021/135)

Myanmar

A$0.79 million
Budgeted funding

3
Bilateral and regional research projects

A year after the coup that overthrew Myanmar's elected civilian government, the World Bank estimated that Myanmar's economy shrank 18% in 2021 and forecasted that continuing political instability and the COVID-19 pandemic would slow recovery in 2022.

The Myanmar Economic Monitor reports that the share of Myanmar's population living in poverty has doubled compared to pre-COVID-19 levels. The report also states that ongoing economic pressures are substantially affecting vulnerability and food security, particularly for the poor, whose savings have been drained because of recent shocks. This is consistent with findings reported under the Myanmar Agriculture Policy Support Activity supported by the International Food Policy Research Institute (IFPRI). In September 2021, IFPRI reported 48% of their respondents cited food supply problems (compared to 32% in May 2021) and 41% cited loss of jobs or income (compared to 31% in May 2021).

Prior to the political turmoil and the COVID-19 pandemic, more than one-third of Myanmar's population was already in poverty, and 6% were in extreme poverty. Almost 70% of Myanmar's 54 million people live in rural areas and rely on crop production and fisheries or livestock for their livelihoods and incomes. The fishery and livestock sectors are considered the most important, after agriculture, to meet the protein needs of the population, enhance food security, and provide employment for rural communities. The agriculture sector used to contribute about 30% of Myanmar's GDP. The political instability and a devastating third wave of the COVID-19 pandemic caused the price of critical inputs such as fertiliser to soar while crop prices have fallen.

Poverty and food insecurity are soaring in Myanmar's Central Dry Zone and Ayeyarwady Delta regions, the country's agricultural heartland. The rising food insecurity and poverty in these regions will have far-reaching repercussions in Myanmar, which relies heavily on the agricultural sector.

Country priorities

In 2020, research priorities for the ACIAR program in Myanmar aligned with 2 of the 3 focuses of Myanmar's Agricultural Development Strategy and Investment Plan (2018–2023): productivity, and market linkages and competitiveness. Specifically, the ACIAR program in Myanmar is focused on:

- increasing net production of food and cash incomes of rural households in the Central Dry Zone and Ayeyarwady Delta, through improvements in, and adoption of, production and post-harvest technologies in agriculture, including livestock and fisheries

- building capacity in agricultural, livestock and fisheries research, development and evaluation through program activities and postgraduate and short-term training
- providing technical assistance and advice on policy strengthening to relevant Government of Myanmar departments
- linking Myanmar regionally through multi-country research collaborations.

Following the rapid global spread of the COVID-19 from early 2020, Australia's program of development cooperation pivoted quickly to respond to the challenges being faced by the Indo-Pacific region, with a focus on health security, stability and (of particular importance to ACIAR) economic recovery. Specifically, as part of Australia's Myanmar COVID-19 Response Plan, ACIAR committed to continuing to support improvements in food production and rural incomes through improvements in agriculture, livestock and fisheries.

The political instability sparked by the military coup of February 2021 has resulted in Australia's development program with Myanmar being redirected to support the immediate humanitarian needs of the most vulnerable and poor, with non-government partners coordinating implementation.

2022–23 research program

- **3 ACIAR-supported projects in Myanmar**
- **3 projects are part of regional projects**

ACIAR is not supporting any new research collaborations in 2022–23. However, ACIAR continues to work with each of the current projects, in consultation with international partners, to identify how collaboration might continue consistent with Australian government guidelines.

Agribusiness

Cassava witches' broom disease and Sri Lanka cassava mosaic virus are spreading rapidly in South-East Asia. A project led by Dr Jonathan Newby of the International Center for Tropical Agriculture is developing technically viable and economically and socially sustainable ways to improve the resilience of cassava production systems and value chains in Cambodia, Laos, Myanmar and Vietnam. The project will conclude in 2023 with researchers continuing on-farm testing of new agronomic practices and training of farmers and extension officers. The project team will also finalise their investigation of alternative models for public-private funding for core activities.[1]

Smallholder farmers in South-East Asia often cannot access credit to invest in new crops or technologies, deal with risks and shocks, and safely carry wealth from harvest to planting. To help smallholders reach their production potential, a project led by Dr Alan de Brauw of the International Food Policy Research Institute aims to increase knowledge about how to design and implement innovative and inclusive agricultural value chain financing models in South-East Asia. During 2022–23, the project will analyse data to determine the impact of the project in each country and produce initial scientific reports and policy papers.[2]

Crops

Mungbean is an ideal rotation crop for smallholder farmers throughout the Indian Ocean Rim region. The International Mungbean Improvement Network, established through a project led by Dr Ramakrishnan Nair of the World Vegetable Center, helped realise the potential of mungbean to improve cropping system productivity and livelihoods by improving researchers' access to genetic material, and coordinating and providing technical support to variety development in Bangladesh, India, Myanmar and Australia. Phase 2 of the project extends the network to Kenya and Indonesia, expanding the source of germplasm to develop new mungbean varieties, as well as strengthening the capacity of more national mungbean breeding programs.[3]

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See page 186 for contact details.

Current and proposed projects

1. Establishing sustainable solutions to cassava diseases in mainland South-East Asia [Cambodia, Laos, Myanmar, Vietnam] (AGB/2018/172)
2. Inclusive agriculture value chain financing [Indonesia, Myanmar, Vietnam] (AGB/2016/163)
3. International Mungbean Improvement Network 2 [Bangladesh, India, Indonesia, Kenya, Myanmar] (CROP/2019/144)

Philippines

A$4.47 million
Budgeted funding

14
Bilateral and regional research projects

1
Small projects and activities

The Philippine economy is steadily recovering from the 9.5% contraction in 2020 brought about by natural disasters such as volcanic eruptions and strong typhoons, and the COVID-19 pandemic. The Philippines was heavily impacted by one of the world's longest and strictest enforced periods of community quarantine, which led to many businesses shutting down, increased unemployment and loss of income among workers in the informal sector, and a reduction in domestic consumption and purchasing power.

In 2021, with the calibrated reopening of businesses and mass transportation and the relaxation of quarantine restrictions, economic activities gradually resumed, resulting in a 5.6% economic growth, moving closer to the pre-pandemic average growth rates over the last decade of about 6%. While the agriculture sector remained resilient in early 2020, the lingering African swine fever and many strong typhoons have eroded the gains and made recovery efforts challenging.

Food insecurity remains a significant issue for the poorest and most vulnerable. To address this, the Philippine government is working on increasing food sufficiency levels through various initiatives such as the Rice Competitiveness Enhancement Fund, loan programs and farm-to-market assistance and disease management.

The Department of Science and Technology – Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST–PCAARRD) is the main government partner of ACIAR in the Philippines. In support of national efforts to mitigate the impacts of the pandemic on agriculture and food systems, PCAARRD initiated a COVID-19 response program, GALING-PCAARRD, which assists communities around the country through technology information sharing, food product distribution, and provision of food production technologies and livelihood opportunities. It also focuses on enabling innovative research and development and integrating the different DOST agencies' initiatives in partnership with the State Universities and Colleges to enhance the food value chain for selected commodities in the regions towards food resilience.

Since the launch of the National Food Policy in January 2021, which directed all public-led initiatives related to hunger, food security, nutrition and sustainable agriculture, to be well coordinated and responsive across national and regional levels, there have been modest improvements in the hunger rate from 21.1% in 2020 to 11.8% by the end of 2021. The Inter-Agency Task Force for Zero Hunger created a roadmap that addresses the fragmented agriculture supply chain prone to disruptions, massive food waste, huge losses for farmers, higher costs and lower quality for consumers. However, while these efforts are laudable, there is still a lot to be done to further reduce hunger rates to pre-pandemic levels and, ultimately, end hunger.

The Philippines is one of Australia's longest-standing bilateral relationships, celebrating 76 years of diplomatic relationship in 2022. Bilateral cooperation is underpinned by the Philippines–Australia Comprehensive Partnership and the Philippines–Australia General Agreement on Development Cooperation. As one of the major bilateral partners for the Philippines, Australia remains committed to collaborate with the Philippine Government on recovery efforts and the country's development.

Country priorities

ACIAR has worked with the Philippine Government, research and academic institutions, private sector and civil society partners for 4 decades, governed by the Memorandum of Agreement for Philippine–Australian collaboration in agriculture and forestry research. Country partnerships have evolved in recent years with significant co-investment from our main bilateral partner, DOST-PCAARRD, and with a deepening of the partnership as defined in the 2018 Record of Partnering Arrangements between PCAARRD and ACIAR for Scientific and Technical Cooperation for Agriculture, Aquatic and Natural Resources.

Our program in the Philippines focuses on research to make agricultural products more marketable and internationally competitive and to build the resilience of smallholder farmers, fishers and their households from impacts of natural disasters, climate change and external shocks such as the COVID-19 pandemic. Higher-value products and market competitiveness would improve food security by enabling smallholder farmers and traders to increase their income and access to other basic services and economic opportunities.

We work with the Philippine Government to progress the Harmonised National Research and Development Agenda for Agriculture, Aquatic and Natural Resources to promote prosperity, reduce poverty, and enhance stability. We do this through research for development that aims to:

- improve agriculture and food production systems
- make agricultural products more competitive in the market
- enable competitive and sustainable fisheries and aquaculture
- improve land and water resource management for profitable and sustainable agriculture
- build resilience to climate change and other natural shocks
- increase adoption of technology through community engagement, enabling extension services and support to policy development.

These priorities remain relevant, and the underlying issues have been compounded considering the COVID-19 pandemic.

The ACIAR program in the Philippines focuses on research to make agricultural products more marketable and internationally competitive and to build the resilience of smallholder farmers, fishers and their households. Photo: Ryam Yap

During 2020, ACIAR examined food systems in the Philippines to identify vulnerabilities exposed or amplified by the COVID-19 shock. This information, published in ACIAR Technical Report 96 *COVID-19 and food systems in the Indo-Pacific: An assessment of vulnerabilities, impacts and opportunities for action*, continues to be relevant in informing research and development to support food systems resilience in the Philippines. In particular, the assessment helped identify focus areas for research collaboration in the Philippines that will contribute to increasing food systems resilience in the face of future shocks.

Capacity building is closely linked to our research initiatives. Opportunities include the John Allwright Fellowship, the John Dillon Fellowship, the Meryl William Fellowships and other initiatives under the alumni engagement plan. Each program focuses on leadership and career development through short and medium-term support for Philippine partners. In August 2022, ACIAR and the Department of Science and Technology (DOST) entered into a new partnership to pilot a joint fellowship program with co-investments from both organisations to send Filipino researchers to Australia for their PhD.

In recent years, ACIAR has introduced innovations to deliver our learning and development programs. One example is the Philippine Agribusiness Masterclass, which successfully brought together a cohort of researchers, academics, farmer leaders and representatives from the private sector to collaborate. This course has now been integrated as a regular course offering of the DOST-PCAARRD, with a second cohort starting in the program last August 2022. In 2021, the John Dillon Fellowship was redesigned and is currently being delivered in-country to a cohort of up to 20 participants with a strong focus on cross-organisational collaboration and strengthening ties with Australian collaborators. The first in-country fellowship program commenced in the Philippines in May 2021, with participants from key government and research partners. The fellows are currently focused on their research projects which are expected to be completed before the end of 2022.

Australian Alumni play an important role as partners in research for development. ACIAR supported the establishment of the first Agriculture, Aquatic and Natural Resources Community of Practice in the Philippines in 2022, with an initial membership of 27 ACIAR alumni who are committed to 'best fit' solutions and approaches to the challenges in the sector.

Outreach and communications are increasingly important as a means to strengthen understanding and awareness of the impact of our programs as part of Australia's aid program in the Philippines, to support and strengthen relationships between in-country project partners and stakeholders and to share knowledge generated from ACIAR supported research programs to the public and policymakers.

2022–23 research program

- **15 ACIAR-supported projects in the Philippines**
- **9 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 the Philippines. The projects are grouped according to research program. Each project description is referenced in a list at the end of this section, which provides the project title and code.

Agribusiness

Economic growth across South-East Asia has resulted in a growing urban middle class. This growth in affluence is driving demand for dairy-based products, and national dairy markets are growing rapidly. The increase in domestic dairy consumption in Indonesia and the Philippines presents an opportunity for significant growth in domestic dairy farming sectors, particularly for smallholder dairy farmers. A new project led by Dr Brad Granzin of Australasian Dairy Consultants aims to develop and pilot commercially viable, sustainable smallholder-inclusive dairy value chains. The project will capitalise on the growing domestic demand for short shelf-life dairy products and collaborate with partners to develop interventions to improve farm productivity, product quality and availability, and supply chain efficiencies.[1]

ACIAR-supported research in the southern Philippines showed that integrating vegetable and coffee value-chain development and community engagement leads to improved innovation, competitiveness, quality and value. However, success occurred at very local scales and, in general, most smallholder horticulture growers in the Philippines cannot compete in higher-value, more-demanding markets. A project led by Dr Lily Lim-Camacho of CSIRO will identify opportunities for inclusive agribusiness-led market development, evaluate opportunities for digital technologies to increase competitiveness and farm-to-market linkages, and evaluate models for public–private learning alliances and innovative co-investment with agribusiness firms. In 2022–23, researchers will conduct participatory community and vegetable and coffee farming systems analysis.[2]

Fisheries

In the Philippines, the successful restoration of damaged coral reefs in experimental plots has led to notable increases in reef fish abundance and fish species richness, compared with control plots where coral was not restored. A project led by Professor Peter Harrison of the Southern Cross University has established rigorous protocols and long-term monitoring and evaluation of the impacts on fish communities and other reef resources from coral restoration in the northern Luzon region. The project concludes in 2022 with training courses for local communities, reef managers and researchers to build capacity for future fish surveys, reef restoration programs and best-practice reef fisheries management.[3]

Previous ACIAR research partnerships successfully demonstrated rapid coral population recovery, re-establishment of breeding populations and increased fish abundance from larval coral restoration interventions. Professor Peter Harrison of the Southern Cross University leads a 5-year project to significantly increase the scale of restoration interventions. Techniques established in previous projects will be refined for application in large-scale restoration trials in 4 regions of the Philippines. Trials will be monitored to quantify coral reproduction success. In 2022–23 the project team will continue working with communities, researchers and local governments to establish coral restoration networks in the trial regions to support local restoration activities. Heat-stress experiments will be conducted to quantify larval production, settlement and recruitment rates to identify heat-tolerant adult coral genotypes that are resilient under future climate-change scenarios.[4]

Coral reef ecosystems provide important livelihood opportunities to coastal communities in the Philippines, but they are threatened by climate change, overfishing, destructive fishing practices and pollution. While the success of coral restoration using larval reseeding techniques has been confirmed by previous and ongoing ACIAR-supported projects, significant challenges remain regarding the integration of this technology with existing maritime policy and governance to ensure the sustainability of restored reefs. Associate Professor Michael Fabinyi of the University of Technology Sydney leads a project funded by DFAT that aims to improve the institutional effectiveness of coral reef restoration by understanding political-economic influences and drivers at multiple scales, and applying lessons learned through a marine governance network-based approach.[5]

Dried sea cucumbers are highly valued in markets across China and South-East Asia. Overfishing and poor fisheries management throughout the Asia-Pacific region have resulted in serious declines of sea cucumber stocks and even led to fishery closures, reducing income-generating opportunities for coastal communities. A project led by Professor Paul Southgate of the University of the Sunshine Coast is developing culture methods that support pond-based sea cucumber farming in Vietnam and sea-based farming in the Philippines. In 2022–23 activities will include assessing potential predator mitigation measures, continuing field experiments and developing protocols for the responsible use and transfer of sandfish.[6]

Dried sea cucumbers are highly valued in markets across China and South-East Asia. A project led by the University of the Sunshine Coast is developing culture methods that support sea cucumber farming in the Philippines and Vietnam. Photo: Mark Anthony Perandos

Horticulture

Fusarium wilt tropical race 4 (TR4), or Panama disease, has become widespread throughout South-East Asia. The disease is threatening smallholder banana production in Indonesia, the Philippines and, more recently, Laos. A project led by Dr Anthony Pattison of the Queensland Department of Agriculture and Fisheries aims to develop an integrated management response to the spread of the disease. The research will investigate the effects on banana production of altering the banana microbiome to suppress disease and increase plant resistance. During 2022–23, the project team will analyse completed field surveys of production systems and natural environments, and there will be ongoing development and training in statistics and experimental procedures for glasshouse and field experiments.[7]

About 40 tropical fruit fly species damage horticultural crops and impede trade throughout South-East Asia. A project in Indonesia and the Philippines builds on the success of previous ACIAR projects, and links to fruit-fly work in other ACIAR partner countries and Australia. The project, led by Mr Stefano De Faveri of the Queensland Department of Agriculture and Fisheries, aims to reduce fruit-fly infestation of mango crops through area-wide management of the pest, and improve pre-harvest and post-harvest practices. The ultimate aim is to improve the yield and quality of crops in order to improve livelihoods and trade opportunities. During 2022–23, focus areas for the project include training farmers and other stakeholders in area-wide management techniques, evaluation of techniques implemented in the field, and integration of techniques into best management practice.[8]

Vegetable consumption is low in the Philippines for several reasons, including the perception that vegetables are of poor quality and unsafe. Vegetable farmers are not well trained in the appropriate use of pesticides, resulting in pesticide residues above permissible limits in harvested crops, exposure of farm workers to pesticide poisoning and contamination of soil and water. Dr Gordon Rogers of Applied Horticultural Research leads a project to improve vegetable supply chains to meet consumer expectations in terms of quality, food safety, nutritional value and price. During 2022–23, the project will continue to measure the social and economic impact of adopting new vegetable good agricultural practice (GAP) protocol and continue training key support personnel, including leading farmers.[9]

Mango production in the Asia-Pacific region accounts for about two-thirds of global production. Much of the crop is produced by smallholders, who achieve relatively modest yields and participate in traditional value-chain arrangements that offer little incentive to innovate or pursue higher quality. Some producers seek better returns by supplying higher-value export markets (such as Korea), but struggle to deliver fruit that meets market or regulatory standards. Dr Muhammad Sohail Mahzar of the Northern Territory Department of Primary Industry and Fisheries Industry, Tourism and Trade will lead a new project in Cambodia and the Philippines that aims to improve the ability of selected mango supply chains to deliver fruit that better meets consumer expectations of quality and value, and provide smallholder growers with a better return on investment.[10]

Livestock Systems

A new project will be established in Indonesia, Laos and the Philippines during 2022–23, as part of the ACIAR–IDRC Research Program on One Health. Led by the University of the Philippines (Los Banos), the project will investigate the potential to enhance livestock production systems in South-East Asia using an EcoHealth/One Health approach (page 24).[11]

The University of the Philippines will also lead a second project in the program to develop a policy approach to support the Philippines' national surveillance and control programs for African swine fever, avian influenza and antimicrobial resistance.[12]

Social Systems

More than 24 million people in the Philippines, most of whom live below the poverty line and rely on subsistence agriculture, especially in the country's rural uplands. Deforestation and land degradation in the uplands are major national environmental and social issues. A project led by Dr Nestor Gregorio of the University of the Sunshine Coast focuses on forest landscape restoration to enhance the livelihoods of low-income residents of rural areas. During 2022–23, information from pilot testing of designs for woodlots, agroforestry systems and woodlot/crop systems suited to smallholders and communities will be used to produced manuals on smallholder-based tree-crop farming systems. Guidelines also will be published to assist the formulation of forest and landscape restoration policy within the Asia-Pacific region.[13]

Soil and Land Management

Rubber is the fourth largest crop in the poorest province of the southern Philippines, Agusan del Sur. Only 50% of the total rubber area planted is productive or tappable, and average yield in the province is much lower than the national average. By introducing improved profitable rubber-based intercropping systems and sustainable management regimes, a project led by Professor Chengrong Chen of Griffith University aims to boost household incomes for Indigenous smallholder subsistence farmers. During 2022–23, the project team will finalise intervention strategies to ensure gender equity, report on the best nutrient and fertiliser management schemes for increasing soil fertility, and continue delivering capacity building activities to promote resilient market-oriented rubber-based intercropping systems with low risk and high productivity and profitability.[14]

Vegetable production systems of upland farming areas of the Philippines are intensively managed and suffer problems including severe soil acidity, undiagnosed micronutrient deficiencies, excessive accumulation of copper and zinc, excessive application of fertilisers and manures, and erosion. Serious soil-borne pathogens also affect productivity in these intensive farming systems. Dr Stephen Harper of the University of Queensland leads a new project to develop management strategies that mitigate, remediate and reduce the risks of contaminants in soils across 3 major vegetable production regions. The project starts with research to provide a clear understanding and validation of the current soil nutrient status, including excesses and deficiencies, and potential short-term and long-term impacts of accumulation of essential heavy metals, particularly copper and zinc, on vegetable production.[15]

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Soil and Land Management: Dr James Quilty

See page 186 for contact details.

Current and proposed projects

1. Evaluating supply chain interventions and partnerships to sustainably grow the smallholder dairy sectors of Indonesia and the Philippines (AGB/2021/124)
2. Agribusiness-led inclusive value chain development for smallholder farming systems in the Philippines (AGB/2018/196)
3. Baseline monitoring and evaluation of long-term impacts on fish stocks from coral restoration [Philippines] (FIS/2018/128)
4. Regional coral restoration networks and appropriate technologies for larger-scale coral and fish habitat restoration in the Philippines and Australia (FIS/2019/123)
5. Institutional effectiveness and political economy of coral reef restoration in the Philippines (FIS/2021/112)
6. Increasing technical skills supporting community-based sea cucumber production in Vietnam and the Philippines (FIS/2016/122)
7. An integrated management response to the spread of *Fusarium* wilt of banana in South-East Asia [Indonesia, Laos, Philippines] (HORT/2018/192)
8. Development of area-wide management approaches for fruit flies in mango for Indonesia, Philippines, Australia and the Asia-Pacific region (HORT/2015/042)
9. Developing vegetable value chains to meet evolving market expectations in the Philippines (HORT/2016/188)
10. Improving mango crop management in Cambodia, the Philippines and Australia to meet market expectations (HORT/2016/190)
11. Livestock enhancement through EcoHealth/One Health assessment in South-East Asia (ACIAR–IRDC One Health Research Program) [Indonesia, Laos, Philippines] (LS/2022/163)
12. Policy support to the Philippines' national surveillance and control programs for African swine fever, avian influenza and antimicrobial resistance: A One Health systems approach (ACIAR–IRDC One Health Research Program) (LS/2022/162)
13. Enhancing livelihoods through forest and landscape restoration [Philippines] (ASEM/2016/103)
14. Land management of diverse rubber-based systems in the southern Philippines (SLAM/2017/040)
15. Managing heavy metals and soil contaminants in vegetable production to ensure food safety and environmental health in the Philippines (SLAM/2020/117)

Timor-Leste

A$1.98 million
Budgeted funding

5
Bilateral and regional research projects

1
Small projects and activities

Before the COVID-19 pandemic, food systems in Timor-Leste were already under stress from many factors, including seasonally recurring food shortages, input supply challenges, low productivity, pests and diseases, and limited access to capital. As the situation is now stabilising, ACIAR will establish a new long-term partnership with Timor-Leste to help develop the research system for the benefit for the rural poor. The partnership will be strengthened by the opening of an ACIAR Country Office in Dili, in mid-2022.

While Timor-Leste has made strong progress in recent years, some development indicators remain stubbornly entrenched. With 70% of the population living in rural areas, there is a heavy reliance on incomes from semi-subsistence and seasonal food cropping, mixed with small-scale animal husbandry and varying degrees of foraging for wild crops and game. Despite many recent improvements in a range of essential services, there is a high prevalence of poverty, with more than 50% of the population facing some level of food and food nutritional insecurity. Improving productivity, diversity and returns from agriculture, livestock and fisheries, as well as the functioning of food systems, will remain crucial to overcoming these challenges, with the aim for rural populations to generate sufficient reliable income from agriculture to improve their living conditions and livelihood opportunities.

The reasons for constrained on-farm crop and animal production and productivity are complex and varied. They include highly variable weather conditions affecting crop establishment and subsequent yields, infertile soils, limited availability of and access to agricultural inputs (especially given a weak private sector), low capital for investment, pests and insects causing crop losses pre-harvest and post-harvest, labour constraints at critical times and limited market demand for agricultural products beyond local consumption. Critically, lack of access to credible, locally relevant and implementable science-based advice is a key constraint cutting across all areas.

Country priorities

Since 2001, ACIAR has had a strong program of projects in Timor-Leste, some of which have been long-term (such as Seeds of Life). The time is now right to pivot our relationship to one based on a research partnership between the two countries, not just a series of projects. To achieve this, ACIAR has opened a country office in Dili and during 2022–23 will work with key partners in Timor-Leste to establish the basis of the new and long-term partnership, using as a starting point the analysis of food systems vulnerabilities published in November 2020. This identified opportunities for future research to contribute to the greater resilience of Timor-Leste food systems, including:

- improved social protection measures for vulnerable households
- a renewed focus on the productivity of smallholder agriculture with gradual intensification and improved feed and biosecurity regimes
- greater efforts to expand private sector market developments and increase employment
- greater focus on education and relevant technical training to increase the availability of skilled graduates.

The opportunities for ACIAR to support these priorities will be investigated in more detail this year. Focus sectoral areas may include research in coastal fisheries, agroforestry, livestock (especially cattle and poultry) and cropping systems, as well as seeking opportunities for trilateral research collaboration with Indonesia.

2022–23 research program

- **6 ACIAR-supported projects in Timor-Leste**
- **4 projects are specific to this country**
- **2 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 Timor-Leste. 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

Many rural households in Timor-Leste do not generate sufficient reliable income from agriculture to improve the living conditions and livelihood opportunities of their families. A new project, led by Associate Professor Louise Barton of the University of Western Australia, will build on previous ACIAR-funded projects to improve productivity of agricultural systems by introducing accessible technologies and improved agronomic practices to overcome soil-related constraints and increase opportunities for diversification and intensification. At the core of the project is capacity development of in-country partners in research practice, research management and agronomic extension services, as well as the development and implementation of business models supporting biochar. The assessment of the viability of sandalwood for smallholders in Timor-Leste will continue, including making recommendations related to barriers to recognising the value of this asset.[1]

The ACIAR program in Timor-Leste will identify opportunities to contribute to the resilience of food systems, such as gradual intensification and improved biosecurity of smallholder agriculture, and greater efforts to expand private sector markets.

Fisheries

Globally, growing momentum for nutrition-sensitive agricultural policy and development assistance is yet to have any impact on the small-scale artisanal fishery sector. To address this, the role and contribution of fish to livelihoods and nutrition security must be supported by rigorous data and communicated at global, national and local scales. A project in Timor-Leste and the East Nusa Tenggara province of Indonesia aims to identify the livelihood and nutrition benefits of fisheries and test nutrition-sensitive co-management systems for inshore fisheries. Led by Dr David Mills of the WorldFish Center, the project will evaluate the nutritional value of fisheries to households, identify the factors enabling or limiting fish consumption, and highlight the potential of fish to reduce malnutrition, particularly during early childhood. In 2022–23 activities will include data collection to understand household livelihood structures and decision-making and community training in healthy diets and child nutrition.[2]

Fish-based livelihoods play a critical role in the economies of coastal communities in Solomon Islands and Timor-Leste, and participation in catching, processing or trading of fish is an important pathway to poverty reduction. A project led by Dr Hampus Eriksson of the University of Wollongong will identify and support community-identified opportunities for innovation within the coastal fisheries post-harvest sector, focusing on income benefits. This new approach addresses the historic lack of success at the community level of large state-led investments in fisheries sector infrastructure and advanced technologies. It seeks to influence policy on how fisheries institutions can support remote communities through appropriate community-led infrastructure and skill development investments. In 2022–23 activities will include monitoring fish distribution and marketing, documenting livelihood experiences and building the capacity of women in safe aquatic food handling practices.[3]

Livestock Systems

There is a growing body of evidence highlighting a causal linkage between foodborne illness due to enteric bacterial infections and malnutrition. Children exposed to damaging enteropathies at an early age may have little chance at realising their full development potential, despite improved diets later in life. Studies in Timor-Leste highlighted the need to better consider the role of food safety in food systems thinking, particularly in the Pacific region where increased consumption of animal-source protein is promoted to address childhood malnutrition and stunting. A new project led by Dr Samantha Colquhoun of the Australian National University, will investigate infant and child dietary practices, food safety and environmental hygiene in relation to community poultry production, with a focus on the risk of *Campylobacter* and *Salmonella* infection. The research will be supported by targeted interventions in urban and rural settings through a One Health approach.[4]

A new project will be established in Timor-Leste during 2022–23, as part of the ACIAR–IDRC Research Program on One Health. Led by the Menzies School of Health Research, the project aims to develop strategies to reduce brucellosis transmission in Timor-Leste based on One Health collaboration (page 24).[5]

Soil and Land Management

A small research activity led by Dr Leigh Vial of Charles Darwin University forms the first stage of a planned large-scale project to improve smallholder farm and livelihood productivity in Timor-Leste. The research will provide an understanding of the biophysical and socioeconomic characteristics of the prospective areas for further targeted research, including an assessment of food security and sovereignty, relevant technical assistance histories, current development status and outlook of each location. These indicators will inform the future design, development and implementation of interventions, technologies and initiatives aimed at lifting rural productivity and resilience in ways that align with expressed community interests.[6]

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Mr Luis de Almeida

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Livestock Systems: Dr Anna Okello
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See page 186 for contact details.

Current and proposed projects

1. Agricultural Innovations for Communities - Intensified and Diverse Farming Systems for Timor-Leste (AI-Comm 2) (CROP/2021/131)
2. A nutrition-sensitive approach to fisheries management and development in Timor-Leste and Nusa Tenggara Timur Province, Indonesia (FIS/2017/032)
3. Innovating fish-based livelihoods in the community economies of Timor-Leste and Solomon Islands (FIS/2019/124)
4. Bacterial enteropathy and nutrition study in poultry [Timor-Leste] (LS/2021/126)
5. Developing strategies to reduce brucellosis transmission in Timor-Leste based on One Health collaboration (ACIAR–IRDC One Health Research Program) (LS/2022/161)
6. Evaluation of livelihood zones, rural household trajectories, research and development partners and initiatives in Timor-Leste (SLAM/2021/108)

Vietnam

A$5.02 million
Budgeted funding

18
Bilateral and regional research projects

7
Small projects and activities

The Vietnam agriculture sector gained an impressive annual growth rate of 2.9% in 2021, higher than the economy's overall growth of 2.6%. Vietnam has set high ambitions and a strong vision for its agricultural development, but obstacles to reaching those targets remain.

In 2021, the COVID-19 pandemic severely impacted all socio-economic aspects of Vietnam. While many sectors experienced disruptions and adverse outcomes, agricultural production continued to maintain and actively contribute to the country's stability and food security. It also contributed impressively to export revenue and proved to be one of the strongest pillars of the economy.

Vietnam has a stated ambition to become a country with world-class agriculture, prosperous rural areas, modern infrastructure, efficient use and sustainable protection of agricultural resources, and resilience to climate change. In agriculture specifically, Vietnam aims to be in the top 15 agricultural developed countries and rank tenth in agricultural processing technology by 2030. To achieve these goals, Vietnam has prioritised focusing on export commodities that meet good agricultural practices and other quality standards and by value-adding to products through new technologies.

In February 2022, Vietnam launched a national strategy for sustainable agriculture and rural development, Vietnam Issues Green Growth Strategy 2021–2030 Vision to 2050. The Strategy is an important policy document for Vietnam's economic growth and sustainable development, with specific goals related to reducing greenhouse gas emissions. The plan aims to retain forest cover at 43% and apply advanced water-saving irrigation methods to at least 60% of the total irrigated dry crop area. At COP26, Vietnam committed to a 30% reduction in methane emissions by 2030. This will translate directly into options to reduce methane emissions from rice production and livestock and opportunities for carbon storage in forestry, agroforestry and soils.

The strategy also maps out foundations for re-organising production to further develop agriculture and rural areas and increase climate change resilience in the sector. By 2050 Vietnam is expected to have a modern, efficient and environmentally friendly agriculture and developed rural areas with residents' living conditions and incomes matching those of the urban area.

One Health is an area of increasing interest involving agriculture in Vietnam. Vietnam's One Health Partnership framework for zoonoses, for the 2021–25 period, aims to minimise the risk that zoonotic pathogens and environmental agents will cross species barriers and reduce the occurrence of antimicrobial resistance in human and animal pathogens by improving multi-sectoral One Health collaboration in Vietnam.

Within that context, Vietnam sees research-for-development (especially the application of 4.0 technology) as the key to achieving its ambitions to improve efficiency and productivity and increase the competitiveness of agricultural products. Research for rural development continues to be vital, especially linking poorer rural areas to exports. The main challenges to achieving these ambitions in the coming years remain to be climate change, water shortage, soil degradation, lack of market access for agricultural produce and development gaps of ethnic minorities and women in rural areas.

Country priorities

ACIAR has sustained a program of research collaboration with Vietnam for the past 28 years. The strategy for research collaboration between Vietnam and ACIAR from 2017 to 2027 was developed on the basis of mutual acknowledgment that the relationship between ACIAR and Vietnam has evolved from donor–recipient to partnership, co-investment and, possibly, through this period, to trilateral collaboration. The strategy confirms the desire of both parties to join with the private sector wherever possible to create opportunities for poorer residents in rural and urban areas through inclusive agribusiness systems. It also focuses on transformational opportunities for women in research and agribusiness systems and on farms.

The key ambitions of the strategy are to:

- improve the capacity of Vietnamese researchers, research managers and development partners to support sustainable and equitable farming and livelihood systems in the Mekong River Delta, Central Highlands and Northwest regions and in the fisheries and aquaculture sector
- improve the skills, livelihoods and incomes of smallholder farmers, including ethnic minorities in the mountainous areas of the Central Highlands and Northwest regions, supported by knowledge networks that allow profitable engagement in domestic and international markets
- improve human health and nutrition through research on integrated farming systems, nutrition-sensitive agriculture and One Health
- improve the quality and safety of meat, fish, vegetables and fruit for domestic consumption
- develop a deeper knowledge of markets to help prevent and reduce economic shocks for participants in agricultural supply chains
- reduce inputs of chemicals and fertiliser for a cleaner environment, safer produce, improved soil health and more-profitable sustainable production systems
- improve resource use efficiency to produce more food with fewer resources
- implement practices and inform policymakers to manage climate-change impacts on agriculture.

In June 2022, Vietnam and ACIAR reaffirmed these priorities as being the key focus for our partnership. We also reaffirmed the commitment to:

- co-fund 75% of projects during the 10-year period
- develop research into climate change, especially drought-tolerant cropping systems in the Mekong River Delta and the Central Highlands, and saline-cropping systems for the Mekong River Delta.

2022–23 research program

- **25 ACIAR-supported projects in Vietnam**
- **13 projects are specific to this country**
- **12 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 Vietnam. 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.

The strategy for research collaboration between Vietnam and ACIAR (2017–27) is based on partnership and co-investment, the intention to partner with the private sector wherever possible to create opportunities for poorer residents in rural and urban areas through inclusive agribusiness systems.

Agribusiness

Cassava witches' broom disease and Sri Lanka cassava mosaic virus are spreading rapidly in South-East Asia. A project led by Dr Jonathan Newby of the International Center for Tropical Agriculture is developing technically viable and economically and socially sustainable ways to improve the resilience of cassava production systems and value chains in Cambodia, Laos, Myanmar and Vietnam. The project will conclude in 2023 with researchers continuing on-farm testing of new agronomic practices and training of farmers and extension officers. The project team will also finalise their investigation of alternative models for public-private funding for core activities.[1]

Catfish (*Pangasius* sp) farming and wild-caught catfish are important income generating activities for smallholder farmers in the Mekong River Basin and are a vital source of dietary protein for those countries' populations. The continued availability of catfish for human consumption is influenced by many factors including climate change, the COVID-19 pandemic, consumer perceptions on food and health safety provenance, and environmental and political changes. Dr Van Kien Nguyen of the Health and Agricultural Policy Research Institute leads a new project in Cambodia, Laos and Vietnam to identify food loss and waste along the catfish value chain; conduct foresight exercises to determine the uncertainties of catfish production for food systems; and develop solutions to reduce food loss in catfish production. This project is part of the ACIAR–IDRC Food Loss Research Program (page 24).[2]

Smallholder farmers in South-East Asia often cannot access credit to invest in new crops or technologies, deal with risks and shocks, and safely carry wealth from harvest to planting. To help smallholders reach their production potential, a project led by Dr Alan de Brauw of the International Food Policy Research Institute aims to increase knowledge about how to design and implement innovative and inclusive agricultural value chain financing models in South-East Asia. During 2022–23, the project will analyse data to determine the impact of the project in each country and produce initial scientific reports and policy papers.[3]

Unmanaged expansion of coffee and pepper production in the Central Highlands region has resulted in deforestation and production on unsuitable land. Increasingly, the region is subject to the impacts of climate change, with increasing temperatures and erratic rains. There has also been misuse and overuse of mineral fertilisers, irrigation water and synthetic pesticides. A project led by Dr Estelle Bienabe of the World Agroforestry Centre aims to enhance smallholder livelihoods, including vulnerable populations, by improving the sustainability of coffee and black pepper farming systems and value chains. In 2022–23, researchers will evaluate integrated farming practices in on-farm trials to inform farming system design, initiate simple practice changes, and assess barriers to adopting recommended good farming practices.[4]

About 1.5 million smallholder farmers in the Mekong River Delta region rely on rice for their livelihood. Rice is grown on small farms, with 2 or 3 crops produced each year. The industry faces issues such as reduced returns to farmers, soil degradation, environmental pollution and declining seed purity and grain quality. In 2017, the Government of Vietnam developed a policy to encourage reduced total rice production and a focus on high quality, with the aim of exporting to premium markets. A new 4-year project, led by Dr Jaquie Mitchell of the University of Queensland, aims to establish a highly productive, sustainable, traceable and quality-assured value chain for tropical medium-grain rice in the Mekong River Delta for the benefit of rice-farming households and to meet established market requirements of the partnering global marketer. The project is a public private partnership, co-funded by ACIAR and Ricegrowers Limited, an Australian company operating a recently refurbished state-of-the-art rice mill in the Mekong Delta and global markets for higher value specialty rice products.[5]

A new project led by Dr Stephen Ives of the University of Tasmania will investigate new collaborative approaches between smallholder farming households and commercial intensive agricultural systems with a focus on beef supply chains. The project aims to establish and pilot best practice smallholder inclusive business models based on these new approaches. These new approaches and business models will be mutually beneficial, enabling improved livelihoods for smallholder farming households and improved productivity and performance for commercial supply chains in Vietnam.[6]

Previous ACIAR-funded projects helped establish a new safe vegetable industry in the Son La province of Northwest Vietnam, worth A$70 million per year. The new value chain follows the VietGAP quality assurance protocol and supplies a range of vegetables to modern retail and traditional markets, mainly in Hanoi. However, challenges remain along the value, the most significant being traceability, compliance with VietGAP and product quality. A small research activity, led by Dr Gordon Rogers of Applied Horticultural Research, will develop and pilot low-cost digital tools (such as QR codes, temperature sensors and GPS locators) to help small and medium-sized vegetable farmers, and other value chain participants, to improve VietGAP compliance and manage the quality and safety of vegetables delivered to market.[7]

Climate Change

Australia is a world leader in greenhouse gas mitigation research in agriculture. This project assists Vietnam in strengthening its national greenhouse gas accounting systems to identify, quantify and report on rice management options that reduce emissions. Led by Professor Peter Grace of Queensland University of Technology, the project team will work with government institutions in Vietnam and will help grow capability in the data management, analyses, reporting and cross-Ministerial governance needed to support current and future emissions reduction commitments under the Paris Agreement. The team will also collaborate with a number of others who are working to support development of Vietnam's greenhouse gas inventory systems.[8]

The impact of climate change on the Mekong River Delta's coastal areas is such that current food production systems, particularly shrimp aquaculture, are already unsustainable and increasingly at risk. Mangrove poly-culture systems have the potential to provide a large-scale alternative, expanding inland as sea-level rise and extensive inundation with sea water increase. They can also contribute to carbon sequestration and support the national government's priorities for growing modern agribusinesses in the delta region. Led by Dr Pham Thu Thuy of CIFOR, in collaboration with Can Tho University and CSIRO, a new project will work alongside existing restoration efforts, building the capacity of farmers, governments and development partners to maximise the success of current mangrove-based food production and co-developing pathways for a more transformative approach linked to agri-business development.[9]

Fisheries

Floodplain development and the regulation of river flows for rice production across South-East Asia are affecting fisheries and fish migration, and the livelihoods of communities that depend on fish for protein and trade. Previous ACIAR-supported research showed that integrating fishways into water regulator designs, allowing passage of migratory fish up and down regulated rivers, can have lasting economic and social benefits for river communities. Professor Lee Baumgartner of Charles Sturt University leads a project to establish a stakeholder network to facilitate sound, cross-sector decision-making on fish passage construction programs across South-East Asia. During 2022–23, researchers will continue gathering data on fish migration and undertake an international review of draft guidelines and curriculum for a specially designed Graduate Certificate in Fisheries. An additional DFAT investment aims to broaden the projects outcomes to include scaling of fish passage technologies across Mekong countries.[10]

Dried sea cucumbers are highly valued in markets across China and South-East Asia. Overfishing and poor fisheries management throughout the Asia-Pacific region have resulted in serious declines of sea cucumber stocks and even led to fishery closures, reducing income-generating opportunities for coastal communities. A project led by Professor Paul Southgate of the University of the Sunshine Coast is developing culture methods that support pond-based sea cucumber farming in Vietnam and sea-based farming in the Philippines. In 2022–23 activities will include assessing potential predator mitigation measures, continuing field experiments and developing protocols for the responsible use and transfer of sandfish.[11]

Australia's Commission for International Research and Policy Advisory Council, and ACIAR staff visited a mangrove area in Soc Trang province during their in-country annual meeting in Vietnam, June 2022, to view mangrove poly-culture systems, which are potentially a large-scale alternative to traditional shrimp aquaculture systems that are increasingly at risk to the impacts of climate change. Photo: Patrick Cape

Marine bivalves, such as mussels, clams and oysters, are known to sequester carbon in their shells. There is interest in the potential for bivalves to mitigate the effects of climate change. In northern Vietnam, a small research activity led by Dr Sarah Ugalde of the University of Tasmania examines the role of the Portuguese oyster (*Crassostrea angulata*) aquaculture industry in the carbon cycle and rates of carbon sequestration. This new information will be used to evaluate the potential value for oyster carbon farming to reduce climate-change impacts through shell recycling and value-adding, including using carbon crediting mechanisms.[12]

Hybrid grouper farming is Vietnam's most profitable marine fish aquaculture sector, involving over 400 hatchery operators and grow-out farmers. The Directorate of Fisheries aims to increase small and medium enterprises in marine aquaculture, but the hybrid grouper sector is constrained by its reliance on a nutritionally poor and variable supply of 'trash' fish. Farmers report they are willing to use more sustainable, cost-effective formulated feeds, but a lack of data on suitable feed formulations has constrained development. A project funded by DFAT and led by Dr Leo Nankervis of James Cook University will deliver nutritional data required to formulate cost-effective feeds that promote superior growth and survival and so attract smallholder farmers to switch to formulated feeds. Cooperation with large feed mills in Vietnam's private sector will support the local supply of cost-effective diets for hybrid grouper and underpin broad-scale adoption of commercial pelleted feeds.[13]

A project funded by DFAT and led by James Cook University is determining the nutritional data required to formulate cost-effective feeds for hybrid groupers to promote superior growth and survival. Photo: Khanh Long

Unique among Pacific island countries is the production of half-pearls, or mabé, in Tonga from the winged pearl oyster. Although half-pearls are generally less valuable than round pearls, an individual oyster can produce multiple half-pearls (unlike round pearls). With appropriate training, pearl production can be accomplished by community members over a 10-month culture period, compared to approximately 2 years for round pearls. Professor Paul Southgate of the University of the Sunshine Coast completes a project in 2023 that is supporting further expansion of community-based pearl farming and handicraft production in Tonga and demonstrating the feasibility of similar development in Vietnam.[14]

Forestry

A project with activities in Indonesia and Vietnam will underpin good plant biosecurity practices in forestry. Led by Dr Caroline Mohammed of the University of Tasmania, researchers will work with government and industry partners to extend screening approaches developed for the fungus *Ceratocystis* in acacia to eucalypts, which have replaced acacias in plantations in areas of the wet tropics. Researchers will develop remote-sensing software applications for cheap and rapid forest health surveillance and, through geospatial modelling, deliver risk maps under current and future climates at a regional level for the highest-priority pests and pathogens. In 2022–23 activities will include building the capacity of local partners to access climate data and run distribution models, and identifying eucalypt parents for hybridisation.[15]

Northwest Vietnam is among Vietnam's poorest regions. It is mountainous, deforested and severely eroded. A project led by Associate Professor Doland Nichols of Southern Cross University will increase tree cover in Muong La District by developing a farmers' cooperative nursery producing and selling fruit and timber trees and subsidising members' tree planting. A linked silvics experiment in Muong La Nature Reserve will use farmer-produced seedlings to provide knowledge responsive to the Vietnamese Government's directive to develop climate-resilient, native timber production for its processing industries. Both activities will provide research training for Tay Bac University faculty and students and contribute to post-flood local restoration.[16]

Increased trade, global movement and a changing climate increase the threat of emerging pests and diseases. The capability to detect and respond to forest pest and disease incursions is crucial to minimising their impacts. In South-East Asia, this capacity varies widely, but there is a general lack of preparedness. A project co-led by Dr Madaline Healey and Associate Professor Simon Lawson of the University of the Sunshine Coast will establish an effective and sustainable forest biosecurity network to improve risk management for invasive forest pests and diseases. The project will use shared field protocols and data as an entry point and foundation for coordinated biosecurity response. In 2022–23 activities will include launching resources to assist with in-country identification of pests and pathogens and delivering biosecurity awareness training.[17]

Livestock Systems

Poultry enterprises offer opportunities to improve the nutrition of households and economically empower women, who are the key custodians of smallholder poultry in South-East Asia. However, low-producing chicken genotypes typically dominate smallholder or family production systems. Dr Tadelle Dessie of the International Livestock Research Institute leads a project to test and make available high-producing, farmer-preferred genotypes of chickens to increase smallholder productivity as a pathway out of poverty in Cambodia and Vietnam. During 2022–23, the project continues activities to quantify smallholder chicken production systems and investigate promising breeds for the region. The project is also designing a breed improvement program in Cambodia.[18]

Goat production in Laos has more than doubled over the past 10 years, largely driven by high demand for goat meat from Vietnam. Traditional extensive goat-raising methods can result in overgrazing of feed resources, negative consequences for the environment and higher incidence of diseases and parasites in livestock. A project led by Professor Stephen Walkden-Brown of the University of New England is aiming to enhance income-generating opportunities for goats in Lao farming systems, while identifying sustainable production practices. Additionally, the project is seeking greater understanding of consumer preferences for goats in Vietnam to further develop market specifications, especially for premium meat. During 2022–23, the project will develop performance benchmarks and define best practice for smallholders, larger goat farmers and agroforestry systems. The project will also conduct market surveys to ascertain past, current and likely future demand for goats and goat meat, and factors affecting pricing and demand.[19]

Market demand for beef is increasing rapidly in Vietnam, outstripping current levels of domestic production. A project led by Dr Stephen Ives of the University of Tasmania is investigating and implementing whole-farm solutions for smallholder cattle producers in the highlands of Northwest Vietnam. This will help smallholder farmers shift from extensive to more-intensive production systems so they can meet market specifications, increase market linkages and improve profitability. In 2022, project will complete capacity building activities for stakeholders in the beef value chain, including key advisory and extension staff, and design an up-scaling strategy for a sustainable crop-livestock system.[20]

A review of key thematic areas of animal health governance considered regulation, the veterinary workforce, ethics and welfare, surveillance, innovation, biosecurity, trans-boundary trade and service delivery. The review found that significant gaps existed in knowledge and engagement, especially when compared to the human health sector. Dr Kevin Bardosh leads a project to address recommendations from the review to strengthen and support the animal health sector in low and middle-income countries. The recommendations include establishing and convening a network of social and political scientists working on animal health governance; and conducting a systematic review of the social and political science literature in the global animal health field.[21]

A project led by the University of Tasmania is investigating and implementing whole-farm solutions for smallholder cattle producers in the highlands of Northwest Vietnam to shift from extensive to more-intensive production systems, to meet rapidly growing market demand and specifications, increase market linkages and improve profitability. Photo: Vu Khanh Long

Social Systems

A small research activity will report on its analysis of gender transformative tools designed to support ethnic minorities in the Technologically Enhanced Agricultural Livelihoods (2018–2022) project operated by CARE International in the northern uplands of Vietnam. The project, led by Dr Rochelle Spencer of Murdoch University, determined how the tools contribute to changing gender relations and empowering women, and to what extent. The project will complete training of in-country partners and 10 early-career social science researchers in mixed-method research, including participatory methods and project-level Women's Empowerment in Agriculture Index.[22]

Soil and Land Management

Strong market demand for concentrated livestock feeds to support livestock industries resulted in a maize boom in Vietnam and Laos and a rapid shift to annual cropping. Fluctuations in maize price, soil erosion and declining soil fertility have pressured governments and communities into looking for alternative land use options. A small research activity led by Professor Michael Bell of the University of Queensland proposes to use an established network of researchers, extension agents and traders as the basis for developing a Theory of Change focused on maize production areas in Vietnam and Laos. It will explore opportunities to link institutional research and private sector development capacity in these regions to stimulate and support the development of economically and environmentally sustainable, climate change resilient agricultural systems.[23]

Increasing numbers of smallholder farmers in Laos and northern Vietnam are growing maize on sloping land to meet demand for livestock feeds by poultry, pig and cattle industries in China and South-East Asia. A project led by Professor Michael Bell of the University of Queensland is helping farmers adopt maize-based farming systems that reduce soil degradation and improve smallholder livelihoods and economic viability. The project concludes in 2022 with the delivery of outreach models to support the adoption of more diversified maize-based farming systems and bioeconomic frameworks to structure the assessment of the sustainability and productivity of different crop and forage options.[24]

Sea-level rise and changes to seasonal rainfall patterns due to climate change result in decreased freshwater availability and higher saline intrusion of the Mekong River Delta during the dry season. To maintain productivity and profitability, farmers require better soil-management techniques and profitable alternative crops to grow in the dry season. A project led by Dr Jason Condon of Charles Sturt University is providing evidence-based options for profitable crop diversification in the rice production areas of the Mekong River Delta. The project aims to increase production and profitability through diversification of saline-affected rice-based cropping systems and create a capacity legacy to enable these systems to adapt to ongoing climate change.[25]

ACIAR Research Program Manager, Soil and Land Management, Dr James Quilty (right), inspects salinity affected soil in the Mekong Delta region of Vietnam with local soil experts Quach Kim Hoa (left) from the Soc Trang Provincial Department for Agriculture and Rural Development, and Dr Chau Minh Khoi (middle) the ACIAR Country Coordinator from Can Tho University. Photo: Patrick Cape

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See page 186 for contact details.

Current and proposed projects

1. Establishing sustainable solutions to cassava diseases in mainland South-East Asia [Cambodia, Laos, Myanmar, Vietnam] (AGB/2018/172)
2. Food loss in the *Pangasius* catfish value chain of the Mekong River Basin (Food Loss Program) [Cambodia, Laos, Vietnam] (CS/2020/209)
3. Inclusive agriculture value chain financing [Indonesia, Myanmar, Vietnam] (AGB/2016/163)
4. Increasing the sustainability, productivity and economic value of coffee and black pepper farming systems and value chains in the Central Highlands region of Vietnam (AGB/2018/175)
5. Planning and establishing a sustainable (SRP) smallholder rice chain in the Mekong Delta [Vietnam] (AGB/2019/153)
6. Integrating smallholder households and farm production systems into commercial beef supply chains in Vietnam (AGB/2020/189)
7. Piloting digital monitoring of VietGAP compliance and quality in Vietnam vegetable value chains (AGB/2021/153)
8. Supporting greenhouse gas inventories and targeted rice mitigation options for Vietnam (CLIM/2019/150)
9. Preparing for mangrove-based climate and agribusiness transformation in the Mekong Delta [Vietnam] (CLIM/2021/138)
10. FishTech: Integrating technical fisheries solutions into river development programs across South-East Asia [Cambodia, Indonesia, Laos, Vietnam, Thailand] (FIS/2018/153)
11. Increasing technical skills supporting community-based sea cucumber production in Vietnam and the Philippines (FIS/2016/122)
12. Blue economy: Valuing the carbon sequestration potential in oyster aquaculture [Vietnam] (FIS/2020/175)
13. Supporting grouper farming smallholders in Vietnam to improve their SME businesses by engaging with aquafeed companies to produce commercial feeds [Vietnam] (FIS/2021/121)
14. Half-pearl industry development in Tonga and Vietnam (FIS/2016/126)
15. Managing risk in South-East Asian forest biosecurity [Indonesia, Vietnam] (FST/2018/179)
16. Vietnamese native tree species for improved livelihoods [Vietnam] (FST/2020/134)
17. Building an effective forest health and biosecurity network in South-East Asia [Cambodia, Indonesia, Laos, Vietnam] (FST/2020/123)
18. Asian chicken genetic gains: A platform for exploring, testing, delivering, and improving chickens for enhanced livelihood outcomes in South East Asia [Cambodia, Vietnam] (LS/2019/142)
19. Goat production systems and marketing in Laos and Vietnam (LS/2017/034)
20. Intensification of beef cattle production in upland cropping systems in Northwest Vietnam (LPS/2015/037)
21. Global animal health governance: High-level consortium [Vietnam] (LS/2021/157)
22. Analysing gender transformative approaches to agricultural development with ethnic minority communities in Vietnam (SSS/2018/139)
23. Embedding knowledge and exploring future research opportunities in sloping land agricultural systems in northern Laos and northwest Vietnam (SLAM/2021/152)
24. Improving maize-based farming systems on sloping lands in Vietnam and Laos (SMCN/2014/049)
25. Farmer options for crops under saline conditions (FOCUS) in the Mekong River Delta, Vietnam (SLAM/2018/144)

5.3

South Asia

Photo: Conor Ashleigh

South Asia

South Asia is an immensely diverse and densely populated region. It is home to 1.5 billion people – one-quarter of the world's population. The region has the highest concentration of poor people in the world, with more than 500 million people living in extreme poverty.

Despite the population pressure, the region has shown impressive annual economic growth at an average of 6.7%. However, the COVID-19 pandemic is projected to significantly and negatively impact the region's economic growth, pushing another 71 million people into extreme poverty. Many more people, particularly women, live marginally above the poverty line but do not have the opportunity to participate in the process of economic growth.

Compared with other regions in the world, South Asia has the highest regional Global Hunger Index and a very low Human Development Index. Half of the population depends on agriculture for their livelihood. Although the share of agriculture in rural employment remains high, growth of the rural non-farm sector is accelerating and now provides a sizeable share of rural income and employment, primarily in services.

Malnutrition is prevalent in South Asia. The region has among the highest burdens of child undernutrition in the world. Thirty-six per cent of children under age 5 are stunted, or too short for their age, which is an indicator of chronic undernutrition. Sixteen per cent are wasted, or too thin for their height, which is an indicator of acute malnutrition. South Asia also has a high prevalence of micronutrient deficiencies, overconsumption and diet-related non-communicable disease.

While the countries of South Asia face common challenges and opportunities in agriculture, there are also fundamental differences between and within these countries in terms of the broad characteristics that influence the nature and success of agriculture. India has 15 distinct agroecological zones. Nepal has 3 distinct topographical zones. The northern hilly region of Bangladesh is geographically distinct from the southern coastal areas, mostly alluvial, with fertile floodplains associated with 3 major rivers. Pakistan's Indus plains are in sharp contrast to the arid regions of Sindh and the hilly and semi-arid areas of the north-west. Sri Lanka's landscape is clearly defined by its dry and wet zones. These regional variations throughout South Asia must be considered when designing a meaningful program for research collaboration to accommodate regional distinctions and varying degrees of vulnerability of the local population.

According to the International Food Policy Research Institute's 2021 Global food policy report: Transforming food systems after COVID-19, South Asia faces continuing and, in some cases, intensifying problems related to climate change, natural disasters, poor food safety and distortionary policies. Fall armyworm devastated Afghanistan, Pakistan and parts of India and Nepal in 2020. Bangladesh and India struggled with flooding during the pandemic, and bird flu caused a nationwide food-safety scare in India. Distortionary policies, and the increasing costs of implementing them, remain, despite overwhelming evidence of their negative impacts and the potential to repurpose these much-needed resources for climate-smart investments or to build robust food-safety institutions. A perplexing reality remains the relatively low volume of agricultural trade among the countries of South Asia.

Given the high population densities and large numbers of vulnerable people, the COVID-19 pandemic has been a huge challenge for South Asia. Agriculture is highly dependent on informal labour, which has been severely limited during lockdowns and restricted by social distancing measures. These were all disruptive factors for supply chains and agriculture markets.

India aims to export a record 10 million tonnes of wheat in 2022–23 amid rising global demand exacerbated by the Ukraine crisis, which will impact buffer stocks and pricing and threaten the region's food security, significantly impacting low-income groups.

Partner countries in the South Asia region

- Bangladesh
- India
- Nepal
- Pakistan
- Sri Lanka

Drivers of regional collaboration

Countries in South Asia share many opportunities and threats that drive the need for regional cooperation, especially in the Eastern Gangetic Plains. Rice and wheat are the region's major staple crops, accounting for about two-thirds of total dietary energy. However, food consumption patterns have changed in the region over the past few decades, and the changes are most apparent in rural areas. Consumption of cereals is declining while consumption of animal-sourced foods, fruits, vegetables and processed foods is increasing.

Pressure to expand food production to meet growing demand is putting stress on natural resources. The resulting expansion and intensification of agriculture is leading to land degradation, deterioration of soil quality and loss of biodiversity, potentially jeopardising the region's capacity to meet future food demand.

Agricultural growth also poses risks for water resources. Facing the world's lowest per capita renewable freshwater resources, millions of rural people in South Asia have benefited from the growing use of groundwater. But aquifers are being depleted and, across the region, watertables are falling, particularly in India. Water quality is also deteriorating throughout the region due to nutrient overloads and industrial pollution, raising concerns about food safety and drinking water quality.

Large areas in several countries of South Asia are prone to natural disasters. Bangladesh and coastal parts of India are threatened frequently by cyclones and floods. Recurring droughts are a common feature in the arid and semi-arid parts of India and Pakistan. The impact of natural calamities is most severe on food-insecure households.

Climate variability, competing and increasing demands from agriculture and industry (including energy production) and population growth are creating severe demands on water availability. Regional cooperation is increasingly essential to manage these shared resources and address shared issues. There are also significant opportunities in regional cooperation to improve the productivity and diversification of agricultural crops, especially beyond cereals, and to improve the sustainability of farming systems through technical, institutional, value-chain and policy research and development.

Sri Lanka is witnessing one of the worst economic and political crises in its history, and the Ukraine crisis has further amplified uncertainty in the region, with oil and fertiliser prices rising.

ACIAR South Asia region program

Australian agricultural and resource management expertise is highly regarded in the South Asia region. ACIAR has a long history of research collaboration in improving crop productivity, forestry, water use efficiency and policy reforms. The South Asia regional program of the Australian Government seeks to underpin Australia's economic engagement in the region by addressing some of the key regionwide barriers to sustainable economic growth and connectivity. Gender equality is a focus in all the investments under the regional program.

The ACIAR strategy in South Asia focuses on communities, production systems and resource management in the 3 main ecosystems of the region – highlands, plains and coastal areas – that are common to Pakistan, India, Bangladesh, Nepal and Sri Lanka.

Research in these areas looks to identify appropriate reform policy, increase adoption of technology (including post-harvest management), improve productivity and livelihoods in marginalised communities, and improve the productivity of crop, livestock, forestry and fisheries systems.

The major pathways of development in the region are modernisation of agrifood systems, technology support, strengthening service providers, developing rural non-farm sector, and local governance at district and state level. Overproduction in some areas and unequal distribution networks due to poorly developed supply-chain management are the major issues in India. Addressing these could play a major role in achieving food and nutrition security and stability in the region.

The medium to long-term strategy in the region focuses on creating regional collaborations that:

- sustainably intensify and diversify cropping systems using conservation agriculture/zero tillage, farm mechanisation, saline land management and adaptation to climate change
- eradicate extreme poverty through improved productivity of food-grain crops (especially wheat and pulses), livestock (in Pakistan), agroforestry (in Nepal) and fisheries (in Sri Lanka)
- better manage agricultural water, including rainfed areas in the Eastern Gangetic Plains and coastal zone
- influence policy about agricultural and farmers' livelihoods and climate change
- increase the emphasis on meaningful gender inclusion and empowerment.

South Asia region program 2022–23

Partner country	No. projects
Bangladesh	12
India	6
Nepal	3
Pakistan	13
Sri Lanka	2

Note that a project may be conducted in several countries, therefore the total number of projects in this table will be greater than the number of projects in the region.

28 projects

20 research projects

8 small research activities

This data was compiled in August 2022. Additional projects may be commissioned during 2022–23.

Research portfolio

3 Agribusiness projects

3 Climate Change projects

7 Crops projects

1 Fisheries project

1 Forestry project

2 Horticulture projects

0 Livestock Systems projects

0 Social Systems projects

1 Soil and Land Management project

10 Water projects

Table 5.3 Current and proposed projects in the South Asia region, 2022–23

Project title	Project code	Country
Agribusiness		
Developing competitive and inclusive value chains of pulses in Pakistan	ADP/2017/004	Pakistan
Understanding the drivers of successful and inclusive rural regional transformation: Sharing experiences and policy advice in Bangladesh, China, Indonesia and Pakistan	ADP/2017/024	Bangladesh, China, Indonesia, Pakistan
Developing food loss reduction pathways through smart business practices in mango and tomato value chains in Pakistan and Sri Lanka (Food Loss Program)	CS/2020/193	Pakistan, Sri Lanka
Climate Change		
MAC-B: Mitigation adaptation co-benefits modelling trial in Bangladesh	CLIM/2021/109	Bangladesh
Locally led learning to turn polders into flexible assets for adaptation	CLIM/2021/137	Bangladesh
Supporting the tracking sharing learning platform of the Adaptation Research Alliance	CLIM/2022/108	Global
Crops		
Incorporating salt-tolerant wheat and pulses into smallholder farming systems in southern Bangladesh	CIM/2014/076	Bangaladesh
Increasing productivity and profitability of pulse production in cereal based cropping systems in Pakistan	CIM/2015/041	Pakistan
International Mungbean Improvement Network 2	CROP/2019/144	Bangladesh, India, Indonesia, Kenya, Myanmar
Managing wheat blast in Bangladesh: Identification and introgression of wheat blast resistance for rapid varietal development and dissemination	CROP/2020/165	Bangladesh
Accelerating genetic gain in wheat through hybrid breeding in Bangladesh, Ethiopia and Pakistan	CROP/2020/167	Bangladesh, Ethiopia, Pakistan
Intercropping for intensification and diversification in the Eastern Gangetic Plains	CROP/2021/155	Bangladesh, India
Enhancing farm-household management decision-making for increased productivity in the Eastern Gangetic Plains	CSE/2012/108	Bangladesh, India, Nepal
Fisheries		
Improved productivity, efficiency and sustainability of the culture-based fishery for finfish and giant freshwater prawn in Sri Lankan reservoirs	FIS/2018/157	Sri Lanka
Forestry		
Enhancing livelihoods through improved forest management in Nepal	FST/2017/037	Nepal
Horticulture		
Strengthening vegetable value chains in Pakistan for greater community livelihood benefits	HORT/2016/012	Pakistan
Improving smallholder wellbeing through participation in modern value chains: sustaining future growth in the Pakistan citrus industry	HORT/2020/129	Pakistan
Soil and Land Management		
Developing and translating soil health information in Bangladesh with farmers and for farmers to build resilient agricultural systems	SLAM/2021/107	Bangladesh
Water		
Cropping system intensification in the salt-affected coastal zones of Bangladesh and West Bengal, India	LWR/2014/073	Bangladesh, India
Nutrient management for diversified cropping in Bangladesh	LWR/2016/136	Bangladesh
Adapting to salinity in the southern Indus Basin	LWR/2017/027	Pakistan
Water management for smallholder farmers: Outscaling ACIAR research in the Andhra Pradesh Drought Mitigation Program	WAC/2018/164	India
Transforming smallholder food systems in the Eastern Gangetic Plain	WAC/2020/148	Bangladesh, India, Nepal
Opportunities for brackish and saline aquaculture in Pakistan	WAC/2020/179	Pakistan
Virtual Irrigation Academy business models in Pakistan	WAC/2020/180	Pakistan
Supporting inter-provincial water allocation decision making in Pakistan	WAC/2021/103	Pakistan
Groundwater management in Pakistan	WAC/2021/134	Pakistan
Trees for salinity management, Sindh, Pakistan	WAC/2021/136	Pakistan

Bangladesh

A$2.11 million
Budgeted funding

11
Bilateral and regional research projects

2
Small projects and activities

Agriculture plays a pivotal role in the Bangladesh economy and in the lives of the vast majority of the population.

The agriculture sector accounts for more than half of employment in Bangladesh. Notwithstanding its transformation from a country of chronic food shortages to one of net food grain self-sufficiency, Bangladesh still faces very substantial food security challenges. While poverty is steadily declining, many people still live below the poverty line.

Recently, Bangladesh has made impressive progress in achieving national food security. Investments in agricultural research have played a pivotal role in driving productivity increases of major crops. The ongoing challenge is to improve productivity of low-lying areas and rainfed cropping systems and increase rural incomes. This goal is adversely affected by increasing seasonal climate variability, reduced freshwater river flows and seawater intrusion.

Climate change is the most pressing issue for Bangladesh, with varying levels of vulnerability and impacts across the country. Coastal areas are prone to salinity intrusion and tropical cyclones, the floodplains in the central areas are prone to floods, the north-western region is prone to drought, the north-eastern region is prone to flash floods and the hilly regions are prone to erosion and landslides.

Bangladesh is an active participant in the global effort to combat climate change and must develop adequate adaptive capacity to protect its people and economy. In view of the substantial long-term challenges presented by climate change, the government has developed a long-term Bangladesh Delta Plan 2100 that focuses on developing approaches to sustainable management of water, environment and land resources.

The Bangladesh Climate Change Strategy and Action Plan is the de facto policy document that provides strategic direction for work on climate-change related issues. Many elements of climate-change adaptation in the country are also being addressed through specific sectoral policies. Recent consultations highlighted that the consequences of climate change on rural livelihoods is the most pressing issue facing Bangladesh and is likely to drive thinking about future priorities for research collaboration with ACIAR.

Key priorities for Bangladesh (National Agriculture Policy 2018) that align with ACIAR objectives are:

- diversification of crops, including production of high-value crops
- development and promotion of stress-tolerant, disease-resistant and nutritious crop varieties
- improvement of crop production systems for market-oriented agriculture
- building national capacity in innovation
- extension of technologies to increase overall productivity growth and reduce the difference between research farm and field-level yields.

ACIAR supports regional approaches to assisting Bangladesh, including in the areas of natural resource management, improving trade connectivity and encouraging investments to empower women to participate in cross-regional trade opportunities.

Country priorities

Bangladesh has been an ACIAR partner country since the mid-1990s. Over time, the ACIAR program has shifted towards a farming systems approach supporting broader food security aspects, improved production and diversification of the rice-based farming systems, and adaptation to climate change. This approach includes research on short-duration varieties of pulses to fit the farming system, conservation agriculture-based technologies and related mechanisation, saline land management and adaptation to climate change. ACIAR-supported programs in Bangladesh have focused on the undulating lands of the north and north-west regions and the coastal region (which is the poorest and most vulnerable region in the country). Bangladesh's ability to maintain food security given its high vulnerability to the impacts of climate change underpins the priorities for our support.

Key agricultural production challenges are common to many countries of South Asia, and we play a role in strengthening regional research linkages between Bangladesh and other countries, particularly India (Bihar and West Bengal states) and Nepal (eastern Terai region).

Consultation with key research and development stakeholders in Bangladesh and Australia established the ACIAR–Bangladesh Collaboration Strategy 2021–2030 and confirmed the following priorities for research collaboration:

- crop improvement, with a focus on wheat, maize and pulses
- improved farming systems, with a focus on cropping systems and diversification
- water management, with a focus on managing both quantity (scarcity, groundwater and waterlogging) and quality (salinity)
- soil fertility and soil management
- markets, diversification and agricultural value chains
- agricultural mechanisation.

Research will focus on farming systems of north, north-west and coastal Bangladesh.

The Krishi Gobeshona Foundation is a strategic partner and co-investor with ACIAR in Bangladesh. The foundation is an agricultural research funding organisation that has made major investments in funding research and capacity building in ACIAR-supported projects. The partnership with the foundation for collaboration in agriculture research and development in Bangladesh was renewed in January 2021 for 5 years.

2022–23 research program

- **13 ACIAR-supported projects in Bangladesh**
- **6 projects are specific to this country**
- **7 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 Bangladesh. The projects are grouped according to research program. Each project description is referenced in a list at the end of this section, which provides the project title and code.

Agribusiness

Success in rural transformation is measured not only by income growth in the rural population, but also by the degree of inclusiveness in the society. A project in China, Bangladesh, Indonesia and Pakistan, led by Dr Chunlai Chen of the Australian National University, endeavours to understand the nature and drivers of rural transformation in order to provide better policy advice to underpin the success of transformation. During 2022–23, researchers will analyse and report on the results of their study into the components of success and the different impacts of rural transformation on women and men.[1]

The priorities of the ACIAR research program in Bangladesh focus on supporting the country to maintain food security given its high vulnerability to the impacts of climate change. Photo: Conor Ashleigh

Climate Change

There are many potential agricultural management changes that could help farmers adapt to and mitigate climate change, but the pace of climate response is slow. Co-benefits modelling could help accelerate climate response by allowing more efficient screening of many potential interventions at once and comparing them to identify the most promising subset, including those that also deliver social and economic benefits. The Agricultural Model Intercomparison and Improvement Project (AgMIP) is a global collaborative initiative that has developed such a co-benefits modelling approach. A small research activity led by Dr Jonas Jaegermeyr and Erik Mencos Contreras of Columbia University and colleagues in Bangladesh has been trialling these modelling methods in rice production systems. In the final stages of the project, the researchers will identify climate responses with the greatest potential for multiple benefits and revise and validate the methods for application globally.[2]

In south-west Bangladesh, polders are potentially an important feature of agricultural production systems that could facilitate ongoing learning, adjustment and adaptation to climate change. Polders can be managed in various ways to support different types of agricultural production, but previous research has focused on optimising management for current conditions rather than building local capacity to change management as conditions change, including sea levels, tidal surge and patterns of river flows. Led by Mr T.S. Amjath Babu of CIMMYT with the International Centre for Climate Change and Development as well as Australian agricultural learning systems expert Dr Christine King, a new project will co-develop targeted processes and local governing organisations so that locally led social learning can support adaptive management of polders as baseline climate conditions continue to change.[3]

Crops

In the coastal regions of southern Bangladesh, agriculture centres on the annual cropping of rice in the monsoon season and other crops in the dry (rabi) season. While the system is profitable, it is limited by topography, soil salinity and irrigation availability. A 5-year project led by Professor William Erskine of the University of Western Australia aims to improve productivity and profitability of dry-season cropping on non-saline land, and introduce pulses and wheat with improved salinity tolerance for saline land. Final-year activities for the project include demonstrations of best practice for mungbean, cowpea, garden pea and wheat production, field validation of wheat lines for salinity tolerance, and piloting the deployment of mini-mills to process pulse grains.[4]

Mungbean is an ideal rotation crop for smallholder farmers throughout the Indian Ocean Rim region. The International Mungbean Improvement Network, established through a project led by Dr Ramakrishnan Nair of the World Vegetable Center, helped realise the potential of mungbean to improve cropping system productivity and livelihoods by improving researchers' access to genetic material, and coordinating and providing technical support to variety development in Bangladesh, India, Myanmar and Australia. Phase 2 of the project extends the network to Kenya and Indonesia, expanding the source of germplasm to develop new mungbean varieties, as well as strengthening the capacity of more national mungbean breeding programs.[5]

Hybrid wheat has the potential to produce more grain from the same or less land, significantly contributing to food security and land sustainability. However, technical difficulties of hybrid wheat development and the high cost of hybrid seed have constrained the commercial development of new varieties for many decades. Professor Richard Trethowan of the University of Sydney leads a project that aims to extend the benefits of new hybrid wheat systems to researchers, wheat breeders, farmers and consumers in Pakistan, Bangladesh and Ethiopia. The university has developed a novel, cost-effective and practical system to rapidly produce large numbers of wheat hybrid combinations for testing in breeding programs, and to produce large amounts of hybrid seed for sale to farmers at an acceptable cost. The project will establish the performance of the hybrids, and determine effective technical processes and business models to produce the seed in collaboration with the national programs and local seed providers in each country.[6]

Wheat blast is a fungal disease now established in Bangladesh which continues to threaten crops throughout South Asia. A large-scale epidemic is inevitable in conducive conditions, and this will have a large impact on wheat production and food security in the region. Dr Pawan Kumar Singh of CIMMYT leads an ACIAR-funded project to support the operation of the wheat blast screening platform established under a previous ACIAR project. The platform is operated in Jashore by Bangladesh researchers, with support from CIMMYT, and is being used by the global wheat research community. The new project will identify new sources of resistance to wheat blast by continuing to support the platform, map the resistance genes, facilitate the rapid breeding of elite varieties for Bangladesh farmers, and document adoption by farmers of new varieties resistant to wheat blast.[7]

The practice of intercropping (growing 2 crops concurrently in one field) was widespread in the northern cereal-growing belt of the Eastern Gangetic Plains until the early 2000s, when disease restricted the area of wheat production. The recent and widespread production of maize – a wider row crop compared to wheat – creates new possibilities for intercropping. While wide-row intercropping has been investigated in North Asia and South America, little research has been conducted in South Asia. Potential benefits include increased cropping system productivity, increased water, labour and energy-use efficiencies, improved nutrition and food security for rural households, economic empowerment for women, and over the longer term, increased soil health. Ms Alison Laing of CSIRO is leading a small research activity on wide-row intercropping to test initial ideas and prepare a research project to design effective wide-row intercropping and determine its agronomic, social and economic implications in the Eastern-Gangetic Plains.[8]

Previous ACIAR projects have identified crop management options to increase productivity in the Eastern Gangetic Plains. This project led by Professor Fay Rola-Rubzen is identifying behavioural components of household decision-making about the adoption of new practices to support sustainable intensification based on conservation agriculture. In its final year, the project will collect evidence of the outcome of behavioural science-inspired methods to inform and engage farming families.[9]

Soil and Land Management

The translation of soil health information, particularly soil resilience, is generally of low value to smallholder farmers due to significant knowledge and language differences between those producing the information and their target audience. A new project led by Professor Chengrong Chen of Griffith University will take a transdisciplinary approach to develop soil health information. The project will bring researchers, farmers, extension agents and other stakeholders together to develop a shared understanding of soil-related problems and risks, particularly abiotic climate induced stress factors. The project will improve soil health and the resilience of farming systems in Bangladesh by developing co-designed solutions appropriate for smallholders.[10]

Improved nutrient management for emerging and more intensive cropping systems is the focus of a project in the coastal zone of Bangladesh, led by Murdoch University. Photo: Conor Ashleigh

Water

Improved nutrient management to increase the profitability and sustainability of intensive and emerging cropping systems is the focus of a project in the coastal zone of Bangladesh, led by Professor Richard Bell of Murdoch University. The first phase of the project (2017 to 2021) established that the adoption of fertiliser recommendation tools can decrease production costs and increase income and yield for smallholder farmers. The project has been extended until the end of 2022 to scale out the use of tools developed by the project and advance practice change. The final phase of the project will test a collective action approach for nutrient management and expand the scope for monitoring and evaluation of the innovations.[11]

The Ganges Delta region, in Bangladesh and India, is characterised by poverty, food insecurity, environmental vulnerability and limited livelihood opportunities, and is highly vulnerable to inundation from rising sea levels. Since 2016, ACIAR has partnered with the Krishi Gobeshona Foundation of Bangladesh to lift agricultural productivity, and hence rural welfare, by increasing cropping intensification. A new phase of the partnership, starting in 2022, aims to strengthen farmer confidence in the technologies introduced previously and demonstrate practices that may mitigate or avoid risks due to untimely rainfall and drainage management. Dr Mohammed Mainuddin of CSIRO leads the project that will also provide information to support the implementation of development plans in the region.[12]

The Eastern Gangetic Plains straddles Bangladesh, India and Nepal. The region is home to 450 million people and has the world's highest concentration of rural poverty. People in this region have a high dependence on agriculture for food and livelihood security. Dr Tamara Jackson of the University of Adelaide leads a project to understand the processes and practices of transforming food systems through diversification to improve farm livelihoods while reducing inequity, production risk and unsustainable resource use. By gaining an understanding of the existing context for diversification in the region, and associated technologies, scaling interventions, and policies and programs, the project will consider these elements individually and demonstrate the interactions between them using case studies to highlight where and how diversification has occurred in the past. In subsequent phases, the project will identify priority opportunities with communities and determine their fit with projected climate change and water availability, and the impact of high-level policies.[13]

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Soil and Land Management: Dr James Quilty
Water: Dr Neil Lazarow

See page 186 for contact details.

Current and proposed projects

1. Understanding the drivers of successful and inclusive rural regional transformation: Sharing experiences and policy advice in Bangladesh, China, Indonesia and Pakistan (ADP/2017/024)
2. MAC-B: Mitigation adaptation co-benefits modelling trial in Bangladesh (CLIM/2021/109)
3. Locally led learning to turn polders into flexible assets for adaptation [Bangladesh] (CLIM/2021/137)
4. Incorporating salt-tolerant wheat and pulses into smallholder farming systems in southern Bangladesh (CIM/2014/076)
5. International Mungbean Improvement Network 2 [Bangladesh, India, Indonesia, Kenya, Myanmar] (CROP/2019/144)
6. Accelerating genetic gain in wheat through hybrid breeding in Bangladesh, Ethiopia and Pakistan (CROP/2020/167)
7. Managing wheat blast in Bangladesh: identification and introgression of wheat blast resistance for rapid varietal development and dissemination (CROP/2020/165)
8. Intercropping for intensification and diversification in the Eastern Gangetic Plains [Bangladesh, India] (CROP/2021/155)
9. Enhancing farm-household management decision-making for increased productivity in the Eastern Gangetic Plains [Bangladesh, India, Nepal] (CSE/2012/108)
10. Developing and translating soil health information in Bangladesh with farmers and for farmers to build resilient agricultural systems (SLAM/2021/107)
11. Nutrient management for diversified cropping in Bangladesh (LWR/2016/136)
12. Cropping system intensification in the salt-affected coastal zones of Bangladesh and West Bengal, India (LWR/2014/073)
13. Transforming smallholder food systems in the Eastern Gangetic Plain [Bangladesh, India, Nepal] (WAC/2020/148)

India

A$0.67 million
Budgeted funding

4
Bilateral and regional research projects

2
Small projects and activities

With more than 1.3 billion people, India is the second most populous country in the world, after China, and accounts for 18% of the world's population. Two-thirds of India's population live in rural areas, with landholdings averaging 1.1 hectares. The rural population is highly vulnerable to the impacts of a declining natural resource base, biosecurity threats and climate change.

Worth US$2.94 trillion, India is the world's fifth largest economy, overtaking the United Kingdom and France. India is emerging as a major agricultural exporter of several key commodities and is currently the largest exporter of rice globally and the second largest exporter of cotton. While the contribution of the agriculture sector to GDP is declining, agriculture remains a major source of employment and accounts for 42% of the total national workforce.

The COVID-19 pandemic and associated lockdowns affected all sectors of the Indian economy; however, agriculture emerged as the main driver of economic growth, recording positive growth of 3.4% (at constant prices) in 2020–21.

Agricultural production has been increasing by an average of 3.6% per year since 2011, due to improved access to inputs such as fertiliser and seed, irrigation and credit facilities. The sector has also diversified from cereal grains to pulses, fruit, vegetables and livestock products, largely driven by evolving demographics, urbanisation and changing consumer demand patterns. However, the sector is still challenged by inefficient market mechanisms, subsidy distortions, lack of storage infrastructure, inefficient use of natural resources and susceptibility to climate change and extreme weather events.

In response to the COVID-19 pandemic, the government announced the 'Atmanirbhar Bharat Abhiyan' (Self-Reliant India) program in 2020. The initiative included institutional credit facilities at concessional rates, creation of an Agriculture Infrastructure Development Fund for projects at farm-gate and aggregation points, and release of emergency funds to provide working capital to farmers through crop loans. The initiative continued into 2021 with increased allocation to the infrastructure fund.

The Government of India, in its various policies and schemes, focuses closely on the role of women in agriculture. It advocates mainstreaming of women's role in agriculture as part of all programs in the agricultural development agenda.

Although 30% of budgetary allocations under various schemes have been made for women farmers, fund utilisation under these schemes has declined. Moreover, due to the complex and varied nature of agriculture in India, there has been a trend of defeminisation in certain pockets of the country. Although policy articulation by the government on the rights of women farmers has shifted, there is still a huge knowledge gap and limited resources to implement gender-inclusive agricultural development strategies.

In June 2020, the leaders of both countries participated in the Australia–India Leaders' Virtual Summit, where they elevated the bilateral Strategic Partnership to a Comprehensive Strategic Partnership. One initiative agreed under the partnership is that India and Australia will boost collaboration on science, technology and research, initially focused on COVID-19 responses. As part of the response being coordinated by Australia's High Commission, in 2022–23 ACIAR is working to clarify the role we can play in supporting the ambition for increased research collaboration between India and Australia.

In April 2022, the Australia–India Economic Cooperation and Trade Agreement was signed. The agreement includes a provision that both countries will cooperate to promote agricultural trade as part of the agreement and will work toward concluding an enhanced agricultural Memorandum of Understanding (MoU). An update to An India Economic Strategy 2035, an ambitious plan to transform Australia's economic partnership with India out to 2035, was also launched in April 2022. The Strategy was an independent report submitted to the Australian Government in 2018.

Country priorities

ACIAR has supported a program of collaborative research with India since 1983. Presently, the ACIAR research program with India is delivered entirely through a regional collaborative approach involving neighbouring countries with shared issues and opportunities. Substantial co-investment from India will increasingly become a desired characteristic of our partnership to maintain an ongoing program of collaboration in future.

The geographic focus on the eastern regions of India and its neighbours will remain the same, with a thematic focus on:

- management of agricultural water, including rainfed areas in the Eastern Gangetic Plains and coastal zone
- sustainable intensification and diversification of cropping systems with support of conservation agriculture/zero tillage
- breeding of improved varieties of mungbean
- assisted policy development for farmers' livelihoods and climate change.

Existing collaboration between ACIAR and organisations in India has the potential to evolve into a substantial co-invested partnership providing benefits for both countries. As a result of a recent partnership refresh between ACIAR and Indian Council of Agricultural Research, in 2022–23 we will explore, at India's request, the possibilities for enhanced collaboration in:

- sustainable intensification with a nutrition framework
- diversification into new dry-season crops
- the role of biotechnology in crop development
- new mechanisation opportunities including farm robotics
- a next phase of mungbean breeding for high-yielding varieties
- groundwater management (overexploitation and under-exploitation)
- co-investment and trilateral collaboration.

2022–23 research program

- **6 ACIAR-supported projects in India**
- **1 project is specific to this country**
- **5 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 India. 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

Mungbean is an ideal rotation crop for smallholder farmers throughout the Indian Ocean Rim region. The International Mungbean Improvement Network, established through a project led by Dr Ramakrishnan Nair of the World Vegetable Center, helped realise the potential of mungbean to improve cropping system productivity and livelihoods by improving researchers' access to genetic material, and coordinating and providing technical support to variety development in Bangladesh, India, Myanmar and Australia. Phase 2 of the project extends the network to Kenya and Indonesia, expanding the source of germplasm to develop new mungbean varieties, as well as strengthening the capacity of more national mungbean breeding programs.[1]

The practice of intercropping (growing 2 crops concurrently in one field) was widespread in the northern cereal-growing belt of the Eastern Gangetic Plains until the early 2000s, when disease restricted the area of wheat production. The recent and widespread production of maize – a wider row crop compared to wheat – creates new possibilities for intercropping. While wide-row intercropping has been investigated in North Asia and South America, little research has been conducted in South Asia. Potential benefits include increased cropping system productivity, increased water, labour and energy-use efficiencies, improved nutrition and food security for rural households, economic empowerment for women, and over the longer term, increased soil health. Ms Alison Laing of CSIRO is leading a small research activity on wide-row intercropping to test initial ideas and prepare a research project to design effective wide-row intercropping and determine its agronomic, social and economic implications in the Eastern-Gangetic Plains.[2]

Previous ACIAR projects have identified crop management options to increase productivity in the Eastern Gangetic Plains. This project led by Professor Fay Rola-Rubzen is identifying behavioural components of household decision-making about the adoption of new practices to support sustainable intensification based on conservation agriculture. In its final year, the project will collect evidence of the outcome of behavioural science-inspired methods to inform and engage farming families.[3]

Water

The Ganges Delta region, in Bangladesh and India, is characterised by poverty, food insecurity, environmental vulnerability and limited livelihood opportunities, and is highly vulnerable to inundation from rising sea levels. Since 2016, ACIAR has partnered with the Krishi Gobeshona Foundation of Bangladesh to lift agricultural productivity, and hence rural welfare, by increasing cropping intensification. A new phase of the partnership, starting in 2022, aims to strengthen farmer confidence in the technologies introduced previously and demonstrate practices that may mitigate or avoid risks due to untimely rainfall and drainage management. Dr Mohammed Mainuddin of CSIRO leads the project that will also provide information to support the implementation of development plans in the region.[4]

The Eastern Gangetic Plains straddles Bangladesh, India and Nepal. The region is home to 450 million people and has the world's highest concentration of rural poverty. People in this region have a high dependence on agriculture for food and livelihood security. Dr Tamara Jackson of the University of Adelaide leads a project to understand the processes and practices of transforming food systems through diversification to improve farm livelihoods while reducing inequity, production risk and unsustainable resource use. By gaining an understanding of the existing context for diversification in the region, and associated technologies, scaling interventions, and policies and programs, the project will consider these elements individually and demonstrate the interactions between them using case studies to highlight where and how diversification has occurred in the past. In subsequent phases, the project will identify priority opportunities with communities and determine their fit with projected climate change and water availability, and the impact of high-level policies.[5]

Australian experts are providing technical support to 5 large land and water management programs in the Indian states of Andhra Pradesh and Odisha. These programs draw on previous ACIAR-supported projects on climate risk management, participatory groundwater management and social learning for irrigation management and governance. Dr Uday Nidumolu of CSIRO Agriculture and Food leads the project, which will work with Indian counterparts to integrate the research, support out-scaling and then co-learn about out-scaling. COVID-19 outbreaks in South Asia mean that training will be delivered online and field activities have been postponed.[6]

Regional Manager, South Asia
Dr Pratibha Singh

Research Program Managers
Crops: Dr Eric Huttner
Water: Dr Neil Lazarow

See page 186 for contact details.

Current and proposed projects

1. International Mungbean Improvement Network 2 [Bangladesh, India, Indonesia, Kenya, Myanmar] (CROP/2019/144)
2. Intercropping for intensification and diversification in the Eastern Gangetic Plains [Bangladesh, India] (CROP/2021/155)
3. Enhancing farm-household management decision-making for increased productivity in the Eastern Gangetic Plains [Bangladesh, India, Nepal] (CSE/2012/108)
4. Cropping system intensification in the salt-affected coastal zones of Bangladesh and West Bengal, India (LWR/2014/073)
5. Transforming smallholder food systems in the Eastern Gangetic Plain [Bangladesh, India, Nepal] (WAC/2020/148)
6. Water management for smallholder farmers: Outscaling ACIAR research in Andhra Pradesh Drought Mitigation Program [India] (WAC/2018/164)

Nepal

A$0.77 million
Budgeted funding

3
Bilateral and regional research projects

Agriculture is the largest economic sector of Nepal. It supports livelihoods of 66% of the population and contributes 36% of national GDP. Farming is largely subsistence and cropping is mostly integrated with livestock production.

Agriculture in Nepal is highly diverse due to the wide range of climates and geographies in the country. The challenges facing agriculture in the lowland Terai rice–wheat farming systems (part of the Eastern Gangetic Plains) are vastly different to those in the mixed crop–livestock–tree farming systems of the hill and mountain areas. Broadly, however, the challenges include:

- the need for seed system improvements
- degradation of natural resources
- underdeveloped agricultural institutions and policies
- declining availability of labour
- access to productive technologies and mechanisation to improve farm household livelihoods.

Natural disasters frame the recent history of the country. In 2015, the deadliest earthquake in 81 years struck Nepal, followed by hundreds of aftershocks and another severe earthquake 17 days later. The process of recovery continues. In 2017, Nepal was hit by devastating floods, causing US$172 million in losses and damage to the agriculture sector alone.

Nepal's Agriculture Development Strategy 2015–2035 outlines a vision for a self-reliant, sustainable, competitive and inclusive agriculture sector that drives economic growth and contributes to improved livelihoods and food and nutrition security. It conceptualises transformation of Nepal from a society primarily based on agriculture to one that derives most of its income from services and industry. The 20-year strategy aims to halve poverty in less than 10 years through an agriculture-led economy achieving improved governance, higher productivity, profitable commercialisation and increased competitiveness.

The Agriculture Development Strategy also guides policies that include women, and states that all agricultural programs will be designed to benefit women. It promotes women's organisations and agroenterprises led by women through specific programs and recommends equal wages for women labourers. The strategy also promotes action to raise awareness of women's rights to land, and builds the capacity of women to manage irrigation, water resources and finances.

Country priorities

ACIAR has supported collaborative research with Nepal since the early 1990s, including projects on small ruminants, wheat and legumes. The focus for ACIAR during 2022–23 continues to be the engagement of Nepal in a regional program to improve integration of soil, water, crop, livestock and tree components of the farming systems.

Increased farm and forest productivity remains a core priority of Nepal for collaboration with ACIAR to improve food and nutrition security of the rural poor. In the Middle Hills districts, where the impacts of earthquakes and floods remain, our program supports the request of the Nepalese Government to focus primarily on research to support increased timber production from community forests. Another area of requested focus is understanding the implications of federalism on agriculture in Nepal.

Given the common agricultural production challenges across the alluvial plains of Nepal, eastern India and Bangladesh, cooperative research linkages with neighbouring countries will be explored further during 2022–23. The focus will be on conservation agriculture, to address key issues such as declining soil health, burning of rice stubble, falling groundwater levels and inequities in access to water.

Nepal hosts an important regional research body – the International Center for Integrated Mountain Development. ACIAR and DFAT are working with the center to identify prospective areas for research collaboration.

2022–23 research program

- **3 ACIAR-supported projects in Nepal**
- **1 project is specific to this country**
- **2 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 Nepal. 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

Previous ACIAR projects have identified crop management options to increase productivity in the Eastern Gangetic Plains. This project led by Professor Fay Rola-Rubzen is identifying behavioural components of household decision-making about the adoption of new practices to support sustainable intensification based on conservation agriculture. In its final year, the project will collect evidence of the outcome of behavioural science-inspired methods to inform and engage farming families.[1]

Forestry

The Middle Hills of Nepal are home to 44% of the country's population, and most people gain their livelihoods from a combination of agricultural and forest products. Most forest lands have been returned to community forest user groups, with suboptimal management and minimal timber harvest. Previous ACIAR-supported work demonstrated the effectiveness of a silvicultural management package called Active and Equitable Forest Management to improve livelihoods, social equity and environmental impacts. Dr Ian Nuberg of the University of Adelaide leads a project focusing on adopting improved forestry practices, developing community forestry planning, governance and gender equity frameworks, and poverty-reducing, small-scale forest enterprises in Kahbre Palanchok and Sindhu Palchok districts. In 2022–23, researchers will document case studies and report on the policy implications of research on community forest enterprises.[2]

Water

The Eastern Gangetic Plains straddles Bangladesh, India and Nepal. The region is home to 450 million people and has the world's highest concentration of rural poverty. People in this region have a high dependence on agriculture for food and livelihood security. Dr Tamara Jackson of the University of Adelaide leads a project to understand the processes and practices of transforming of food systems through diversification to improve farm livelihoods while reducing inequity, production risk and unsustainable resource use. By gaining an understanding of the existing context for diversification in the region, and associated technologies, scaling interventions, and policies and programs, the project will consider these elements individually and demonstrate the interactions between them using case studies to highlight where and how diversification has occurred in the past. In subsequent phases, the project will identify priority opportunities with communities and determine their fit with projected climate change and water availability, and the impact of high-level policies.[3]

Regional Manager, South Asia
Dr Pratibha Singh

Research Program Managers
Crops: Dr Eric Huttner
Forestry: Dr Nora Devoe
Water: Dr Neil Lazarow

See page 186 for contact details.

Current and proposed projects

1. Enhancing farm-household management decision-making for increased productivity in the Eastern Gangetic Plains [Bangladesh, India, Nepal] (CSE/2012/108)
2. Enhancing livelihoods through improved forest management in Nepal (FST/2017/037)
3. Transforming smallholder food systems in the Eastern Gangetic Plain [Bangladesh, India, Nepal] (WAC/2020/148)

Pakistan

A$3.59 million
Budgeted funding

9
Bilateral and regional research projects

4
Small projects and activities

Agriculture is the largest sector of Pakistan's economy, contributing 19% to GDP and engaging 38% of the national workforce. This is the largest segment of the workforce and two-thirds are women. Pakistan's strong research system has been driving innovation and improvements in this sector.

The COVID-19 pandemic has put significant pressure on the economy of Pakistan. Drastic measures to control the pandemic significantly reduced economic activity (including activity in agrifood systems), with consequent impacts on livelihoods, food security and nutrition.

Before the pandemic, about 25% of the population lived below the national poverty line. Food insecurity is typically high, with 20–30% of the population (40 to 62 million people) experiencing some form of food insecurity and chronic vulnerability through natural hazards and shocks, including the ongoing pandemic. The continued lockdown has affected the demand for food. This is due not only to limited physical access but also declining financial resources. Lockdown reduced or eliminated the earnings of almost 3 million informal daily wage labourers working in agriculture and other related activities.

Food market mechanisms in Pakistan are strong and well-integrated but temporary supply shocks occurred due to disturbance in logistics. This affected the price and supply of perishable goods, imported food and processed food. Along with a high rate of population growth, food and water security are among the most pressing challenges for Pakistan in the current circumstances.

Pakistan recognises that cost-effective availability of energy, water and food is essential to ensure sustainable economic growth and development. Sizeable national and provincial programs are being funded to revolutionise the agriculture and livestock sectors. These programs are aimed at increasing agricultural productivity and value addition, reducing dependence on imports, supporting and stimulating agriculture-based industries, and improving the livelihoods and wellbeing of farming communities.

Pakistan is ranked third in the world of countries facing water shortages. It is estimated that Pakistan will become the most water-stressed country in South Asia by 2040, with absolute water scarcity by 2025. There are many reasons for the country's water scarcity. The most important are climate change, urbanisation and high dependence on groundwater for agriculture and other operations.

Country priorities

Australia has a 70-year development assistance relationship with Pakistan, which has contributed to Pakistan's long-term economic prosperity, stability and resilience. ACIAR is regarded as a key international partner supporting agricultural research in Pakistan. Australia is seen as a country with deep, relevant expertise in agriculture, livestock production and water management. Our work is high profile and regularly gains the attention of policymakers at national and provincial levels.

Australia has helped Pakistan increase livelihood opportunities for men and women living in poverty by enhancing agricultural productivity and expanding revenue streams for farmers through improved water management practices, adding value to raw agricultural products and improving access to markets. Our programs have invested in the people of Pakistan, especially women and girls.

Our program with Pakistan is based on Australia's global expertise in areas that are high-priority concerns for Pakistan, and the recognition that water and food security are critical to Pakistan's long-term stability. Pakistan's strong network of researchers has a longstanding platform of collaboration with Australian researchers, which is highly valued by both countries.

The ongoing focus of our research collaboration is:

- empowering women to enhance farm incomes
- water management, particularly horizontal expansion, salinity management, water harvesting, and low-cost/high-efficiency irrigation systems
- crop improvement, particularly productivity enhancement and access to novel breeding techniques
- horticulture, including fresh produce and nursery certification systems
- agribusiness development, including background research in value-adding, product development, branding and traceability systems for growing private sector needs, which the national system cannot provide
- models for rural transformation.

When pandemic conditions permit, we will recalibrate our relationship with Pakistan with a 10-year plan for research cooperation. This will enable a stronger equal partnership of international research collaboration with substantial co-investment for mutual benefit.

2022–23 research program

- **13 ACIAR-supported projects in Pakistan**
- **10 projects are specific to this country**
- **3 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 Pakistan. 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.

The Quaid-i-Azam University leads a new project using mango and tomato as focal commodities to map value chains in Pakistan and Sri Lanka, to identify the extent and root causes of food losses.

Agribusiness

Success in rural transformation is measured not only by income growth in the rural population, but also by the degree of inclusiveness in the society. A project in China, Bangladesh, Indonesia and Pakistan, led by Dr Chunlai Chen of the Australian National University, endeavours to understand the nature and drivers of rural transformation in order to provide better policy advice to underpin the success of transformation. During 2022–23, researchers will analyse and report on the results of their study into the components of success and the different impacts of rural transformation on women and men.[1]

Pulses are important to both agricultural systems and diets in Pakistan, but domestic production has declined in recent decades. Pakistan now imports 80% of lentils and 10% of chickpeas to meet domestic demand. A project led by Dr Rajendra Adhikari of the University of Queensland is developing socially inclusive and competitive value chains for pulses in Punjab and Sindh, with spillover benefits expected for Khyber Pakhtunkhwa. These 3 regions are characterised by gender inequality within industry and society. Chickpeas, lentils and mungbean are well-suited to smallholder farming by both women and men. Before the project concludes in 2023, researchers will deliver capacity building activities for smallholder farmers to improve connections between farmers and markets and finalise policy advice and recommendations for decision-makers to assist industry development.[2]

Fresh fruits and vegetables are important food commodities in both Pakistan and Sri Lanka. Maintaining quality and freshness under humid tropical conditions presents a vast challenge in meeting the growing demand for domestic consumption and export. Supply chains are inadequate and inefficient. Food losses are large, especially during seasonal gluts. Associate Professor Anwar Shah of Quaid-i-Azam University leads a new project using mango and tomato as focal commodities to map value chains in Pakistan and Sri Lanka, to identify the extent and root causes of food losses. The project will design and demonstrate affordable technological and organisational options to mitigate losses and create new economic opportunities. Sri Lanka provides a useful case study to contrast its fruit and vegtable value chain against Pakistan. This project is part of the ACIAR–IDRC Food Loss Research Program (page 23).[3]

Crops

Hybrid wheat has the potential to produce more grain from the same or less land, significantly contributing to food security and land sustainability. However, technical difficulties of hybrid wheat development and the high cost of hybrid seed have constrained the commercial development of new varieties for many decades. Professor Richard Trethowan of the University of Sydney leads a project that aims to extend the benefits of new hybrid wheat systems to researchers, wheat breeders, farmers and consumers in Pakistan, Bangladesh and Ethiopia. The university has developed a novel, cost-effective and practical system to rapidly produce large numbers of wheat hybrid combinations for testing in breeding programs, and to produce large amounts of hybrid seed for sale to farmers at an acceptable cost. The project will establish the performance of the hybrids, and determine effective technical processes and business models to produce the seed in collaboration with the national programs and local seed providers in each country.[4]

The demand for pulses in Pakistan has been increasing, while production is decreasing. Despite relatively high prices, pulses, especially chickpea and lentils, have been pushed out to the most marginal lands, and labour shortages are a major production constraint. Reintroducing legumes into existing cropping systems would have nutritional, economic and environmental benefits and has been identified as a priority for agriculture development by the Pakistan Government. In its final year, the 6-year project led by Dr Ata-ur Rehman of Charles Sturt University will use results to engage partners and farmers in scaling out effective innovations to intensify pulses production and increase productivity. The project will also identify emerging knowledge gaps and research opportunities to improve pulses production in Pakistan.[5]

Horticulture

The horticulture sector in Pakistan is significant, both domestically and for export production. Dr Babar Ehsan Bajwa of CABI leads a project to strengthen selected vegetable value chains in Punjab and Sindh provinces as part of the Agriculture Value Chain Collaborative Research Program (Aik-Saath). Focusing on potatoes, chillies, tomatoes and onions, in 2022–23, the project team will deliver capacity building activities to support the implementation, scaling out and monitoring of interventions and improve pre and post-harvest processes, from improved seedlings and variety selection to better packaging, transport, and marketing.[6]

Citrus is Pakistan's leading fruit crop, and although production is increasing, productivity is below comparable countries, farm-gate waste is high and value is stagnant. Waste continues throughout the value chain, with post-harvest losses in citrus ranging between 23% and 38%. Despite these limitations, the industry's main product, Kinnow mandarin, has market potential at higher levels of quality and value, especially for export. Further, citrus industry development is a priority for provincial and national governments. A project led by Dr Rajendra Adhikari of the University of Queensland aims to improve the wellbeing of citrus-producing smallholder families through participation in inclusive value chains that meet market needs and provide equitable returns to farmers.[7]

Water

Salinity currently affects 4.5 million hectares of land across Pakistan and 54% of the southern Indus Basin, threatening agricultural production and livelihoods, resulting in high rates of poverty for communities living in affected areas. A project led by Dr Michael Mitchell of Charles Sturt University aims to build the adaptive capacity of farming and coastal communities in salinity-affected areas to maintain and improve their livelihoods. During 2022–23, the project will finalise analysis and report on the status and future trends of salinity in southern Indus Basin, including policy and management recommendations, and capacity building and mentoring of next users of groundwater monitoring and modelling tools. The project will report on for future research into adaptation strategies, drawing on value chain analysis; and prepare a strategy for scaling out selected adaption strategies beyond the life of the project.[8]

In Pakistan, inland groundwater reserves over a large area of the country are saline, and about 40,000 hectares of agricultural land are abandoned within the Indus Basin annually due to secondary salinisation. Aquaculture is an enterprise option for saline areas that are not suitable for crop cultivation. Scientists from the International Water Management Institute and the WorldFish Centre, led by Dr Mohsin Hafeez, reviewed the options and potential for brackish and marine aquaculture in Pakistan, and the extent to which aquaculture could provide a transformative adaptation strategy for areas affected by salinisation in the southern Indus Basin. The project concludes in 2022 with the development of practical and simple guidelines to assist farmers and local extension agents implement viable options for brackish aquaculture, for sustainable livelihoods in saline areas.[9]

Irrigated cropping is critical to Pakistan's economy and food security, and effective management of the country's irrigation is an urgent priority. While basin-level water management is efficient, distribution of water at the community level is inefficient and unfair, and yields and water productivity are low. A small project is being led by Mr Simon Dyer, Managing Director of Virtual Irrigation Academy, a company created to scale out water monitoring technology developed by CSIRO. The project aims to create viable and sustainable business models in Pakistan to supply farmers with water monitoring tools developed by the Virtual Irrigation Academy program, which provides a digital platform to monitor soil water, underpinned by a process of social learning to improve irrigation management at the farm and scheme level. The program was developed through ACIAR-supported projects in southern Africa.[10]

Irrigated cropping is critical to Pakistan's economy and food security, and effective management of the country's irrigation is an urgent priority, and a focus of several ACIAR-supported projects.

The Indus Basin Irrigation System is the world's largest continuous irrigation system and it provides water, energy and food security for Pakistan. Responsibility for the system's surface water resources is shared between the Indus River System Authority, the Water and Power Development Authority and provincial irrigation departments. Allocation of the water resource is a complex process that is only a few people understand. CSIRO, through a DFAT-funded project in close collaboration with partners in Pakistan, developed the Water Apportionment Accord Tool to enable a more transparent and consistent allocation process. Dr Mobin-ud Din Ahmad of CSIRO leads a small project that is supporting and training in-country partners to use the tool for 2 rounds of seasonal planning (Kharif and Rabi). The experience will be used to further develop and refine the software and a user guide.[11]

Groundwater is essential for more than 50% of irrigation requirements in Punjab and up to 20% in Sindh, but the resource is poorly understood and its use largely unregulated. Government and water users recognise the need to improve groundwater management but institutional frameworks for regulation and management are largely lacking. A two-level approach to groundwater management is needed: strategic planning and coordination of actions, and site-specific research and operational management. Dr Jay F Punthakey and Dr Catherine Allan of Charles Sturt University lead a new project to support knowledge creation, sharing and co-design for improved systems of sustainable groundwater management in selected farming communities in Punjab and Sindh. It is expected that this work will contribute to the development of national and provincial frameworks to sustain the long-term productive potential of groundwater and better integrate groundwater into water resource management plans. The project consolidates and builds on past and current ACIAR research investment in improving groundwater management in Pakistan.[12]

The combination of saline landscapes and low forest cover presents numerous and compounding challenges for smallholder farmers in Sindh, Pakistan. With strong linkages to existing ACIAR-supported projects, this small research activity will evaluate the potential of tree planting to manage salinity and increase income in smallholder farming systems. The project will synthesise existing knowledge of suitable species, their characteristics, uses and appropriate management; and well as identify and develop effective forestry extension methods and materials to deliver the knowledge to extension workers and educated smallholders. Concurrently, the project will engage with smallholders and extension workers to ground truth a synthesis of current literature and provide further insights into the knowledge, practices, needs and pressures of smallholders in several different landscapes.[13]

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Horticulture: Ms Irene Kernot
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See page 186 for contact details.

Current and proposed projects

1. Understanding the drivers of successful and inclusive rural regional transformation: Sharing experiences and policy advice in Bangladesh, China, Indonesia and Pakistan (ADP/2017/024)
2. Developing competitive and inclusive value chains of pulses in Pakistan (ADP/2017/004)
3. Developing food loss reduction pathways through smart business practices in mango and tomato value chains in Pakistan and Sri Lanka (Food Loss Research Program) (CS/2020/193)
4. Accelerating genetic gain in wheat through hybrid breeding in Bangladesh, Ethiopia and Pakistan (CROP/2020/167)
5. Increasing productivity and profitability of pulse production in cereal-based cropping systems in Pakistan (CIM/2015/041)
6. Strengthening vegetable value chains in Pakistan for greater community livelihood benefits (HORT/2016/012)
7. Improving smallholder wellbeing through participation in modern value chains: sustaining future growth in the Pakistan citrus industry (HORT/2020/129)
8. Adapting to salinity in the southern Indus Basin [Pakistan] (LWR/2017/027)
9. Opportunities for brackish and saline aquaculture in Pakistan (WAC/2020/179)
10. Virtual Irrigation Academy business models in Pakistan (WAC/2020/180)
11. Supporting inter-provincial water allocation decision making in Pakistan (WAC/2021/103)
12. Groundwater management in Pakistan (WAC/2021/134)
13. Trees for salinity management, Sindh, Pakistan (WAC/2021/136)

Sri Lanka

A$0.61 million
Budgeted funding

2
Bilateral and regional research projects

After a 26-year civil war and a tsunami in 2004 that left tens of thousands of people dead, injured or homeless, Sri Lanka moved ahead rapidly to achieve middle-income country status.

Following the early optimism about prospects for the country after peace was established, in mid-2022 Sri Lanka is facing its worst ever economic crisis, with food and fuel price spikes driving civil unrest. Australia continues to have a strong interest in ensuring Sri Lanka can be a secure, stable and prosperous partner of Australia in the Indian Ocean region.

ACIAR had a broad collaborative research program with Sri Lanka from 1980 to the early 2000s, which covered fisheries, agriculture policy, forestry, animal health and crops. In 2016, Australia's Commission for International Agricultural Research requested an assessment of re-establishing a collaborative research program with Sri Lanka. A scoping study[3] identified 6 broad areas for potential future collaboration with Sri Lanka. Given that the partnership was new, we decided to start small with a single project. ACIAR was looking to this project to identify lessons for possible further re-engagement based on significant co-investment from Sri Lanka. The current economic and political crisis puts any possibility of re-engagement on hold.

3 de Meyer, J., Curnow, J., 2016. ACIAR Scoping study: Re-engagement in agricultural research for development partnerships in Sri Lanka. Australian Centre for International Agricultural Research: Canberra. 52 pp.

2022–23 research program

Agribusiness

Fresh fruits and vegetables are important food commodities in both Pakistan and Sri Lanka. Maintaining quality and freshness under humid tropical conditions presents a vast challenge in meeting the growing demand for domestic consumption and export. Supply chains are inadequate and inefficient. Food losses are large, especially during seasonal gluts. Associate Professor Anwar Shah of Quaid-i-Azam University leads a new project using mango and tomato as focal commodities to map value chains in Pakistan and Sri Lanka, to identify the extent and root causes of food losses. The project will design and demonstrate affordable technological and organisational options to mitigate losses and create new economic opportunities. Sri Lanka provides a useful case study to contrast its fruit and vegetable value chain against Pakistan, as the 2 countries are at different stages of development and face different exposure regimes and vulnerabilities. This project is part of the ACIAR–IDRC Food Loss Research Program (page 23).

Project: Developing food loss reduction pathways through smart business practices in mango and tomato value chains in Pakistan and Sri Lanka (Food Loss Research Program) (CS/2020/193)

Fisheries

Sri Lanka has a well-developed and sustainable inland reservoir fishery that makes up about 12–15% of total fish production and significantly benefits rural communities in the former conflict-affected Northern province. Based on a co-management strategy, management practices and stocking strategies for sustainable culture-based fisheries have been established in a previous ACIAR project and have increased the productivity of the reservoir fishery. The Government of Sri Lanka has long recognised the potential for the extensive culture of the indigenous giant freshwater prawn (Macrobrachium rosenbergii) in inland reservoirs, but development has been ad hoc, with productivity and returns relatively low. A project led by Dr Clive Jones of James Cook University investigates stocking, monitoring and harvesting practices to optimise fish and prawn productivity and improve product quality. The project will also conduct market-chain analysis to ensure farming practices meet market product requirements and benefits are socially equitable.

Project: Improved productivity, efficiency and sustainability of the culture-based fishery for finfish and giant freshwater prawn in Sri Lankan reservoirs (FIS/2018/157)

Regional Manager, South Asia
Dr Pratibha Singh

Research Program Manager
Agribusiness: Mr Howard Hall
Fisheries: Prof Ann Fleming

See page 186 for contact details.

Maintaining quality and freshness under humid conditions presents a vast challenge in meeting standards for domestic and export markets. Food losses are large, especially during seasonal gluts. A new project, focusing on mango and tomato, will map value chains in Pakistan and Sri Lanka, to identify the extent and root causes of food losses.

5.4

Eastern and Southern Africa

Photo: Emmie Wachira

Eastern and Southern Africa

Economic performance of the African region has been strong for several years, but the COVID-19 pandemic has taken a heavy toll on lives and economies. Despite the impact of the pandemic, the region continues to recover from its worst recession in more than half a century and with economic growth of 3.4% in 2022.

Eastern and southern African countries have been the most affected by the economic impacts of the pandemic, with heavy disruptions to tourism-dependent, oil-exporting and other-resource intensive economies, resulting in deepening inequality. An estimated 39 million Africans could slip into extreme poverty this year, following about 30 million who were pushed into extreme poverty in 2020 as a result of the pandemic. However, economic recovery is fuelled by elevated commodity prices, the relaxation of stringent pandemic measures, and recovery in global trade. The region remains vulnerable due to low rates of vaccination on the continent, protracted economic damage, and the slow pace of recovery.

Despite its incredible diversity at a macro level, Africa has a greater proportion of poor people on average than any other region in the world, and the region is characterised by high levels of food insecurity and very low Human Development Index rankings. If the current trend continues, Africa will need to intensify its efforts to meet the United Nations' Sustainable Development Goals, including Goal 1 of eradicating extreme poverty by 2030.

Africa's urban population has been growing at a very high rate and is projected to reach 56% of the total population (currently 44% of 1.34 billion) by 2050. Africa's demand for food is expected to more than double by that time, driven by population growth, rising incomes, rapid urbanisation, changes in national diets towards greater consumption of higher-value fresh and processed foods, and more open intra-regional trade policies. This is compounded by impacts associated with climate change, which continue to hamper agricultural production, productivity and reliability and increase the demand for land and water. In addition, rural demographics continue to change. Rural populations are ageing, many farms are getting smaller, and rural youth are looking for more lucrative livelihoods in urban areas rather than in traditional farming.

These changes are helping create new opportunities for Africa's smallholder farmers. Their small farms are transforming into business operations, which in turn brings new challenges to the agricultural systems.

Agriculture typically accounts for 30–40% of the GDP of African countries and more than 70% of the continent's poor live in rural areas. While agriculture remains a key driver of the economic growth required to deliver economic transformation for the rural poor, growth in productivity and production have broadly stagnated in the past decade. Unlocking the potential of Africa's agricultural and food systems requires substantial investment in the agriculture sector and in research to provide the knowledge that underpins growth in agricultural productivity, especially for commercialising smallholder farming.

Partner countries in the ACIAR Eastern and Southern Africa region

- Burundi
- Ethiopia
- Kenya
- Malawi
- Mozambique
- Nigeria
- Rwanda
- South Africa
- Tanzania
- Uganda
- Zambia
- Zimbabwe

Drivers of regional collaboration

The Comprehensive Africa Agriculture Development Programme (CAADP) of the African Union, in collaboration with the Regional Economic Communities, has been at the helm of mobilising the interest and commitment of African member states and their stakeholders for the transformation of the African agriculture sector.

A major milestone was the adoption of the 2014 Malabo Declaration on Accelerated African Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods, in which the heads of states agreed to spend a minimum of 10% of their total expenditure on agriculture and pursue a target of 6% annual growth. Subsequently, the leaders noted the need for monitoring, tracking and reporting on the implementation of the declaration using the CAADP Results Framework.

In response to this, the African Union introduced a biannual review, the Africa Agriculture Transformation Scorecard, which tracks and reports each country's progress towards achieving the goals and targets of the Malabo Declaration. This important mechanism ensures that there is political will, backed by appropriate actions, to achieve agricultural growth and transformation in Africa.

The scorecard is presented at the African Green Revolution Forum, a key annual pan-African forum with a goal of accelerating progress on agriculture's contribution to economic growth and transformation, in line with delivering on the Malabo commitments.

The forum has become a premier platform for leaders from across Africa and around the world to advance concrete action plans and share knowledge to tap the enormous potential of agriculture in driving equitable and sustainable economic growth across the continent. The Alliance for a Green Revolution in Africa, in collaboration with several investors, coordinates the forum and produces a report on the forum, the Africa Agriculture Status Report.

Regional collaboration is crucial to achieving economic development in Africa, and the role of regional and sub-regional organisations is key, including the promotion and protection of foreign investment.

We are closely linked in with the main regional agencies including the Forum for Agricultural Research in Africa and the African Union Development Agency–New partnership for Africa Development and the Forum for Agricultural Research in Africa which remain important knowledge brokers and sources of priorities for the region.

We also liaise with sub-regional organisations, which are important strategic partners and play a key role in enhancing our impact to a regional scale, especially the Association for Strengthening Agricultural Research in Eastern and Central Africa and the Food, Agriculture, and Natural Resources Policy Analysis Network.

A good source for calibrating our regional priorities comes from the annual African Green Revolution Forum, which aims to advance concrete action plans and share knowledge to tap into the enormous potential of agriculture in driving equitable and sustainable economic growth across the continent.

TISA project assistant Emmanuel Kimaro (right) talks with farmer Zamda Tave, of Kiwere. Mr Kimaro works on a project that has introduced soil and water management technologies to farmers in 3 countries, to increase productivity and incomes, and make irrigation schemes more self-sustaining. Photo: Andrew Munuwa

Eastern and Southern Africa region program 2022–23

Partner country	No. projects
Burundi	1
Ethiopia	6
Kenya	9
Malawi	4
Mozambique	5
Nigeria	1
Rwanda	2
South Africa	4
Tanzania	5
Uganda	5
Zambia	2
Zimbabwe	5

Note that a project may be conducted in several countries, therefore the total number of projects in this table will be greater than the number of projects in the region.

This data was compiled in August 2022. Additional projects may be commissioned during 2022–23.

Research portfolio

3 Agribusiness projects

1 Climate Change project

9 Crops projects

0 Fisheries projects

2 Forestry projects

1 Horticulture project

7 Livestock Systems projects

0 Social Systems projects

0 Soil and Land Management projects

3 Water projects

5 CultiAF2 projects

Table 5.4 Current and proposed projects in the Eastern and Southern Africa region, 2022–23

Project title	Project code	Country
Agribusiness		
Kwale agricultural research for development project, Kenya	AGB/2021/123	Kenya
Managing food value chains for improved nutrition for urban vulnerable populations in Lusaka City (Zambia) (AfricitiesFood)	CS/2020/210	Zambia
Managing food value chains for improved nutrition for urban vulnerable populations in Mzuzu City (Malawi) (AfricitiesFood)	CS/2021/115	Malawi
Climate Change		
Supporting the tracking sharing learning platform of the Adaptation Research Alliance	CLIM/2022/108	Global
Crops		
Faba bean in Ethiopia: Mitigating disease constraints to improve productivity and sustainability	CIM/2017/030	Ethiopia
Rapid breeding for reduced cooking time and enhanced nutritional quality in common bean (*Phaseolus vulgaris*)	CROP/2018/132	Burundi, Ethiopia, Kenya, Rwanda, Tanzania, Uganda
International Mungbean Improvement Network 2	CROP/2019/144	Bangladesh, India, Indonesia, Kenya, Myanmar
Protecting Ethiopian lentil crops	CROP/2020/164	Ethiopia
Accelerating genetic gain in wheat through hybrid breeding in Bangladesh, Ethiopia and Pakistan	CROP/2020/167	Bangladesh, Ethiopia, Pakistan
Australian technology reaches the field: Supporting and monitoring the release of pod-borer resistant cowpea	CROP/2021/165	Nigeria
Harnessing appropriate-scale farm mechanisation in Zimbabwe	CROP/2021/166	Zimbabwe
Adoption of conservation agriculture practices in selected sites in eastern Africa: Drivers, constraints and obstacles	CROP/2022/106	Kenya, Tanzania, Uganda
Demand-led plant variety design for emerging markets in Africa	FSC/2013/019	Ghana, Kenya, South Africa, Tanzania
Forestry		
Growing the future: Better forestry in Uganda	FST/2021/147	Uganda
Fruit trees for climate adaption and mitigation in East Africa	FST/2021/163	Kenya
Horticulture		
Developing a biosecurity system for small banana growers resilient to *Fusarium* wilt TR4 in southern and eastern Africa	HORT/2020/128	Mozambique, South Africa, Tanzania
Livestock Systems		
Resilient and low-carbon livestock systems for trade and food security in the rangelands of eastern and southern Africa	LS/2020/152	Ethiopia, Kenya, Zimbabwe
Upscaling the benefits of insect-based animal feed technologies for sustainable agricultural intensification in Africa (PROTeinAfrica)	LS/2020/154	Kenya, Rwanda, Uganda
Water		
Transforming smallholder irrigation into profitable and self-sustaining systems in southern Africa	LWR/2016/137	Malawi, Mozambique, South Africa, Tanzania, Zimbabwe
Virtual Irrigation Academy Phase 2: From water monitoring to learning to governance	WAC/2018/162	Malawi, Mozambique, South Africa, Zimbabwe
Information for agriculture and food security – Digital Earth Africa	WAC/2021/164	Eastern and southern Africa
CultiAF2		
Climate-smart interventions for smallholder farmers in Ethiopia (CultiAF 109038)	GP/2019/173	Ethiopia
User-driven approaches to make government and farmer led smallholder irrigation in Mozambique more productive (CultiAF 109039)	GP/2019/174	Mozambique
Alien invasive fruit flies in southern Africa: Implementation of a sustainable integrated pest mangement programme to combat their menaces (CultiAF 109040)	GP/2019/175	Malawi, Mozambique, Zambia, Zimbabwe
Harnessing dietary nutrients of underutilised fish and fish-based products in Uganda (CultiAF 109041)	GP/2019/176	Uganda
Improving agricultural productivity and resilience with satellite and cellphone imagery to scale climate-smart crop insurance (CultiAF 109076)	GP/2019/177	Kenya

Eastern and Southern Africa

A$8.2 million
Budgeted funding

22
Bilateral and regional research projects

4
Small projects and activities

The agricultural environments of eastern and southern Africa and northern Australia have much in common — the wet tropics of Rwanda with northern Queensland, the semi-arid tropics of eastern Africa with central Queensland, and the arid rangelands of Ethiopia and southern Africa with the Northern Territory.

Australian agricultural science has expertise that is directly relevant to the African context. For more than 3 decades, ACIAR has supported projects that mobilised this expertise to deliver sustainable development outcomes in the region. The free-market orientation and effective architecture of agricultural research in Australia are also relevant to African agricultural transformation.

The ACIAR program with eastern and southern Africa fills a niche not addressed by many donors: agricultural research-for-development. Our work is highly regarded and remains as relevant now as it was 30 years ago because of our research for development focus, ability to enable projects with a trans-disciplinary and cross institutional approach, the similarities of the agricultural environments between Australia and eastern and southern Africa, synergies built with Australia's world-class teaching and research institutions that advance African agriculture and our long-term commitment to address specific constraints in agricultural production, with multi-year projects.

We currently invest 10% of our annual budget in our Eastern and Southern Africa regional program and directly fund projects in partnership with 11 African countries. However, our footprint is much broader because of our contribution to the CGIAR, which has 4 of its centres located in Africa and, until recently, spent half of its total budget in Africa.

Our program is delivered primarily through bilateral country research partnerships (linked to regional impact pathways) and regional collaborations coordinated with sub-regional organisations. We also have a strong element of engagement through the CGIAR. The portfolio of projects covers a diverse range of priorities, guided by the recommendations of the regional research coordination bodies that we collaborate with.

We also have a substantial collaboration with Canada's International Development Research Centre through two programs: Cultivate Africa's Future Fund (CultiAF) that is focused on Africa, and the Food Loss Research Program that has a global reach with two of its projects being implemented in Africa. Now in its second phase and supporting 9 projects across 7 countries, CultiAF has been a highly regarded and somewhat unique program with Africa. Several CultiAF2 projects ended in 2021 and the overall program has recently undergone an external review whose results will inform the 2 agencies on ways forward and possibly provide options for additional work.

2022–23 research program

- **26 ACIAR-supported projects in eastern and southern Africa**
- **24 projects are specific to this country**
- **2 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 eastern and southern Africa. The projects are grouped according to research programs. Each project description is referenced in a list at the end of this section, which provides the project title and code.

Agribusiness

Zambia and Malawi are among the world's hungriest and fastest urbanising countries. The number of people facing food insecurity continues to rise, grabbing international attention in policy dialogues on food and nutrition security. One of the key strategies to address this hunger and nutrition challenge lies in food loss along the food value chain. With the demographic shift to cities and towns, food value chains now involve many actors that influence the way that food is produced, processed, distributed, marketed and consumed.

This situation has resulted in an increased number of actors, raised questions of actor responsibility and inefficiency (both resulting in increased food loss), increased cost of food and reduced nutrition security. Dr Gilbert Siame of the University of Zambia and Dr Mtafu Manda of Mzuzu University of Malawi lead 2 projects that seek to make an intervention at 4 stages of the fresh food value chain in selected cities in Zambia and Malawi to understand the drivers and implications of food loss at points of production, transportation, open-air markets and households. This project is part of the ACIAR–IDRC Food Loss Research Program (page 23).[1,2]

Sub-Saharan Africa is one of the fastest growing regions in the world, in terms of population growth and the number of undernourished people, making food insecurity a top challenge. 74% of Kenya's population live in rural areas and rely on farming to support livelihoods. The expansion of food production and supply is a priority of the Kenyan Government. A new project led by Ms Deb Doan of Business for Development will develop and trial a model for market-driven, collaborative value chains incorporating collective farming systems and intensive and circular agriculture principles to create sustainable and ethical production systems in the smallholder farming community of Kwale, Kenya. Critical success factors will be identified and implemented for adoption and scale-out by existing networks and institutions across Kenya.[3]

Dr Gilbert Siame of the University of Zambia (right), pictured with ACIAR Regional Manager, Dr Leah Ndungu, inspect a field site linked to a project where food loss is investigated at 4 points along the value chain. Photo: Emmie Wachira

ACIAR supports several projects in eastern and southern Africa to improve crop development, nutritive value and pest and disease tolerance of major food crops, including faba beans, mungbeans and lentils. Photo: Emmie Wachira

Crops

Nigeria produces about 44% of the world's cowpea, but it is also the largest importer of cowpea in Africa. Grown by millions of smallholder farmers, the crop is the main source of dietary protein and vital minerals such as iron in Nigeria. Most households consume cowpea in various cooked forms at least once a day. Pre-harvest infestation of pod borer can reduce production by up to 80%. A Bt-based pod borer-resistant cowpea developed by Dr TJ Higgins of CSIRO has been grown by farmers since 2021. The project will support a small field-based research activity by the African Agricultural Technology Foundation to assess the entomological effects and impact on agronomic practices and yield of the pod borer-resistant cowpea compared with conventional cowpea, determine the impact of growing pod-borer resistant cowpea on family workload and livelihood, and assess the opportunity for release of the pod borer-resistant cowpea in Ghana and Burkina Faso. The project will also assess the socio-economic performance of the new variety and the application of stewardship protocols along its value chain.[4]

Mungbean is an ideal rotation crop for smallholder farmers throughout the Indian Ocean Rim region. The International Mungbean Improvement Network, established through a project led by Dr Ramakrishnan Nair of the World Vegetable Center, helped realise the potential of mungbean to improve cropping system productivity and livelihoods by improving researchers' access to genetic material, and coordinating and providing technical support to variety development in Bangladesh, India, Myanmar and Australia. Phase 2 of the project extends the network to Kenya and Indonesia, expanding the source of germplasm to develop new mungbean varieties, as well as strengthening the capacity of more national mungbean breeding programs.[5]

Using new plant breeding methods, a project led by Professor Wallace Cowling of the University of Western Australia aims to deliver genotypes of the common bean (*Phaseolus vulgaris*) that have 30% shorter cooking time, 15% greater zinc and 10% greater iron content than current varieties. The new types will also have better resistance to bruchid beetle and *Pythium* root rot, and other improved agronomic trait. The project continues to train plant breeders in the Pan-Africa Bean Research Alliance, coordinated by the International Center for Tropical Agriculture, in accelerated plant breeding, based on recent developments in genetic data collection and analysis.[6]

Faba bean is the most important legume crop in Ethiopia, where pulses contribute 15% of the protein consumed. Faba bean gall disease threatens the ongoing cultivation, viability and existence of the crop in the highland areas of Ethiopia. A project led by Professor Martin Barbetti of the University of Western Australia continues to build knowledge of the disease, its distribution and its management. The project is delivering integrated disease management packages and extension packages to manage faba bean gall. In doing so, the project will increase the capacity of Ethiopian scientists and extension workers to address other plant disease issues using new methodologies and knowledge obtained through this project.[7]

Lentils are one of the main pulses consumed and an essential rotation cash crop for smallholders in cereal-based cropping systems of the mid-highlands of Ethiopia. Protecting the lentil crop and increasing its productivity is a priority for the Ethiopian Institute of Agricultural Research, as previously minor viral diseases have recently become high-impact epidemics. Professor Martin Barbetti of the University of Western Australia has mobilised the best expertise in Australia and the International Center for Agricultural Research in the Dry Areas to support Ethiopian lentil breeding and plant pathologists. In 2022–23, the project continues to identify germplasm with a high level of resistance to the target diseases and establish sustainable disease management practices for production systems in Ethiopia.[8]

A scoping study will be commissioned in eastern Africa to understand how conservation agriculture practices are known and evaluated by farmers around past experimental sites. The main aim of the study is to identify research questions about the interplay between conservation agriculture, small scale machinery and the integration of crop with livestock, to be addressed in a future project.[9]

Previous ACIAR projects in Zimbabwe showed the potential benefits of appropriate-scale mechanisation for productivity, resilience and reduced drudgery, enabling the adoption of climate smart intensification technologies (which tend to increase labour demands). The Government of Zimbabwe is now investing to support mechanisation, especially to mechanise the maize conservation agriculture practice locally known as Pfumvudza. Dr Frederic Baudron of CIMMYT is leading the project, which aims to support government and private sector investment in mechanisation, through better targeting, business intelligence, modelling alternative investment outcomes, coordination of stakeholders and the local and regional exchange of information.[10]

Demand-led plant variety design has the potential to transform plant breeding for small-scale agriculture and food security. A project facilitated by the Alliance for Agricultural Research and Development for Food Security (page 24) and led by Professor Kaye Basford of the University of Queensland engages with plant-breeding and university sectors in many countries. Phase 1 identified skills and processes needed for breeders to obtain high-performing plant varieties to meet the demands of emerging markets in Sub-Saharan Africa. Phase 2 provided more plant breeders with access to the program and focused on the implementation of best practice in demand-led plant-breeding programs for beans and tomatoes. The project concludes in 2023 with the strengthening of education and training programs for plant breeders across Africa to build capacity in demand-led variety design.[11]

Hybrid wheat has the potential to produce more grain from the same or less land, significantly contributing to food security and land sustainability. However, technical difficulties of hybrid wheat development and the high cost of hybrid seed have constrained the commercial development of new varieties for many decades. Professor Richard Trethowan of the University of Sydney leads a project that aims to extend the benefits of new hybrid wheat systems to researchers, wheat breeders, farmers and consumers in Pakistan, Bangladesh and Ethiopia. The university has developed a novel, cost-effective and practical system to rapidly produce large numbers of wheat hybrid combinations for testing in breeding programs, and to produce large amounts of hybrid seed for sale to farmers at an acceptable cost. The project will establish the performance of the hybrids, and determine effective technical processes and business models to produce the seed in collaboration with the national programs and local seed providers in each country.[12]

Previous ACIAR funded-projects established that agroforestry trees around homesteads and farms can underpin and improve food security and livelihoods. New research focuses on the potential to enhance farm-level climate adaptation and household food security through increased planting and strategic siting of fruit trees. Photo: Isaac Kasamani

Forestry

Uganda has experienced a sharp decline in forest cover, from 24% in 1990 to 9% in 2015. To mitigate this, the government has prioritised forest restoration, but forest cover continues to decline. A new project led by Dr Hillary Agaba of the National Forestry Resources Research Institute aims to improve the effectiveness of forest restoration in Uganda by identifying factors contributing to success or failure in current and recent forestry projects. The project will build the capacity of community-based organisations, NGOs and commercial forestry actors to conduct and analyse research while improving the returns on forestry investment.[13]

Previous ACIAR projects have established that adopting agroforestry trees around homesteads, farmers' fields and landscape niches in East Africa can provide products and services that underpin and improve food security and livelihoods. A new project led by Professor Catherine Muthuri of World Agroforestry aims to enhance farm-level climate adaptation as well as household food security and nutrition for smallholders in Kenya and Rwanda by increasing the stocking and strategic siting of fruit trees. Researchers will also explore the potential for the carbon sequestered in fruit trees to provide access to additional international climate finance.[14]

Horticulture

Fusarium wilt tropical race 4 (TR4) of bananas is caused by a highly destructive and invasive plant pathogen, the soil-borne fungus *Fusarium* sp. The disease, also called Panama disease, was first detected in Africa in 2013 in northern Mozambique, and further spread of the disease would be catastrophic. In eastern and central Africa, 70–100 million people rely directly or indirectly on bananas for their livelihoods. A new project led by Mr Stewart Lindsay of the Queensland Department of Agriculture and Fisheries aims to understand the vulnerabilities of banana farming systems in Mozambique and Tanzania and work with country partners and landholders to identify biosecurity measures to reduce risks and mitigate the damage in farmer fields. The project aims to build knowledge specifically for smallholder banana production systems to inform research, extension, regulatory and policy decisions more broadly in Africa, Asia and Latin America, where smallholder banana producers are common.[15]

Livestock Systems

Extensive livestock systems support the majority of Africa's livestock population, but many pastoralists experience chronic food, nutrition and economic insecurity. Furthermore, livestock account for almost 80% of total agricultural emissions in eastern Africa. In the rangelands of eastern and southern Africa, sociocultural practices and climate are not conducive to crop production.

Livestock are the lifeblood of these systems and the people that thrive within them. A new project focused on Ethiopia, Kenya and Zimbabwe will address knowledge gaps and identify emergent opportunities to increase livestock productivity and trade, while reducing greenhouse gas emissions. Dr Dawit Solomon of the International Livestock Research Institute will lead the project, which is structured around 4 key intervention areas: community-based rangeland management, small ruminant community-based breeding initiatives, animal health and increased off-take through livestock marketing.[16]

Through the INSFEED projects, which are part of CultiAF, the International Centre of Insect Physiology and Ecology and partners successfully demonstrated mass insect rearing on organic waste, resulting in both a proven animal protein source and organic fertiliser. Post-harvest technologies were established to ensure product shelf-life and safety, meeting national standards for the use of insects as ingredients in compounded feeds. Dr Chrysantus Tanga of the International Centre of Insect Physiology and Ecology leads a new project that starts with scaling up the production of insects and insect-based feed products through modular rearing systems. These systems are already established in Kenya and Uganda and will be assessed for Rwanda. Several storage techniques will be investigated for their potential to improve both shelf and on-farm storage conditions in Kenya.[17]

Dr Anna Okello, ACIAR Livestock Systems RPM and the ACIAR Africa team visited Riverside Farm in Embu, Kenya. The farm is a commercial pig production enterprise that rears black soldier flies larvae using pig manure as the substrate. Photo: Emmie Wachira

Water

Smallholder farmers in southern Africa require new irrigation management skills to realise the benefits and potential of available irrigation infrastructure. Phase 1 of the Virtual Irrigation Academy project in Malawi, South Africa and Tanzania developed a system of continual social and institutional learning to improve the profitability and sustainability of irrigated farming. Phase 2 of the project, led by Dr Richard Stirzaker of CSIRO, will develop the Virtual Irrigation Academy system into a water learning and governance platform to support smallholder farmers and address the information deficits at scheme to national levels. In 2022–23, the rollout of the Virtual Irrigation Academy will be supported across irrigation schemes in Malawi, Mozambique and Zimbabwe. An assembly facility for the production of the Chameleon sensor, and training for repairs to the device, will be set up on Malawi.[18]

Irrigation has significant potential to contribute to food security in Sub-Saharan Africa, but many irrigation schemes are under-performing and returns on investment in irrigation infrastructure are low. The Transforming Irrigation in Southern Africa (TISA) project, led by Professor Jamie Pittock of the Australian National University, has involved irrigation schemes supporting more than 15,000 farmers in Mozambique, Zimbabwe and Tanzania. Due to be completed in 2023, the project has introduced soil and water management technologies that have increased the productivity and incomes of farmers and made irrigation schemes more self-sustaining. In its final year, the project will report on the best methods for dissemination of technologies and identify the factors leading to inequity among farmers in water supply and financial benefit from irrigation schemes.[19]

Earth Observation-based services are increasingly being identified as an essential enabler in addressing food security, both in Africa and the world over. To support more effective and sustainable use of water resources for food security, food system managers in Africa require awareness and easy access to such services. A new project, led by Dr Cedric Jorand of Geoscience Australia, in partnership with the Association for Strengthening Agricultural Research in Eastern and Central Africa aims to support consultations with African agricultural and water management agencies to understand the needs, opportunities and gaps for using Earth Observation-based services to increase agricultural productivity and sustainability, including through improved water use. In doing so, the project will develop a roadmap for Digital Earth Africa to deliver services tailored to these needs, to improve productivity and build resilience.[20]

CultiAF2 projects

Climate change is causing a higher frequency of drought and crop failures in Ethiopia's dry lowlands, exposing farmers to food shortages and livestock losses due to a lack of feed. Dr Taye Mindaye of the Ethiopian Institute of Agricultural Research leads a project, which started with CultiAF2, to develop and implement technologies that reduce the risk of crop failure, increase crop productivity and create new business opportunities for women. The focus is on technologies associated with sorghum production, such as drought-tolerant varieties and small-scale threshers.[21]

Inefficiency constrains the performance of government and farmer-led smallholder irrigation schemes in Mozambique. A CultiAF2 project led by Dr Mario Chilundo of the University of Eduardo Mondlane, Mozambique, aims to equip farmers with the resources and skills to sustain such schemes and identify institutional strategies to support government rehabilitation and expansion programs. The project will combine technical (soil and water management practices), social (business plans and market linkages) and institutional (innovation platforms and water-user associations) innovations and compare changes in their management, productivity and profitability for farmers. Gender analysis and scenario planning will be conducted to inform the design of user-driven, equitable and gender-responsive approaches for schemes that are inclusive of all users.[22]

High-value horticultural crops are key drivers of economic development in Sub-Saharan Africa. Fruit crops can return a higher income than staple crops, and they provide more employment opportunities for smallholders both on and off the farm, especially women. Fruit-fly infestations reduce the quality and quantity of fruit, curtailing lucrative export opportunities and increasing the use of synthetic insecticides. Dr Samira Mohamed of the International Centre of Insect Physiology and Ecology, Kenya, will lead a project to adapt and promote the widescale adoption of integrated pest-management interventions in Malawi, Mozambique, Zambia and Zimbabwe.[23]

Nutritional deficiencies are widespread in Uganda's poor rural and urban communities, particularly in women of reproductive age and children under 5 years, due to limited access to animal protein and micronutrient-rich foods, especially fish. Dr Jackson Efitre of Makerere University, Uganda, leads the NutriFish project and works with the fish sector and its associated value chains to address the nutritional needs of vulnerable groups. NutriFish aims to increase the availability, accessibility and consumption of underused fish to improve sustainable food and nutrition security and improve the livelihoods of vulnerable groups. It also aims to increase by-product processing through public–private partnerships.[24]

Crop insurance is an option for farmers to protect their livelihoods against losses, as climate changes and extreme weather events become more frequent. However, very few insurance schemes are suitable for smallholder farmers. The high monitoring and verification costs of traditional insurance, the low demand for index-based insurance and the lack of complementary risk-management options (such as irrigation and drought-tolerant cultivars) are constraints for farmers in Kenya. Mr Amos Tabalia of Agriculture and Climate Risk Enterprise Limited leads a project to rigorously evaluate insurance packages and promote technologies to make farming systems more resilient. This project focuses on technologies such as satellite and cell phone imagery to verify crop losses and observe management practices.[25]

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Horticulture: Ms Irene Kernot
Livestock Systems: Dr Anna Okello
Water: Dr Neil Lazarow
CultiAF: Dr Anna Okello

See page 186 for contact details.

Current and proposed projects

1. Managing food value chains for improved nutrition for urban vulnerable populations in Mzuzu City (Malawi) (AfricitiesFood) (CS/2021/115)
2. Managing food value chains for improved nutrition for urban vulnerable populations in Lusaka City (Zambia) (AfricitiesFood) (CS/2020/210)
3. Kwale Agricultural Research for Development Project, Kenya (AGB/2021/123)
4. Australian technology reaches the field: Supporting and monitoring the release of pod-borer resistant cowpea [Nigeria] (CROP/2021/165)
5. International Mungbean Improvement Network 2 [Bangladesh, India, Indonesia, Kenya, Myanmar] (CROP/2019/144)
6. Rapid breeding for reduced cooking time and enhanced nutritional quality in common bean (*Phaseolus vulgaris*) [Burundi, Ethiopia, Kenya, Rwanda, Tanzania, Uganda] (CROP/2018/132)
7. Faba bean in Ethiopia: Mitigating disease constraints to improve productivity and sustainability (CIM/2017/030)
8. Protecting Ethiopian lentil crops (CROP/2020/164)
9. Adoption of conservation agriculture practices in selected sites in eastern Africa: Drivers, constraints and obstacles [Kenya, Tanzania, Uganda] (CROP/2022/106)
10. Harnessing appropriate-scale farm mechanisation in Zimbabwe (CROP/2021/166)
11. Demand-led plant variety design for emerging markets in Africa [Ghana, Kenya, South Africa, Tanzania] (FSC/2013/019)
12. Accelerating genetic gain in wheat through hybrid breeding in Bangladesh, Ethiopia and Pakistan (CROP/2020/167)
13. Growing the future: Better forestry in Uganda (FST/2021/147)
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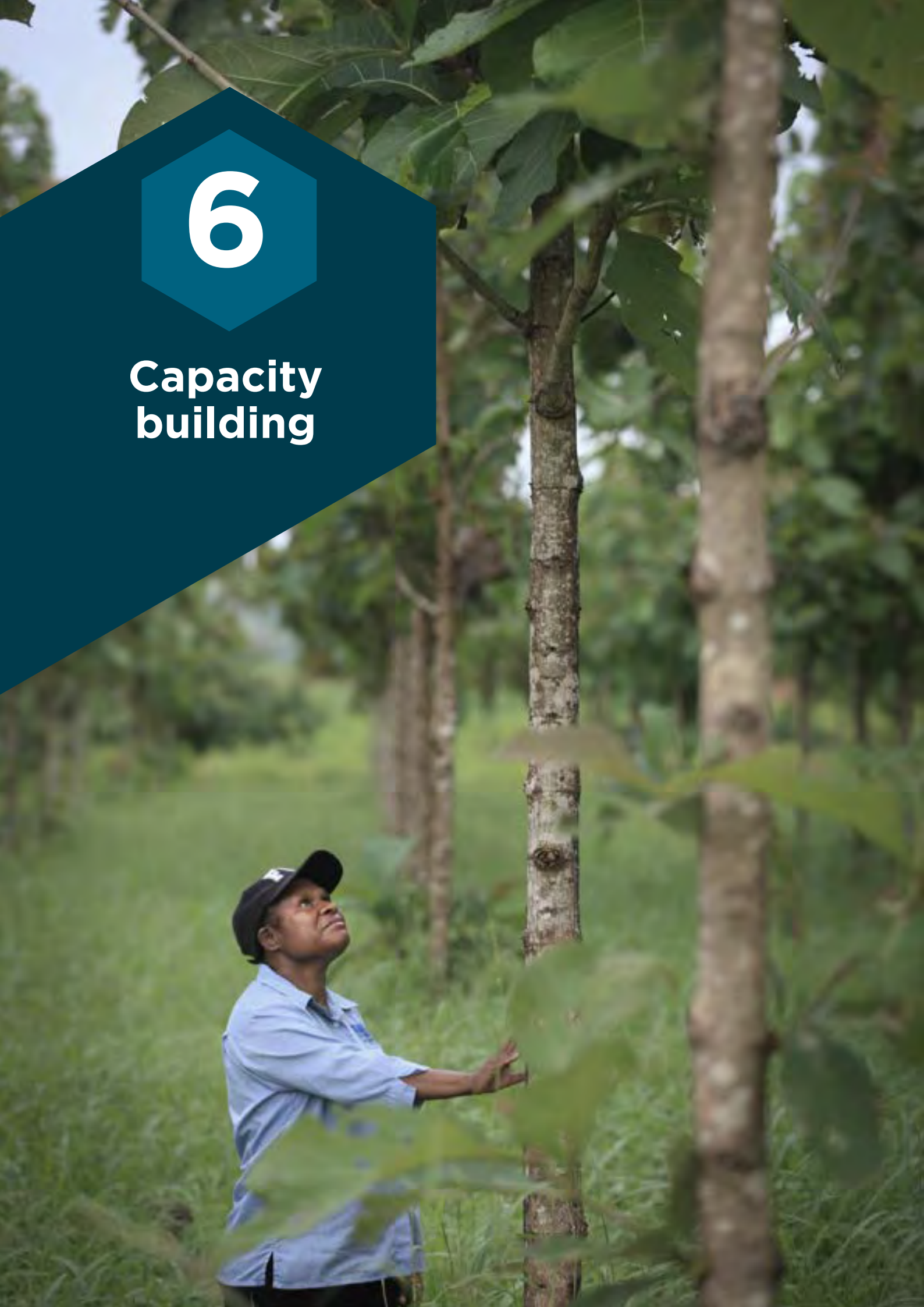
15. Developing a biosecurity system for small banana growers resilient to *Fusarium* wilt TR4 in southern and eastern Africa [Mozambique, South Africa, Tanzania] (HORT/2020/128)
16. Resilient and low-carbon livestock systems for trade and food security in the rangelands of eastern and southern Africa [Ethiopia, Kenya, Zimbabwe] (LS/2020/152)
17. Upscaling the benefits of insect-based animal feed technologies for sustainable agricultural intensification in Africa (PROTeinAfrica) [Kenya, Rwanda, Uganda] (LS/2020/154)
18. Virtual Irrigation Academy Phase 2: From water monitoring to learning to governance [Malawi, Mozambique, South Africa, Zimbabwe] (WAC/2018/162)
19. Transforming smallholder irrigation into profitable and self-sustaining systems in southern Africa [Malawi, Mozambique, South Africa, Tanzania, Zimbabwe] (LWR/2016/137)
20. Information for agriculture and food security – Digital Earth Africa [Eastern and southern Africa] (WAC/2021/164)
21. Climate-smart interventions for smallholder farmers in Ethiopia (CultiAF 109038) (GP/2019/173)
22. Improving agricultural productivity and resilience with satellite and cellphone imagery to scale climate-smart crop insurance (CultiAF 109076) [Kenya] (GP/2019/177)
23. Alien invasive fruit flies in southern Africa: Implementation of a sustainable integrated pest management programme to combat their menaces (CultiAF 109040) [Malawi, Mozambique, Zambia, Zimbabwe] (GP/2019/175)
24. User-driven approaches to make government and farmer led smallholder irrigation in Mozambique more productive (CultiAF 109039) [Mozambique] (GP/2019/174)
25. Harnessing dietary nutrients of underutilised fish and fish-based products in Uganda (CultiAF 109041) (GP/2019/176)



6

Capacity building

Capacity building

Science and innovation are critical to advancing agriculture and livelihoods in the Indo-Pacific region. However, of equal importance to our partner countries is the development of individual and organisational science and policy capability to implement research outcomes.

Developing capability in partner countries is a key priority for ACIAR to maximise the adoption of new knowledge and technologies to contribute to our strategic objectives. The ACIAR Capacity Building Program identifies and establishes opportunities for individuals and organisations in partner countries to boost technical, policy and management skills in agricultural research-for-development. To achieve this, we facilitate programs in scientific research, leadership, management, policy and governance with our partners in the Indo-Pacific region.

In 2022–23 the program will return to face-to-face learning, after several years of remote delivery because of the COVID-19 pandemic. While face-to-face is the preferred mode of delivery, we will draw on the experience of remote delivery and apply some of the benefits discovered during this period. At the same time, we will continue to develop ACIAR Learn, a bespoke online learning portal, to offer flexibility and greater access to learning opportunities in our program.

This year we will also work towards a stronger integration of our Capacity Building Program with the Research Program. We will work to embed more strategic capacity building initiatives at the planning stage of selected research projects and facilitate connections between the extensive alumni network and current research projects and opportunities.

John Dillon Fellowship

We have been delivering the John Dillon Fellowship for 20 years. The program develops the leadership and management skills of mid-career professionals, particularly scientists, researchers and economists working in agriculture research-for-development in ACIAR partner countries. To date, there are more than 180 alumni of the program across our partner countries.

In 2022–23, we will be completing the program for cohorts in the Philippines and Vietnam and beginning new cohorts in Bangladesh and the Pacific Region in partnership with our provider, the University of New England. In 2022–23, ACIAR is continuing to deliver the program in individual country cohorts of up to 18 participants with a strong focus on cross-organisational collaboration and strengthening ties with Australian partners. This approach further bolsters Australia's approach to science diplomacy.

Meryl Williams Fellowship

ACIAR launched the Meryl Williams Fellowship Program in 2019. This initiative works with women agricultural researchers, providing them with the skills and knowledge to take on greater leadership positions in their employing institutions. The fellowship contributes to more secure food systems and our strategic objective of gender equality and women's empowerment by providing women in agricultural science with greater access to leadership resources, building collaborative networks, supporting career advancement and driving institutional progress towards gender equity. The fellowship is delivered by the University of New England. In 2022–23 the first cohort of fellows will conclude the program with face-to-face workshops in Australia in November.

The second cohort of the Meryl Williams Fellowship will meet in Australia for the first time in August to formally start the program. The cohort has been engaging in mentoring activities online for the last 12 months and will use their time in Australia to consolidate their learning and develop career development plans to implement until their final workshop in late 2023.

John Allwright Fellowship

In 2022–23 John Allwright Fellows who were previously impacted by travel restrictions are starting or restarting their studies in Australia. There are currently 37 fellows in the program. Applications for study in 2023 will be assessed and offers to new fellows made.

During the year the selection criteria for the John Allwright Fellowship will be revised for the 2024 round to ensure it better reflects the strategic priorities of the countries in which we work and current ACIAR research projects. This follows changes to the criteria for the 2023 round that identified priority countries for applications.

In 2022–23, the John Allwright Support Facility will provide support, advice and direction to John Allwright Fellowship scholars and ACIAR. The facility includes regular check-ins with fellows during their higher degree research program. This includes both academic and welfare support, noting the significant challenges associated with research during a global pandemic. The facility will primarily act as a second layer of support to provide advice and hands-on assistance to help the fellows achieve their qualifications and advise ACIAR on how we can improve management of the Fellowship.

The John Allwright Fellowship Executive Leadership program continues to be a key mechanism to enhance leadership skills development for fellows in Australia. The program equips the fellows with leadership and management skills designed to support their return to the workplace and will be revised for ongoing implementation this financial year.

Pacific scholarships

Our longstanding agricultural research scholarship program with the University of South Pacific was redesigned, expanded and renamed PASS-CR (Pacific Agricultural Scholarship Support and Climate Resilience program). 2021 saw the inclusion of scholarships at Fiji National University, and a return to offering PhD scholarships. Currently, there are 29 Pacific scholars studying under this program at either university, with this number set to expand as we finalise the 2023 intake. Scholars are aligned to an ACIAR research project in agriculture, forestry and fisheries and have an Australian co-supervisor. Through PASS-CR, ACIAR aims to support new generations of Pacific agricultural researchers who are equipped to tackle and address the challenges facing Pacific agriculture now, and into the future.

The redesigned PASS-CR academic support program is being delivered primarily through the University of Sunshine Coast's Australian Centre for Pacific Island Research, in conjunction with Southern Queensland University, Central Queensland University and Science Research Organisation of Samoa. Through PASS-CR, Pacific students and staff will have access to the extensive Pacific Agriculture Information System, which houses more than 1000 Pacific agricultural records. This will address the difficulty researchers have in locating information about their own countries.

The PASS-CR academic support program extends beyond awarding scholarships and engages both with the Schools of Agriculture and Offices of Research at University of South Pacific and Fiji National University, providing workshops, research training and networking to scholars and their supervisors.

Activities in 2022–23 include support to locate strategic research priorities, monthly Pacific seminars (which are jointly presented to Pacific and Australian students) and higher degree research supervision workshops for students and academics.

PASS masters scholarship recipient, Ms Nirma Nadan conducts her research on the on *Actinobacteria* as a bio-control approach for managing bacterial wilt in tomatoes. Photo: Nirma Nadan

Alumni program

In response to the COVID-19 pandemic, the Alumni Research Support Facility was opened for applications. This targeted activity provides up to $20,000 for small research activities that build resilience and respond to the emerging challenges that COVID-19 has placed on agricultural systems in our partner countries. The program will conclude in August 2023. Across the 3 phases of the program, the facility is supporting 103 small research projects led by ACIAR alumni across the Indo-Pacific. In 2022–23 the final research projects will be completed for participants from the first 2 rounds of the program, some 65 small research activities. We will be working closely with this cohort of researchers to support them to undertake outreach activities to ensure this research has maximum impact.

During 2022–23, we will be continuing to deliver our new Global Alumni Strategy, with an increased focus on supporting alumni through the post-COVID operating environment. The aim of this strategy is to engage with ACIAR alumni to develop the skills, knowledge and networks of agricultural researchers and scientists to contribute to positive development outcomes in the agricultural research-for-development sector.

Under the Global Strategy, ACIAR Country and Regional Offices will continue to implement their 3-year alumni engagement plans. These plans have identified the priorities and interests of each country's alumni. From these, annual plans identify a program of activities to be implemented at the country and regional level, including training workshops (both online and in-person), networking events and new opportunities for alumni.

In 2022–23, we will continue to build on our virtual alumni network, ACIAR Alumni 360, developing pathways for further engagement with ACIAR work. The platform is designed to be the central mechanism for alumni to interact with ACIAR and the greater alumni network. Country Office staff facilitate country chapter pages with links to information about events, research collaborations and discussion forums. ACIAR Alumni 360 also includes information on the Capacity Building Program, including calls for applications to our fellowships, funding opportunities, publications and other resources. There are currently around 600 active members on the platform, and we expect this will continue to grow in 2022–23.

ACIAR Learn (online learning)

ACIAR in partnership with University of Queensland and Catalpa International piloted a new mobile-learning platform, ACIAR Learn, in response to the COVID-19 pandemic. The platform is a bespoke online learning for agricultural researchers demonstrating best practice of Australian agricultural science knowledge. In 2022–23, we will continue to strengthen the platform, incorporating lessons learned from the pilot courses and working with the research program and Alumni to develop relevant and engaging content for users continued professional development.

The first cohort of the Meryl Williams Fellowship graduated in November 2022, in Brisbane. The fellows are pictured with ACIAR General Manager, Outreach and Capacity Building, Eleanor Dean (centre back, in pink), and fellowship facilitators from the University of New England, Dr Rebecca Spence and Dr Philip Harrell. Photo: Patrick Cape.

Organisational capacity building

ACIAR has long-term relationships with overseas agricultural research organisations. The ongoing nature of our research partnerships makes it important to understand the enablers, constraints and impacts that capacity building has on strengthening institutions. Under our organisational capacity-building research, we are identifying approaches that have been successful in enhancing our research partners' organisational effectiveness for improved agricultural research. This body of work is informing new approaches to enhance institutional awareness in research projects for more effective and sustainable research outcomes. In 2022–23 we will continue to work with a select number of partner organisations and develop shared pathways and approaches to supporting increased organisational effectiveness.

Other training activities

ACIAR supports training activities delivered by the Crawford Fund. This includes the Master Class and Training Program, a new program of e-mentoring linking agricultural researchers from developing countries with mentors in Australia, and the Next-Gen suite of activities designed to build interest in careers in international agricultural research.

Director, Capacity Building
Ms Kate Turner-Mann

See page 185 for contact details.

Table 6.1 Participation in ACIAR capacity-building programs

Programs	2017–18	2018–19	2019–20	2020–21	2021–22	2022–23 (est)
John Allwright Fellowship						
No. active in year	97	85	75	70	37	37
No. awarded in year	7	12	10	10	No round	12
John Dillon Fellowship						
No. active in year	10	28	28	20	15	36
Meryl Williams Fellowship						
No. active in year	–	–	20	40	40	23
Pacific Scholarships						
No. active in year	13	10	10	23	23	29
No. awarded in year	6	6	3	14	11	To be awarded
Alumni engagement						
No. participants	–	75	90	140	180	120
Launch fund						
No. events supported	–	11	15	11	8	4

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Increasing influence and impact

Photo: Conor-Ashleigh

Increasing influence and impact

Reflecting the ACIAR 10-Year Strategy 2018–2027 and its 6 strategic objectives, the Outreach Program is designed to communicate the work of ACIAR to audiences, both in Australia and overseas.

The objectives of the ACIAR Outreach Program are to:

- communicate the value and impact of our work, and increase our reputation as a trusted and valued partner
- build closer, more effective working relationships with our partners and other stakeholders
- support the communication needs of our Country Offices, with an emphasis on detailing research results and outcomes achieved at a regional and country level.

In 2022–23, comprehensive and coordinated strategies and plans, programs and projects will be developed and/or implemented to achieve these objectives. This work will include:

- managing and implementing an integrated content strategy, including segmenting our messaging to key target audiences
- working with partner and commissioned organisations to collaborate in outreach efforts on projects and programs
- identifying opportunities to further engage with stakeholders, including leveraging the profile and networks of the members of the Commission for International Agricultural Research
- leveraging sponsorship and opportunities through events to create awareness among stakeholders and cultivate relationships with partner and commissioned organisations
- continuing to improve the user experience of our website, including progressing additional developments to make it more dynamic demonstrating the geographic spread of our projects
- working to develop an online catalogue of scientific publications
- supporting and building our In-Country Communication Officer Network to increase our reach and continue to communicate actively and effectively in-country and in our regions.

Stakeholder engagement

Work will continue on implementing domestic and international stakeholder engagement strategies to ensure we take a strategic approach to improving awareness and detailed understanding of ACIAR among specific stakeholder groups.

In 2022–23, the stakeholder engagement strategy will:

- increase engagement with Australian stakeholders, including their awareness and understanding of the ACIAR value proposition with information specifically targeted to a domestic audience
- leverage opportunities to demonstrate the impact of ACIAR-funded projects to business and Government leaders
- collaborate with partner and commissioned organisations to ensure combined outreach approach
- strengthen relationships with international stakeholder organisations to establish productive partnerships, collaborations and co-delivered initiatives
- identify opportunities to leverage the profile and networks of members of the Commission for International Agricultural Research to raise awareness of and advocate for ACIAR
- continue to position ACIAR to help deliver on our 10-year strategy.

We will continue to participate in key sector events both in person and online to share the results of our research with a highly targeted audience.

A significant event for ACIAR is hosting the CGIAR System Council meeting in Australia in November 2022 alongside the TropAg conference in Brisbane. The program includes opportunities for international delegates that demonstrate Australian leadership in agricultural innovation.

40 years of ACIAR

During 2022–23 the Outreach Program will continue to leverage our 40-year anniversary to communicate our achievements and impact in a variety of forums. This will include publication of an anniversary book and additional content on the subsite.

A series of stakeholder events, podcasts and a social media campaign, including video and photography, continues to be delivered throughout 2022 under the 40-year anniversary banner. A special edition of *Partners* magazine was published early in 2022, featuring a range of ACIAR associates, friends and staff sharing their reflections on ACIAR achievements since 1982. A second edition focused on important domestic and international partnerships will be published in late 2022.

Website

The ACIAR website has undergone significant redevelopment in the past 4 years. During 2022–23, there will be further development of the website to increase usability, improve reach to our audiences and ensure access to the right information.

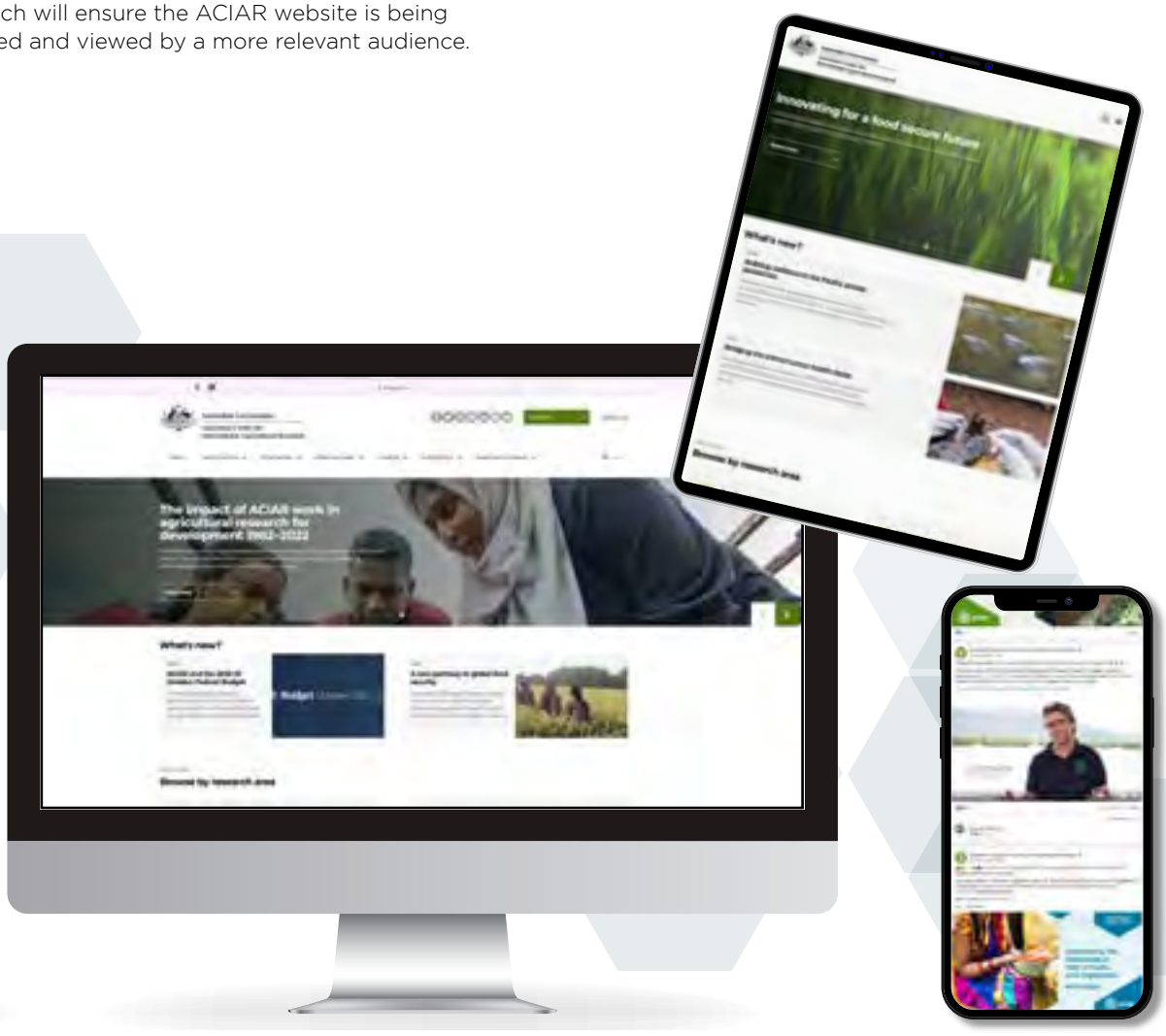
Improvements to the interactive map will be explored further with a focus on a more dynamic approach.

A search engine optimisation audit will be conducted in 2022–23 with strategy development to follow. This approach will ensure the ACIAR website is being accessed and viewed by a more relevant audience.

Social media

With an audience of over 85,000 in 2022, the ACIAR social media channels reinforces awareness of the impact of ACIAR-funded research to an engaged and relevant audience.

In 2022–23 the focus of digital content production will be on emphasising short-form video, photography and infographics which work to capture the audience's attention briefly but with impact.



Publications

Publications, including annual corporate reports, are an essential part of our outreach and communication work. Publications contribute to ensuring audiences in Australia and our partner countries can access and use our research findings.

The Scientific Publications Committee continues to ensure the quality and relevance of ACIAR scientific publications, so that our scientific and research partners are better served with improved review processes and more timely production of research publications.

During 2022–23, we will work with the Business Systems Unit to develop an online catalogue of ACIAR scientific publications. We will also continuously improve our publications production and distribution program, strengthening internal production support systems and processes to manage the timely production, distribution and promotion of ACIAR publications.

Corporate publications will be published according to statutory and legislative requirements, and these will be available both online and, in limited numbers, as hard copy. The Annual Operational Plan and the Annual Review are published each year, both as accessible snapshots of our plans and activities.

The production of our flagship publication, the *Partners in Research for Development* magazine, continues on a quarterly basis, with ongoing review of content, audiences and delivery modes.

In-country communication

In 2022–23 we will continue to build our network of communication professionals in our Country Offices.

Currently, there are communication officers in 6 Country Offices: Fiji, Papua New Guinea, Vietnam, India, the Philippines and Kenya with plans to recruit 2 more officers during 2022–23. Communication and stakeholder engagement plans and activities will continue to be devised and delivered on a country or regional basis to provide ACIAR Country Offices with communication expertise, ensuring more proactive content is being produced and increasing engagement with our partners and stakeholders.

Media partnerships

We will continue to partner with media organisations, both domestically and internationally, to raise the profile of the impact of our funded work to a wider audience. In 2022–23, we will engage with journalists who have expressed keen interest in ACIAR-funded projects and their impact to identify opportunities for site visits or local media/journalism training.

We will also work closely with the Crawford Fund to generate positive media coverage, especially in regional and agriculture-based media in Australia.

NextGen project

The Crawford Fund has developed high-school curriculum materials that profile the work of ACIAR and other international agricultural research organisations and highlight a number of key issues, including gender and food loss. These materials are part of the Crawford Fund's NextGen project, which is targeted at undergraduate and high-school students. NextGen aims to raise awareness about careers in international agricultural research. Forums with teachers designed to increase and enhance the uptake of the curriculum materials will be delivered across Australia.

The Crawford Fund also oversees the administration of Researchers in Agriculture for International Development, whose membership contribute and feature in the NextGen campaign through appearances in video and at events, both in person and online.

Director, Outreach
Ms Michelle Nakamura

See page 185 for contact details.

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Appendixes

Photo: Peter Lowe

Appendix 1

Details of current and proposed projects and small research activities, 2022–23

Project title	Project code	Start	End	Proect leader	Commissioned organisation	Collaborating institutions
Agribusiness						
Agricultural policy research to support natural resource management in Indonesia's upland landscapes	ADP/2015/043	3/21/2018	12/15/2022	Prof Randy Stringer	The University of Adelaide	Australian National University, Indonesian Centre for Agriculture Socio Economic and Policy Studies, University of New England, World Agroforestry, World Wide Fund for Nature (Indonesia)
Developing competitive and inclusive value chains of pulses in Pakistan	ADP/2017/004	9/1/2018	6/30/2023	Dr Rajendra Adhikari	The University of Queensland	Australian National University, COMSATS Institute of Information Technology, National Agricultural Research Centre, Sindh Agricultural University, University of Agriculture Faisalabad, University of Tasmania
Understanding the drivers of successful and inclusive rural regional transformation: Sharing experiences and policy advice in Bangladesh, China, Indonesia and Pakistan	ADP/2017/024	1/1/2020	12/31/2023	Dr Chunlai Chen	Australian National University	Bangladesh Academy for Rural Development, Bangladesh Agricultural University, Bogor Agricultural University, Indonesian Centre for Agriculture Socio Economic and Policy Studies, Pakistan Institute of Development Economics
Pacific Agribusiness Research in Development Initiative Phase 2 (PARDI 2)	AGB/2014/057	6/12/2017	12/31/2022	Prof Steven Underhill	University of the Sunshine Coast	Pacific Island Farmers Organisation Network, Pacific Islands Development Forum, Pacific Islands Private Sector Organization, Southern Cross University, The University of the South Pacific, The University of Adelaide, The University of Queensland, University of the Sunshine Coast
Inclusive agriculture value chain financing	AGB/2016/163	6/25/2018	9/30/2023	Dr Alan de Brauw	International Food Policy Research Institute	Abdul Latif Jameel Poverty Action Lab, South-East Asia (J-PAL SEA), Indonesian Centre for Agriculture Socio Economic and Policy Studies, Innovations for Poverty Action (Myanmar), Institute of Policy and Strategy for Agriculture and Rural Development, Myanmar Economics Association, The University of Sydney
Establishing sustainable solutions to cassava diseases in mainland South-East Asia	AGB/2018/172	8/23/2019	6/30/2023	Dr Jonathan Newby	International Center for Tropical Agriculture	Agricultural Genetics Institute, Cambodian Agricultural Research and Development Institute (CARDI) , Central Tuber Crops Research Institute (ICAR-CTCRI), General Directorate of Agriculture, Hung Loc Agricultural Research Centre, Kasetsart University, National Agriculture and Forestry Research Institute, Plant Protection Center, Department of Agriculture, Plant Protection Research Institute, Thai Tapioca Development Institute, The Chinese Academy of Tropical Agricultural Sciences, The University of Queensland

Project title	Project code	Start	End	Proect leader	Commissioned organisation	Collaborating institutions
Increasing the sustainability, productivity and economic value of coffee and black pepper farming systems and value chains in the Central Highlands Region of Vietnam	AGB/2018/175	2/1/2021	10/31/2024	Dr Estelle Bienabe	World Agroforestry	Deakin University, Institute of Policy and Strategy for Agriculture and Rural Development, International Center for Tropical Agriculture, National Institute of Agricultural Planning and Projection, Plant Protection Research Institute, Tay Nguyen University, The University of Sydney, Western Highlands Agriculture and Forestry Science Institute
Agribusiness-led inclusive value chain development for smallholder farming systems in the Philippines	AGB/2018/196	8/1/2021	7/31/2025	Dr Lilly Lim-Camacho	CSIRO	Australian National University, Foodlink Advocacy Co-operative, University of the Philippines at Los Banos, University of the Philippines, Mindanao, Visayas State University
Planning and establishing a sustainable smallholder rice chain in the Mekong Delta	AGB/2019/153	2/25/2022	12/30/2025	Dr Jaquie Mitchell	The University of Queensland	An Giang University, Australian Grain Storage Pty Ltd, Can Tho University, Cuu Long Delta Rice Research Institute, NSW Department of Primary Industries, Rice Research Australia Pty Ltd, Ricegrowers Singapore Pte. Ltd., Ricegrowers Vietnam, SunRice
Integrating smallholder households and farm production systems into commercial beef supply chains in Vietnam	AGB/2020/189	10/1/2022	9/30/2026	Dr Stephen Ives	University of Tasmania	Center for Rural Development in Vietnam, National Institute of Animal Sciences, Simon Winter Agricultural Consulting, Vietnam National University of Agriculture
Kwale agricultural research for development project, Kenya	AGB/2021/123	7/1/2022	6/30/2027	Ms Deb Doan	Business for Development	—
Evaluating supply chain interventions and partnerships to sustainably grow the smallholder dairy sectors of Indonesia and the Philippines	AGB/2021/124	7/1/2022	6/30/2027	Dr Brad Granzin	Australasian Dairy Consultants	Business for Development Ltd
Creating resilient communities through smallholder-inclusive tourism markets in Indonesia	AGB/2021/125	7/1/2022	6/30/2027	Mr Jeremy Badgery-Parker	Primary Principles Pty Ltd	—
Piloting digital monitoring of VietGAP compliance and quality in Vietnam vegetable value chains	AGB/2021/153	1/31/2022	11/30/2022	Dr Gordon Rogers	Applied Horticultural Research	—
Defining priority commercialisation pathways and potential private commercialisation partners for viable long-term commercialisation of products emerging from FST/2019/128	AGB/2021/172	2/21/2022	9/30/2022	Mr Ian Buck	Buck Advisory	Queensland Department of Agriculture & Fisheries

Project title	Project code	Start	End	Proect leader	Commissioned organisation	Collaborating institutions
Landscape and opportunity analysis in the Pacific tuna sector: Foundation analysis to identify innovation pathways to enhance participation by the Pacific community and value retention in the region	AGB/2021/173	6/15/2022	3/31/2023	Ms Deb Doan	Business for Development	—
Developing food loss reduction pathways through smart business practices in mango and tomato value chains in Pakistan and Sri Lanka (Food Loss Program)	CS/2020/193	8/16/2022	3/31/2025	Assoc Prof Anwar Shah	Quaid-i-Azam University	Bahauddin Zakariya University , Fortunate Agribusiness Private Limited, Institute of Policy Studies of Sri Lanka, Mallawa Insights, Open University of Sri Lanka, Pir Mehr Ali Shah Arid Agriculture University, University of Peradeniya, Wayamba University of Sri Lanka
Food loss in the *Pangasius* catfish value chain of the Mekong River Basin (Food Loss Program)	CS/2020/209	4/1/2022	3/31/2025	Dr Van Kien Nguyen	Health and Agricultural Policy Research Institute	National University of Laos, Royal University of Agriculture, University of New England
Managing food value chains for improved nutrition for urban vulnerable populations in Lusaka City (Zambia) (AfricitiesFood)	CS/2020/210	9/1/2021	6/30/2023	Dr Gilbert Siame	University of Zambia	—
Managing food value chains for improved nutrition for urban vulnerable populations in Mzuzu City (Malawi) (AfricitiesFood)	CS/2021/115	9/1/2021	6/30/2023	Dr Mtafu Manda	Mzuzu University	—
Climate Change						
Supporting greenhouse gas inventories and targeted rice mitigation options for Vietnam	CLIM/2019/150	9/1/2022	8/31/2024	Prof Peter Grace	Queensland University of Technology	Institute of Agriculture and Environment, Queensland University of Technology
Transformation pathways for Pacific coastal food systems	CLIM/2020/178	11/1/2022	12/31/2025	Dr James Butler	Cawthron Institute	AgResearch Ltd, Live and Learn Kiribati, The Pacific Community, University of Technology Sydney, World Wide Fund for Nature-Pacific
Sustainable intensification for climate-resilient development in Pacific island countries	CLIM/2020/186	2/1/2023	6/30/2026	Prof Timothy Reeves and Dr Dorin Gupta	The University of Melbourne	Lincoln University, The Pacific Community, University of South Pacific (Samoa)
MAC-B: Mitigation adaptation co-benefits modelling trial in Bangladesh	CLIM/2021/109	9/1/2021	12/31/2022	Dr Jonas Jaegermeyr and Erik Mencos Contreras	Columbia University	CIMMYT, Oregon State University

Project title	Project code	Start	End	Proect leader	Commissioned organisation	Collaborating institutions
Institutional barriers to climate finance through a gendered lens in Fiji, Samoa and Solomon Islands	CLIM/2021/110	12/6/2021	12/31/2022	Dr Rowena Maguire	Queensland University of Technology	Australian National University, University of Technology Sydney, Walks and Trails (Fiji) Pte Limited, trading as Talanoa Consulting
Locally led learning to turn polders into flexible assets for adaptation	CLIM/2021/137	2/1/2023	6/30/2027	Mr T.S. Amjath Babu	CIMMYT	—
Preparing for mangrove-based climate and agribusiness transformation in the Mekong Delta	CLIM/2021/138	2/1/2023	12/1/2026	Dr Pham Thu Thuy	CIFOR	—
Supporting greenhouse gas inventories and livestock data development in Fiji	CLIM/2021/160	11/1/2022	12/31/2024	Dr Natalie Doran-Browne	Riverine Plains Inc	—
Supporting the tracking sharing learning platform of the Adaptation Research Alliance	CLIM/2022/108	3/25/2022	12/31/2022	Sydney Church	SouthSouth-North	—
Crops						
Incorporating salt-tolerant wheat and pulses into smallholder farming systems in southern Bangladesh	CIM/2014/076	3/1/2017	3/31/2023	Prof William Erskine	The University of Western Australia	—
Increasing productivity and profitability of pulse production in cereal based cropping systems in Pakistan	CIM/2015/041	11/1/2016	10/31/2023	Dr Ata-ur Rehman	Charles Sturt University	Muhammad Nawaz Sharif University of Agriculture, Multan, Punjab, Pakistan Agricultural Research Council, Sindh Agricultural University, University of Arid Agricultural Rawalpindi
Faba bean in Ethiopia: Mitigating disease constraints to improve productivity and sustainability	CIM/2017/030	12/1/2018	6/30/2024	Prof Martin Barbetti	The University of Western Australia	Debre Berhan Agricultural Research Centre, Ethiopian Institute of Agricultural Research, International Center for Agricultural Research in the Dry Areas, NSW Department of Primary Industries
Rapid breeding for reduced cooking time and enhanced nutritional quality in common bean (*Phaseolus vulgaris*)	CROP/2018/132	8/1/2019	6/30/2024	Prof Wallace Cowling	The University of Western Australia	Ethiopian Institute of Agricultural Research, Institut des Sciences Agronomiques du Burundi, International Center for Tropical Agriculture, Kenya Agricultural and Livestock Research Organisation, Maruku Agricultural Research Institute, National Crops Resources Research Institute, Rwanda Agriculture and Animal Resources Development Board
International Mungbean Improvement Network 2	CROP/2019/144	7/1/2020	6/30/2025	Dr Ramakrishnan Nair	The World Vegetable Center	Bangladesh Agricultural Research Institute, Department of Agricultural Research, Indian Institute of Pulses Research, Indonesian Legume and Tuber Crops Research Institute, Kenya Agricultural and Livestock Research Organisation, Queensland Department of Agriculture & Fisheries, The University of Queensland
Weed management techniques for mechanised and broadcast lowland crop production systems in Cambodia and Laos	CROP/2019/145	1/1/2021	12/31/2025	Dr Jaquie Mitchell	The University of Queensland	Cambodia Agricultural Research and Development Institute, National Agricultural and Forestry Research Institute, Laos, Royal University of Agriculture

Project title	Project code	Start	End	Proect leader	Commissioned organisation	Collaborating institutions
Protecting Ethiopian lentil crops	CROP/2020/164	7/1/2021	6/30/2026	Prof Martin Barbetti	The University of Western Australia	Amhara Region Agricultural Research Institute, Ethiopian Institute of Agricultural Research, International Center for Agricultural Research in the Dry Areas, NSW Department of Primary Industries, Oromiya Agricultural Research Institute
Managing wheat blast in Bangladesh: Identification and introgression of wheat blast resistance for rapid varietal development and dissemination	CROP/2020/165	11/1/2021	6/30/2026	Dr Pawan Kumar Singh	CIMMYT	Bangladesh Agricultural University, Bangladesh Wheat and Maize Research Institute
Accelerating genetic gain in wheat through hybrid breeding in Bangladesh, Ethiopia and Pakistan	CROP/2020/167	12/1/2021	6/30/2026	Prof Richard Trethowan	The University of Sydney	Bangladesh Agricultural University, Bangladesh Wheat and Maize Research Institute , Ethiopian Institute of Agricultural Research, International Center for Agricultural Research in the Dry Areas, KWS, Muhammad Nawaz Sharif University of Agriculture, Multan, Punjab
Finding a genetic basis for oil palm responses to basal stem rot in a long-term infected block	CROP/2021/130	6/1/2022	6/30/2024	Dr Agnieszka Mudge	The University of Queensland	Guadalcanal Plains Palm Oil Limited, PNG Oil Palm Research Association Inc
Agricultural Innovations for Communities: Intensified and diverse farming systems for Timor-Leste (AI-Comm 2)	CROP/2021/131	10/1/2022	6/30/2027	Assoc Prof Louise Barton	The University of Western Australia	—
Intercropping for intensification and diversification in the Eastern Gangetic Plains	CROP/2021/155	12/1/2021	9/30/2022	Ms Alison Laing	CSIRO	CIMMYT, Uttar Banga Krishi Vishwavidyalaya
Australian technology reaches the field: Supporting and monitoring the release of pod-borer resistant cowpea	CROP/2021/165	1/1/2022	6/30/2023	Dr TJ Higgins	CSIRO	African Agricultural Technology Foundation
Harnessing appropriate-scale farm mechanisation in Zimbabwe	CROP/2021/166	1/21/2022	6/30/2023	Dr Frederic Baudron	CIMMYT	Hello Tractor, Kurima Machinery and Technology, Ministry of Lands, Agriculture, Fisheries, Water and Rural Development, University of KwaZulu-Natal , University of Zimbabwe
Adoption of conservation agriculture practices in selected sites in eastern Africa: Drivers, constraints and obstacles	CROP/2022/106	10/1/2023	12/31/2023	TBC	TBC	—

Project title	Project code	Start	End	Proect leader	Commissioned organisation	Collaborating institutions
Enhancing farm-household management decision-making for increased productivity in the Eastern Gangetic Plains	CSE/2012/108	7/1/2018	4/30/2023	Prof Fay Rola-Rubzen	The University of Western Australia	Bihar Agricultural University, Nepal Agricultural Research Council, Rajshahi University, Rangpur Dinajpur Rural Service, University of New England, Uttar Banga Krishi Vishwavidyalaya
Demand-led plant variety design for emerging markets in Africa	FSC/2013/019	6/26/2014	3/31/2023	Prof Kaye Basford	The University of Queensland	African Centre for Crop Improvement, Alliance for a Green Revolution in Africa, Association for Strengthening Agricultural Research in Eastern and Central Africa, Biosciences eastern and central Africa, Crawford Fund, Forum for Agricultural Research in Africa, International Livestock Research Institute, Pan Africa Bean Research Alliance, Regional Universities Forum for Capacity Building in Agriculture, Syngenta Foundation for Sustainable Agriculture, University of Nairobi, The University of Queensland, West Africa Centre for Crop Improvement, University of Ghana, West and Central African Council for Agricultural Research and Development
Fisheries						
Harvest strategies for Indonesian tropical tuna fisheries to increase sustainable benefits	FIS/2016/116	2/26/2018	3/30/2023	Dr Campbell Davies	CSIRO	Agency for Research and Human Resources Development Marine and Fisheries, Indonesia
Increasing technical skills supporting community-based sea cucumber production in Vietnam and the Philippines	FIS/2016/122	10/1/2018	8/31/2023	Prof Paul Southgate	University of the Sunshine Coast	Guiuan Development Foundation Incorporated, Marine Science Institute - University of the Philippines, Mindanao State University at Naawan, Southeast Asian Fisheries Development Centre
Half-pearl industry development in Tonga and Vietnam	FIS/2016/126	9/1/2017	2/28/2023	Prof Paul Southgate	University of the Sunshine Coast	Ministry of Agriculture and Food, Forests and Fisheries, Ministry of Fisheries Tonga
Assessing upstream fish migration measures at Xayaburi Dam in Laos	FIS/2017/017	9/1/2019	12/31/2022	Prof Lee Baumgartner	Charles Sturt University	Living Aquatic Resources Research Centre, National University of Laos, Xayaburi Power Company Limited
A nutrition-sensitive approach to fisheries management and development in Timor-Leste and Nusa Tenggara Timur Province, Indonesia	FIS/2017/032	9/1/2021	7/31/2025	Dr David Mills	WorldFish Center	CSIRO, Ministry of Agriculture and Fisheries, Timor-Leste, Research Centre for Marine and Fisheries Socio-economics Indonesia, WorldFish Center
Baseline monitoring and evaluation of long-term impacts on fish stocks from coral restoration	FIS/2018/128	6/25/2018	12/31/2022	Prof Peter Harrison	Southern Cross University	James Cook University, University of the Philippines
FishTech: Integrating technical fisheries solutions into river development programs across South-East Asia	FIS/2018/153	1/1/2020	6/30/2025	Prof Lee Baumgartner	Charles Sturt University	Charles Sturt University, Fisheries Administration Cambodia, Ministry of Agriculture, Livestock and Irrigation, Ministry of Marine Affairs and Fisheries, National University of Laos

Project title	Project code	Start	End	Proect leader	Commissioned organisation	Collaborating institutions
Improving peri-urban and remote inland fish farming in PNG to benefit both community-based and commercial operators	FIS/2018/154	9/1/2022	6/30/2027	Assoc Prof Jesmond Sammut	University of New South Wales	Australian Nuclear Science and Technology Organisation, Department of Agriculture and Livestock, National Fisheries Authority, University of New South Wales
Agriculture and fisheries for improved nutrition: integrated agrifood system analyses for the Pacific region	FIS/2018/155	8/1/2019	3/31/2023	Prof Neil Andrew	University of Wollongong	CSIRO, The Pacific Community, The University of Sydney, University of Wollongong, WorldFish Center
Improved productivity, efficiency and sustainability of the culture-based fishery for finfish and giant freshwater prawn in Sri Lankan reservoirs	FIS/2018/157	6/1/2020	6/30/2025	Clive Jones	James Cook University	James Cook University, National Aquaculture Development Authority, University of Ruhuna, Wayamba University of Sri Lanka
Towards more profitable and sustainable mabé pearl and shell-based livelihoods in the western Pacific	FIS/2019/122	1/1/2022	12/31/2026	Prof Paul Southgate	University of the Sunshine Coast	Ministry of Agriculture and Fisheries Samoa, Ministry of Fisheries Fiji, Ministry of Fisheries Tonga, National Fisheries College Papua New Guinea, The The Pacific Community
Regional coral restoration networks and appropriate technologies for larger-scale coral and fish habitat restoration in the Philippines and Australia	FIS/2019/123	12/1/2020	10/31/2025	Prof Peter Harrison	Southern Cross University	Queensland University of Technology, The University of Melbourne, University of Technology Sydney, University of the Philippines
Innovating fish-based livelihoods in the community economies of Timor-Leste and Solomon Islands	FIS/2019/124	9/1/2021	3/31/2025	Dr Hampus Eriksson	University of Wollongong	Ministry of Agriculture and Fisheries, Timor-Leste, Ministry of Fisheries and Marine Resources, Solomon Islands, University of Canberra, WorldFish Center
Improving nutrition through women's and men's engagement across the seaweed food chain in Kiribati and Samoa	FIS/2019/125	10/1/2020	10/31/2022	Dr Libby Swanepoel	University of the Sunshine Coast	—
Developing social and economic monitoring and evaluation systems in Indonesian tuna fisheries to assess potential impacts of alternative management measures on vulnerable communities	FIS/2020/109	12/1/2020	6/30/2023	Dr Nick McClean	University of Technology Sydney	Research Centre for Socio-Economics, Ministry of Marine Affairs and Fisheries
Spatially integrated approach to support a portfolio of livelihoods	FIS/2020/111	6/1/2021	5/31/2023	Dr Amy Diedrich	James Cook University	Ecological Solutions Foundation Solomon Islands, WorldFish Center
Coalitions for change in sustainable national community-based fisheries management programs in the Pacific	FIS/2020/172	9/1/2021	6/30/2025	Dr Dirk Steenbergen	University of Wollongong	Ministry of Fisheries and Marine Resources Development, Kiribati, Ministry of Fisheries and Marine Resources, Solomon Islands, The Pacific Community, University of Wollongong, Vanuatu Fisheries Department, WorldFish Center

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Blue economy: Valuing the carbon sequestration potential in oyster aquaculture	FIS/2020/175	9/1/2020	12/31/2022	Dr Sarah Ugalde	University of Tasmania	—
Institutional effectiveness and political economy of coral reef restoration in the Philippines	FIS/2021/112	9/1/2021	12/31/2024	Assoc Prof Michael Fabinyi	University of Technology Sydney	Macquarie University, Marine Environment and Resources Foundation Inc., Southern Cross University
Strengthening agricultural resilience in Western Province: Developing methods for strengths-based livelihoods approach	FIS/2021/113	9/1/2021	12/30/2023	Assoc Prof Katharine McKinnon	University of Canberra	Western Sydney University
Supporting grouper-farming smallholders in Vietnam to improve their SME businesses by engaging with aquafeed companies to produce commercial feeds	FIS/2021/121	8/1/2021	6/30/2023	Leo Nankervis	James Cook University	Research Institute for Aquaculture No. 2, Research Institute for Aquaculture No. 3, The Company One
Strengthening agricultural resilience in Western Province: Mapping place-based strengths and assets	FIS/2021/122	9/1/2021	6/30/2023	Prof Katherine Gibson	Western Sydney University	University of Canberra
Forestry						
Advancing enhanced wood manufacturing industries in Laos and Australia	FST/2016/151	4/1/2017	9/30/2022	Dr Hilary Smith	The University of Melbourne	Australian National University, Luang Prabang Teak Program, National University of Laos, Queensland Dept of Agriculture and Fisheries
Enabling community forestry in Papua New Guinea	FST/2016/153	10/1/2017	9/30/2022	Assoc Prof Grahame Applegate	University of the Sunshine Coast	Papua New Guinea Forest Authority, Papua New Guinea Forest Research Institute, Ramu Agri-Industries Ltd, Timber and Forestry Training College of the PNG University of Technology
Enhancing livelihoods through improved forest management in Nepal	FST/2017/037	7/1/2018	6/30/2024	Dr Ian Nuberg	The University of Adelaide	Department of Forest Research and Survey Nepal, Department of Forests, ForestAction Nepal, Nepal Agroforestry Foundation, University of Canberra, University of New South Wales
Enhancing private sector-led development of the canarium industry in Papua New Guinea – Phase 2	FST/2017/038	12/1/2019	12/31/2023	Prof Helen Wallace	Griffith University	National Agricultural Research Institute, The University of Adelaide
Promoting smallholder teak and sandalwood plantations in Papua New Guinea and Australia	FST/2018/178	1/1/2022	12/31/2025	Dr Tony Page	University of the Sunshine Coast	East New Britain Women and Youth in Agriculture, Organisation for Industrial, Spiritual and Cultural Advancement, Pacific Island Projects, Papua New Guinea Forest Authority, Papua New Guinea Forest Research Institute, University of Natural Resources and Environment
Managing risk in South-East Asian forest biosecurity	FST/2018/179	9/24/2021	6/30/2025	Dr Caroline Mohammed	University of Tasmania	Centre for Forestry Instrument Standard Assessment, NSW Department of Primary Industries

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Coconut and other non-traditional forest resources for the manufacture of engineered wood products	FST/2019/128	2/1/2021	1/31/2026	Dr Rob McGavin	Queensland Department of Agriculture & Fisheries	Griffith University, The Pacific Community, PHAMA Plus, The University of Queensland
Building an effective forest health and biosecurity network in South-East Asia	FST/2020/123	11/1/2021	6/30/2025	Dr Madaline Healey and Assoc Prof Simon Lawson	University of the Sunshine Coast	Department of Agriculture, Plant Quarantine Division, Laos, Department of Plant Protection, Cambodia, Forestry Administration, National Agriculture and Forestry Research Institute, Queensland Department of Agriculture & Fisheries, University of the Sunshine Coast, University of Tasmania
Vietnamese native tree species for improved livelihoods	FST/2020/134	7/15/2021	12/31/2022	Assoc Prof Doland Nichols	Southern Cross University	Muong La Nature Reserve, Tay Bac University, Vietnamese Academy of Forest Sciences
Livelihoods in forest ecosystem recovery	FST/2020/135	9/1/2022	8/31/2028	Prof Helen Wallace	Griffith University	Ecological Solutions Foundation Solomon Islands, Ministry of Forest and Research
Forest restoration for economic outcomes	FST/2020/137	10/1/2022	9/30/2027	Prof Patrick Baker	The University of Melbourne	National Agricultural and Forestry Research Institute Laos, National University of Laos, Department of Forestry
Retaining the jewels in the crown: Kalimantan peat forest remnants	FST/2021/145	7/1/2022	12/31/2023	Dr Laura Linda Bozena Graham	The Borneo Orangutan Survival Foundation	—
Kava land use changes	FST/2021/146	9/1/2022	3/1/2024	TBC	Geoscience Australia	—
Growing the future: Better forestry in Uganda	FST/2021/147	9/1/2022	12/31/2023	Dr Hillary Agaba	National Forestry Resources Research Institute	—
Fruit trees for climate adaption and mitigation in East Africa	FST/2021/163	3/11/2022	6/30/2023	Prof Catherine Muthuri	World Agroforestry	Rwanda Agriculture Board
Horticulture						
Adopting a gender-inclusive participatory approach to reducing horticultural food loss in the Pacific	CS/2020/191	2/8/2022	12/31/2024	Dr Seeseei Molimau-Samasoni	Scientific Research Organisation of Samoa	Fiji National University, Mainstreaming of Rural Development Initiative, Tonga Trust, Solomon Islands National University, University of the Sunshine Coast
Supporting an international initiative to maintain the coconut genetic resources network (COGENT)	GP/2018/193	1/1/2020	12/30/2022	Dr Jelfina Alouw	International Coconut Community	—

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Aligning genetic resources, production and post-harvest systems to market opportunities for Pacific island and Australian cocoa	HORT/2014/078	4/12/2017	12/30/2022	Mr Yan Diczbalis	Queensland Department of Agriculture & Fisheries	Alternative Communities Trade in Vanuatu, Ministry of Agriculture, Ministry of Agriculture and Fisheries, Ministry of Agriculture and Livestock, Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity, The Pacific Community, The University of Adelaide
Developing the cocoa value chain in Bougainville	HORT/2014/094	2/1/2016	12/31/2022	Prof David Guest	The University of Sydney	Autonomous Region of Bougainville Department of Primary Industries and Marine Resources, Cocoa Coconut Institute of Papua New Guinea, Mars Australia, University of Natural Resources and Environment
Development of area-wide management approaches for fruit flies in mango for Indonesia, Philippines, Australia and the Asia-Pacific region	HORT/2015/042	11/1/2018	6/30/2024	Mr Stefano De Faveri	Queensland Department of Agriculture & Fisheries	Eastern Mennonite University, Gadjah Mada University, Indonesian Centre for Agriculture Socio Economic and Policy Studies, Indonesian Centre for Horticulture Research and Development, Provincial Agriculturist Office, University of the Philippines at Los Banos, University of the Philippines, Mindanao
Strengthening vegetable value chains in Pakistan for greater community livelihood benefits	HORT/2016/012	2/21/2018	12/31/2022	Dr Babar Ehsan Bajwa	CABI	Agriculture Research Institute, Pakistan, Department of Agriculture Extension Punjab, Engro Foundation, Mojaz Foundation, National Agricultural Research Centre, Sindh Agricultural University, Sindh Department of Agriculture Extension, University of Agriculture, Faisalabad, The University of Queensland, Women Agriculture Development Organisation
Responding to emerging pest and disease threats to horticulture in the Pacific Islands	HORT/2016/185	4/1/2018	9/30/2023	Dr Michael Furlong	The University of Queensland	Ministry of Agriculture, Ministry of Agriculture and Fisheries, Ministry of Agriculture and Food, Forests and Fisheries, Ministry of Agriculture and Livestock, National Agricultural Research Institute, The Pacific Community, Solomon Islands National University, University of Goroka
Developing vegetable value chains to meet evolving market expectations in the Philippines	HORT/2016/188	2/1/2019	12/31/2023	Dr Gordon Rogers	Applied Horticultural Research	Department of Agriculture, East West Seed Company Inc, Landcare Foundation of the Philippines Inc, The University of Sydney, Visayas State University
Improving mango crop management in Cambodia, the Philippines and Australia to meet market expectations	HORT/2016/190	1/1/2023	12/31/2023	Dr Muhammad Sohail Mazhar	Department of Industry, Tourism and Trade	
Safeguarding and deploying coconut diversity for improving livelihoods in the Pacific islands	HORT/2017/025	5/1/2019	12/31/2024	Dr Carmel Pilotti	The The Pacific Community	Kokonat Indastri Koporasen, Ministry of Agriculture, Ministry of Agriculture and Fisheries, Ministry of Agriculture and Livestock, Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity, The University of Queensland

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An integrated management response to the spread of *Fusarium* wilt of banana in South-East Asia	HORT/2018/192	1/1/2020	12/31/2024	Dr Anthony Pattison	Queensland Department of Agriculture & Fisheries	Australian Banana Growers Council Inc, Gadjah Mada University, Horticultural Research Centre, Indonesian Tropical Fruit Research Institute, Plant Protection Center, Department of Agriculture, Provincial Agricultural Office-Rigion XI, Davao Del Norte, The University of Queensland, University of Southeastern Philippines
Protecting the coffee industry from coffee berry borer in Papua New Guinea and Australia	HORT/2018/194	7/1/2019	6/30/2024	Dr Ian Newton	Queensland Department of Agriculture & Fisheries	PNG Coffee Industry Corporation, University of the Sunshine Coast
Improving root crop resilience and biosecurity in Pacific island countries and Australia	HORT/2018/195	1/1/2022	6/30/2025	Dr Julie O'Halloran	Queensland Department of Agriculture & Fisheries	Australian Sweetpotato Growers Incorporated, Kastom Gaden Association, Ministry of Agriculture, Ministry of Agriculture & Livestock (MAL) Solomon Islands, Ministry of Agriculture and Fisheries, Ministry of Agriculture, Food, Forestry and Fisheries, The Pacific Community, Pacific Island Farmers Organisation Network, Solomon Islands National University, The University of Queensland
Preparedness and management of huánglóngbìng (citrus greening disease) to safeguard the future of citrus industry in Australia, China and Indonesia	HORT/2019/164	7/1/2021	6/30/2026	Dr Jianhua Mo	NSW Department of Primary Industries	Citrus Australia Ltd, Citrus Research Institute of Chinese Academy of Agricultural Science, Gadjah Mada University, Indonesian Citrus and Subtropical Fruit Research Institute (ICSFRI)
Enhanced fruit systems for Tonga and Samoa (Phase 2): Community based citrus production	HORT/2019/165	9/1/2021	6/30/2025	Prof Steven Underhill	University of the Sunshine Coast	Mainstreaming of Rural Development Initiative, Tonga Trust, Ministry of Agriculture, Food, Forestry and Fisheries, Nishi Trading, Scientific Research Organisation of Samoa, The University of Queensland
Developing a biosecurity system for small banana growers resilient to *Fusarium* wilt TR4 in southern and eastern Africa	HORT/2020/128	1/1/2022	12/31/2024	Mr Stewart Lindsay	Queensland Department of Agriculture & Fisheries	International Institute of Tropical Agriculture (Tanzania), Ministry of Agriculture (Tanzania), Ministry of Agriculture and Rural Development (Mozambique), Mozambique Institute of Agricultural Research (IIAM), Stellenbosch University (South Africa), Tanzania Agricultural Research Institute
Improving smallholder wellbeing through participation in modern value chains: sustaining future growth in the Pakistan citrus industry	HORT/2020/129	1/1/2022	12/31/2025	Dr Rajendra Adhikari	The University of Queensland	Chinese Academy of Agricultural Sciences, Department of Agriculture Extension Punjab, Queensland Department of Agriculture & Fisheries, University of Agriculture, Faisalabad, University of Sargodha
PICfood: Driving vegetable food environments to promote healthy diets in Pacific island countries	HORT/2021/141	1/1/2023	12/30/2024	Dr Jody Harris	World Vegetable Centre	Central Queensland University

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Safe, fresh, year-round vegetables in Cambodia and Laos through research and development support of whole supply chain agribusiness networks	HORT/2021/143	11/1/2022	11/30/2027	Mr Jeremy Badgery-Parker	The University of Adelaide	—
Biosecurity planning	HORT/2021/151	1/1/2023	5/31/2024	Dr Michael Furlong	The University of Queensland	—
Understanding school food provision in the Pacific: Scoping the potential of local food systems to improve diets, nutrition and livelihoods	HORT/2021/159	1/1/2022	9/30/2022	Sarah Burkhart	University of the Sunshine Coast	Bioversity International, The Pacific Community
Livestock Systems						
Intensification of beef cattle production in upland cropping systems in Northwest Vietnam	LPS/2015/037	1/1/2017	12/15/2022	Dr Stephen Ives	University of Tasmania	CIRAD, Department of Agriculture and Rural Development, Dien Bien, Hanoi Agricultural University, National Institute of Animal Sciences, Swinburne University of Technology, Tay Bac University, Thai Nguyen University, The University of Queensland, Vietnam National University of Agriculture
Increasing the productivity and profitability of smallholder beekeeping enterprises in Papua New Guinea and Fiji	LS/2014/042	7/1/2019	6/30/2023	Dr Cooper Schouten	Southern Cross University	Biosecurity Authority of Fiji, Coffee Industry Corporation, Department of Agriculture and Livestock, Fiji Beekeepers Association, Ministry of Agriculture
Investigating and developing interventions to mitigate food borne parasitic disease in production animals in Laos	LS/2014/055	11/15/2020	12/31/2023	Dr Amanda Ash	Murdoch University	Department of Communicable Diseases Control, Ministry of Health, Murdoch University, National University of Laos
Improving small ruminant production and supply in Fiji and Samoa	LS/2017/033	7/1/2019	6/30/2024	Dr Frances Cowley	University of New England	Charles Sturt University, Fiji National University, College of Agriculture, Fisheries and Forestry, Ministry of Agriculture, Ministry of Agriculture and Fisheries, The University of the South Pacific
Goat production systems and marketing in Laos and Vietnam	LS/2017/034	7/1/2019	12/31/2023	Prof Stephen Walkden-Brown	University of New England	Charles Sturt University, National Agriculture and Forestry Research Institute, National Animal Health Laboratory
A farm planning approach to increase productivity and profitability of smallholder cattle systems in Vanuatu	LS/2018/185	1/1/2022	12/31/2025	Dr Simon Quigley	Central Queensland University	Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity, Ministry of Trade, Commerce, Industry and Tourism, Queensland Department of Agriculture & Fisheries, The University of Queensland, Vanuatu Agricultural Research and Technical Centre

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Drug sensitive and resistant tuberculosis and zoonotic infections as causes of lymphadenitis in 3 provinces in Papua New Guinea	LS/2018/217	4/15/2019	6/30/2023	Dr Philipp Du Cros	Burnet Institute	—
Asian chicken genetic gains: A platform for exploring, testing, delivering, and improving chickens for enhanced livelihood outcomes in South-East Asia	LS/2019/142	9/15/2020	6/30/2024	Dr Tadelle Dessie	International Livestock Research Institute	E-Merge Centre for Innovations - Africa, Livestock Development for Community Livelihood Organisation, Ministry of Agriculture and Fisheries, National Animal Health and Production Research Institute, National Institute of Animal Sciences
Resilient and low-carbon livestock systems for trade and food security in the rangelands of eastern and southern Africa	LS/2020/152	7/1/2022	1/31/2027	Dr Dawit Solomon	International Livestock Research Institute	—
Upscaling the benefits of insect-based animal feed technologies for sustainable agricultural intensification in Africa (PROTeinAfrica)	LS/2020/154	2/23/2022	6/30/2025	Dr Chrysantus Tanga	International Centre of Insect Physiology and Ecology	Makerere University Uganda, University of Rwanda
Development of a third party verified voluntary sustainable certification program for beef and other key commodities in Vanuatu	LS/2020/155	6/10/2021	12/31/2022	Dr Cherise Addinsall	Sustainable Island States	—
Global burden of animal disease initiative: Indonesia case study	LS/2020/156	12/20/2021	6/30/2024	Dr Dianne Mayberry	CSIRO	Gadjah Mada University, Indonesian Research Centre for Veterinary Sciences
Bacterial enteropathy and nutrition study in poultry	LS/2021/126	10/1/2022	6/30/2027	Dr Samantha Colquhoun	Australian National University	—
Rapid transformation of Lao beef sector - biosecurity, trade and smallholders	LS/2021/128	7/1/2022	12/31/2023	Dr Rodd Dyer	FocusGroupGo Asia Pacific	—
Global animal health governance: High-level consortium	LS/2021/157	4/21/2022	6/30/2023	Dr Kevin Bardosh	Kevin Bardosh LLC	Griffith University, Institute of Development Studies, King's College London, Praxis labs, Tasker and Najman Ltd , University of Edinburgh, University of Nairobi
Strengthened surveillance for vector-borne zoonotic and livestock diseases in Papua New Guinea	LS/2021/158	4/19/2022	6/30/2023	Dr David Williams	CSIRO	Burnet Institute, James Cook University, National Agriculture Quarantine and Inspection Authority, PNG Institute of Medical Research
Developing strategies to reduce brucellosis transmission in Timor-Leste based on One Health collaboration (ACIAR–IRDC One Health Research Program)	LS/2022/161	10/1/2022	12/31/2025	Dr Shawn Ting	Menzies School of Health Research	

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Policy Support to the Philippines' national surveillance and control programs for African swine fever, avian influenza and antimicrobial resistance: A One Health systems approach (ACIAR–IRDC One Health Research Program)	LS/2022/162	10/1/2022	12/31/2025	Dr Yusuf Sucol	University of the Philippines at Los Banos	
Livestock enhancement through ecohealth/One Health assessment in South-East Asia (ACIAR–IRDC One Health Research Program)	LS/2022/163	10/1/2022	12/31/2025	Dr Rico Ancog	University of the Philippines at Los Banos	
Social Systems						
Uptake of agricultural technologies amongst farmers in Battambang and Pailin provinces, Cambodia	ASEM/2013/003	4/1/2017	12/31/2022	Dr Brian Cook	The University of Melbourne	Australian National University, Center for Development Oriented Research in Agriculture and Livelihood Systems, Partners for Rural Development, Prek Leap National School of Agricullture, RMIT University
Improving livelihoods of smallholder coffee communities in Papua New Guinea	ASEM/2016/100	10/1/2017	3/31/2023	Prof George Curry	Curtin University	CSIRO, PNG Coffee Industry Corporation
Climate-smart landscapes for promoting sustainability of Pacific island agricultural systems	ASEM/2016/101	1/1/2018	6/30/2023	Dr Bryan Boruff	The University of Western Australia	Ministry of Agriculture and Food, Forests and Fisheries, The Pacific Community, Stockholm Environment Institute - Asia, The University of Auckland, The University of the South Pacific, The University of Sydney
Enhancing livelihoods through forest and landscape restoration	ASEM/2016/103	12/15/2017	12/31/2023	Dr Nestor Gregorio	University of the Sunshine Coast	—
Climate-smart agriculture opportunities for enhanced food production in Papua New Guinea	ASEM/2017/026	3/18/2019	12/31/2023	Dr Steven Crimp	Australian National University	Climate Change and Development Authority, CSIRO, Department of Agriculture and Livestock, Fresh Produce Development Agency Ltd, National Agricultural Research Institute, Phloem 3 Pty Ltd, PNG National Weather Service, Sustineo Pty Ltd, University of Goroka
Improving agricultural development opportunities for female smallholders in rural Solomon Islands	SSS/2018/136	1/1/2020	12/31/2024	Dr Deborah Hill	University of Canberra	Kastom Gaden Association, Live and Learn Solomon Islands, Longgu District Mother's Union, University of Canberra
Gender equitable agricultural extension through institutions and youth engagement in Papua New Guinea	SSS/2018/137	10/1/2019	3/31/2024	Dr Josephine Caffery	University of Canberra	Pacific Adventist University, University of Canberra

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Analysing gender transformative approaches to agricultural development with ethnic minority communities in Vietnam	SSS/2018/139	10/1/2018	9/15/2022	Dr Rochelle Spencer	Murdoch University	—
Next generation agricultural extension: Social relations for practice change	SSS/2019/138	1/11/2021	12/31/2025	Dr Brian Cook	The University of Melbourne	Macquarie University, Partners for Rural Development, The University of Adelaide, University of Battambang, University of Canberra
Landcare: An agricultural extension and community development model at district and national scale in Fiji	SSS/2019/140	3/1/2021	4/30/2025	Dr Mary Johnson	RMIT University	Global Landcare, Fiji National University, Landcare Foundation of the Philippines Inc, Ministry of Agriculture, Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development, Tei Tei Taveni, University of the Philippines at Los Banos, University of the Philippines, Mindanao
Policy impact in Laos: From research to practice	SSS/2020/142	7/15/2020	9/30/2022	Dr Hilary Smith	Australian National University	Australian National University, Deakin University, National University of Laos
Building the evidence base on the impacts of mobile financial services for women and men in farming households in Laos and Cambodia	SSS/2020/160	9/1/2021	8/31/2026	Dr Erin Taylor	Western Sydney University	National University of Laos, Royal University of Phnom Penh, The University of Adelaide
Climate-smart coastal landscapes for sustaining fisheries-based livelihoods and food security in the Pacific	SSS/2021/120	7/1/2022	6/30/2026	Dr Cherise Addinsall	Southern Cross University	—
The role of agricultural and forest landscapes on human and environmental health in Cambodia (ACIAR–IRDC One Health Research Program)	SSS/2022/164	9/1/2022	8/31/2025	Dr Kimchhin Sok	Royal University of Agriculture	—
Soil and Land Management						
Improving community fire management and peatland restoration in Indonesia	FST/2016/144	12/1/2017	6/30/2023	Dr Daniel Mendham	CSIRO	Australian National University, Forestry Research, Development and Innovation Agency, La Trobe University, RMIT University, The Borneo Orangutan Survival Foundation, The University of Melbourne, University of Palangka Raya, University of the Sunshine Coast, Yayasan Tambuhak Sinta
Land management of diverse rubber-based systems in the southern Philippines	SLAM/2017/040	1/1/2019	12/31/2023	Prof Chengrong Chen	Griffith University	Bureau of Soil and Water Management, Caraga State University, Provincial Government of Agusan del Sur, University of Southern Mindanao

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Farmer options for crops under saline conditions in the Mekong River Delta, Vietnam	SLAM/2018/144	1/1/2020	12/31/2024	Dr Jason Condon	Charles Sturt University	Can Tho University, Institute of Agricultural Sciences of Southern Vietnam, Murdoch University, NSW Department of Primary Industries, University of New England
Crop health and nutrient management of shallot-chilli-rice cropping systems in coastal Indonesia	SLAM/2018/145	8/1/2020	1/31/2025	Dr Stephen Harper	The University of Queensland	Balai Pengkajian Teknologi Pertanian Central Sulawesi, Bogor Agricultural University, Gadjah Mada University, Indonesian Soil Research Institute, Indonesian Vegetable Research Institute, Queensland Department of Agriculture & Fisheries, The University of Queensland
Better soil information for improving Papua New Guinea agricultural production and land use planning: Building on PNGRIS and linking to the Pacific Regional Soil Partnership	SLAM/2019/106	9/1/2022	9/30/2026	Mr Peter Wilson & Dr Mark Thomas	CSIRO	Department of Agriculture and Livestock, National Agricultural Research Institute, Fresh Produce Development Agency, Papua New Guinea University Technology, Coffee Industry Corporation
Optimising soil management and health in Papua New Guinea integrated cocoa farming systems - Phase 2	SLAM/2019/109	6/21/2021	5/30/2026	Prof Damien Field	The University of Sydney	Cocoa Board of Papua New Guinea, University of Canberra
Managing heavy metals and soil contaminants in vegetable production to ensure food safety and environmental health in the Philippines	SLAM/2020/117	1/1/2023	12/31/2026	Dr Stephen Harper	The University of Queensland	University of Philippines Los Banos, University of Science and Technology of Southern Philippines, Visayas State University
Validating technologies for assessing and monitoring the impacts of re-wetting of peatland Indonesia using eddy flux towers coupled with the Chameleon sensors	SLAM/2020/118	9/1/2020	6/30/2023	Dr Samantha Grover	RMIT University	Borneo Orangutan Survival Foundation, University of Palangka Raya, The The University of Melbourne, The The University of Western Australia, Charles Darwin University, Solutech
Soil management in Pacific island countries Phase 2: Investigating nutrient dynamics and the utility of soil information for better soil and crop management	SLAM/2020/139	1/1/2023	12/31/2026	Dr Ben Macdonald	CSIRO	Ministry of Agriculture, Food, Forestry and Fisheries Tonga, Fiji Ministry of Agriculture, Samoan Ministry of Agriculture and Scientific Research Organization, The Secretariat of the The Pacific Community, University of the South Pacific, Vanuatu Ministry of Agriculture, Livestock, Forestry, Fisheries, and Biosecurity, Manaaki Whenua Landcare Research NZ
Developing and translating soil health information in Bangladesh with farmers and for farmers to build resilient agricultural systems	SLAM/2021/107	7/1/2022	6/30/2027	Prof Chengrong Chen	Griffith University	Bangladesh Agriculture University

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Evaluation of livelihood zones, rural household trajectories, research and development partners and initiatives in Timor-Leste	SLAM/2021/108	4/4/2022	10/31/2023	Dr Leigh Vial	Charles Darwin University	—
Embedding knowledge and exploring future research opportunities in sloping land agricultural systems in northern Laos and Northwest Vietnam	SLAM/2021/152	12/1/2021	12/31/2022	Prof Michael Bell	The University of Queensland	The University of Queensland
Management practices for profitable crop livestock systems for Cambodia and Laos	SMCN/2012/075	3/22/2016	3/31/2024	Dr Matthew Denton	The University of Adelaide	Cambodia Agricultural Research and Development Institute, Department of Agricultural Land Management, Murdoch University, National Agriculture and Forestry Research Institute, Provincial Agriculture and Forestry Office, Royal University of Agriculture
Sustaining soil fertility in support of intensification of sweetpotato cropping systems	SMCN/2012/105	2/15/2016	4/30/2023	Prof Neal Menzies	The University of Queensland	National Agricultural Research Institute
Improving maize-based farming systems on sloping lands in Vietnam and Laos	SMCN/2014/049	2/1/2017	12/31/2022	Prof Michael Bell	The University of Queensland	CIRAD, Department of Agricultural Land Management, International Center for Tropical Agriculture, Northern Mountainous Agriculture and Forestry Science Institute, Queensland Department of Agriculture & Fisheries, Soil and Fertilizer Research Institute, University of Tasmania
Land suitability assessment and site-specific soil management for Cambodian uplands	SMCN/2016/237	11/10/2017	12/31/2022	Dr Wendy Vance	Murdoch University	Cambodia Agricultural Research and Development Institute, Department of Agriculture and Food Western Australia, Royal University of Agriculture
Water						
Cropping system intensification in the salt-affected coastal zones of Bangladesh and West Bengal, India	LWR/2014/073	11/1/2015	10/31/2024	Dr Mohammed Mainuddin	CSIRO	Bangladesh Agricultural Research Council,Bangladesh Agricultural Research Institute,Bangladesh Rice Research Institute, Bidhan Chandra Krishi Viswavidyalaya University, Central Soil Salinity Research Institute, Institute of Water Modelling, Khulna University, Krishi Gobeshona Foundation, Murdoch University, Shushilan, Tagore Society for Rural Development
Nutrient management for diversified cropping in Bangladesh	LWR/2016/136	8/1/2017	12/31/2022	Prof Richard Bell	Murdoch University	Bangladesh Agricultural Research Council,Bangladesh Agricultural Research Institute,Bangladesh AGRICULTURAL UNIVERSITY,Bangladesh Rice Research Institute, Conservation Agriculture Service Providers Association, Khulna University, Patuakhali Science and Technology University, Soil Resource Development Institute

Project title	Project code	Start	End	Proect leader	Commissioned organisation	Collaborating institutions
Transforming smallholder irrigation into profitable and self-sustaining systems in southern Africa	LWR/2016/137	6/16/2017	6/30/2023	Prof Jamie Pittock	Australian National University	Ardhi University, CSIRO, Food, Agriculture and Natural Resources Policy Analysis Network, International Crops Research Institute for the Semi Arid Tropics, National Institute of Irrigation, University of South Australia
Adapting to salinity in the southern Indus Basin	LWR/2017/027	11/1/2020	9/30/2023	Dr Michael Mitchell	Charles Sturt University	CSIRO, International Centre for Biosaline Agriculture, International Union for Conservation of Nature and Natural Resources, Mehran University of Engineering and Technology
Virtual Irrigation Academy Phase 2: From water monitoring to learning to governance	WAC/2018/162	6/17/2019	6/30/2023	Dr Richard Stirzaker	CSIRO	Association for Strengthening Agricultural Research in Eastern and Central Africa, Department of Agricultural Research Services, Department of Irrigation, National Institute of Irrigation
Water management for smallholder farmers: Outscaling ACIAR research in the Andhra Pradesh Drought Mitigation Program	WAC/2018/164	10/1/2019	3/31/2023	Dr Uday Nidumolu	CSIRO	Western Sydney University, South Australian Research and Development Institute, Water Support Services Activities Network, GRDCLRN, Acharya N.G. Ranga Agricultural University
Transforming smallholder food systems in the Eastern Gangetic Plain	WAC/2020/148	10/1/2021	9/30/2026	Dr Tamara Jackson	The University of Adelaide	Bangladesh Agricultural University, International Food Policy Research Institute, CIMMYT, Ministry of Land Management and Cooperatives, Rangpur Dinajpur Rural Service, Satmile Satish Club Opathagar, Uttar Banga Krishi Vishwavidyalaya
Opportunities for brackish and saline aquaculture in Pakistan	WAC/2020/179	6/18/2021	10/30/2022	Dr Mohsin Hafeez	International Water Management Institute	WorldFish (Malaysia)
Virtual Irrigation Academy business models in Pakistan	WAC/2020/180	6/21/2022	6/30/2023	Mr Simon Dyer	Virtual Irrigation Academy Ltd	Pakistan Council of Research in Water Resources
Supporting inter-provincial water allocation decision making in Pakistan	WAC/2021/103	4/8/2021	12/31/2022	Dr Mobin-ud Din Ahmad	CSIRO	—
Groundwater management in Pakistan	WAC/2021/134	7/1/2022	6/30/2027	Dr Jay F Punthakey and Dr Catherine Allan	Charles Sturt University	Charles Sturt University

Project title	Project code	Start	End	Proect leader	Commissioned organisation	Collaborating institutions
Water for fish and irrigation in the Mekong	WAC/2021/135	7/1/2022	6/30/2023	Mr Tarek Ketelsen	Australia Mekong Partnership for Environmental Resources and Energy Systems	
Trees for salinity management, Sindh, Pakistan	WAC/2021/136	7/1/2022	6/30/2023	TBC	International Union for Conservation of Nature and Natural Resources	—
Information for agriculture and food security – Digital Earth Africa	WAC/2021/164	6/4/2022	6/30/2023	Dr Cedric Jorand	Geoscience Australia	Association for Strengthening Agricultural Research in Eastern and Central Africa, Kenya
CultiAF2						
Climate-smart interventions for smallholder farmers in Ethiopia (CultiAF 109038)	GP/2019/173	4/1/2019	9/30/2022	Taye Mindaye	Ethiopian Institute of Agricultural Research	—
User-driven approaches to make government and farmer led smallholder irrigation in Mozambique more productive (CultiAF 109039)	GP/2019/174	4/1/2019	9/30/2022	Mario Chilundo	University of Eduardo Mondlane	—
Alien invasive fruit flies in southern Africa: Implementation of a sustainable integrated pest mangement programme to combat their menaces (CultiAF 109040)	GP/2019/175	4/1/2019	9/30/2022	Samira Mohamed	International Centre of Insect Physiology and Ecology	—
Harnessing dietary nutrients of underutilised fish and fish-based products in Uganda (CultiAF 109041)	GP/2019/176	4/1/2019	9/30/2022	Jackson Efitre	Makerere University Uganda	—
Improving agricultural productivity and resilience with satellite and cellphone imagery to scale climate-smart crop insurance (CultiAF 109076)	GP/2019/177	4/1/2019	9/30/2022	Amos Tabalia	Agriculture and Climate Risk Enterprise Limited (ACRE Africa)	—

Appendix 2

Location (Australian state or international) of commissioned organisations for current and proposed projects, 2022–23

Project title	Project code	Commissioned organisation
Australian Capital Territory		
Understanding the drivers of successful and inclusive rural regional transformation: Sharing experiences and policy advice in Bangladesh, China, Indonesia and Pakistan	ADP/2017/024	Australian National University
Australian technology reaches the field: Supporting and monitoring the release of pod-borer resistant cowpea	CROP/2021/165	CSIRO
Strengthening agricultural resilience in Western Province: Developing methods for strengths-based livelihoods approach	FIS/2021/113	University of Canberra
Kava land use changes	FST/2021/146	Geoscience Australia
Bacterial enteropathy and nutrition study in poultry	LS/2021/126	Australian National University
Better soil information for improving Papua New Guinea agricultural production and land use planning: Building on PNGRIS and linking to the Pacific Regional Soil Partnership	SLAM/2019/106	CSIRO
Climate-smart agriculture opportunities for enhanced food production in Papua New Guinea	ASEM/2017/026	Australian National University
Improving agricultural development opportunities for female smallholders in rural Solomon Islands	SSS/2018/136	University of Canberra
Gender equitable agricultural extension through institutions and youth engagement in Papua New Guinea	SSS/2018/137	University of Canberra
Policy impact in Laos: From research to practice	SSS/2020/142	Australian National University
Cropping system intensification in the salt-affected coastal zones of Bangladesh and West Bengal, India	LWR/2014/073	CSIRO
Transforming smallholder irrigation into profitable and self-sustaining systems in southern Africa	LWR/2016/137	Australian National University
Virtual Irrigation Academy Phase 2: From water monitoring to learning to governance	WAC/2018/162	CSIRO
Virtual Irrigation Academy business models in Pakistan	WAC/2020/180	Virtual Irrigation Academy Ltd
Supporting inter-provincial water allocation decision making in Pakistan	WAC/2021/103	CSIRO
Information for agriculture and food security – Digital Earth Africa	WAC/2021/164	Geoscience Australia
New South Wales		
Evaluating supply chain interventions and partnerships to sustainably grow the smallholder dairy sectors of Indonesia and the Philippines	AGB/2021/124	Australasian Dairy Consultants
Piloting digital monitoring of VietGAP compliance and quality in Vietnam vegetable value chains	AGB/2021/153	Applied Horticultural Research
Supporting greenhouse gas inventories and livestock data development in Fiji	CLIM/2021/160	Riverine Plains Inc
Increasing productivity and profitability of pulse production in cereal based cropping systems in Pakistan	CIM/2015/041	Charles Sturt University
Accelerating genetic gain in wheat through hybrid breeding in Bangladesh, Ethiopia and Pakistan	CROP/2020/167	The University of Sydney
Assessing upstream fish migration measures at Xayaburi Dam in Laos	FIS/2017/017	Charles Sturt University
Baseline monitoring and evaluation of long-term impacts on fish stocks from coral restoration	FIS/2018/128	Southern Cross University
FishTech: Integrating technical fisheries solutions into river development programs across South-East Asia	FIS/2018/153	Charles Sturt University
Improving peri-urban and remote inland fish farming in PNG to benefit both community-based and commercial operators	FIS/2018/154	University of New South Wales
Agriculture and fisheries for improved nutrition: integrated agrifood system analyses for the Pacific region	FIS/2018/155	University of Wollongong
Regional coral restoration networks and appropriate technologies for larger-scale coral and fish habitat restoration in the Philippines and Australia	FIS/2019/123	Southern Cross University
Innovating fish-based livelihoods in the community economies of Timor-Leste and Solomon Islands	FIS/2019/124	University of Wollongong

Project title	Project code	Commissioned organisation
Developing social and economic monitoring and evaluation systems in Indonesian tuna fisheries to assess potential impacts of alternative management measures on vulnerable communities	FIS/2020/109	University of Technology Sydney
Coalitions for change in sustainable national community-based fisheries management programs in the Pacific	FIS/2020/172	University of Wollongong
Institutional effectiveness and political economy of coral reef restoration in the Philippines	FIS/2021/112	University of Technology Sydney
Strengthening agricultural resilience in Western Province: Mapping place-based strengths and assets	FIS/2021/122	Western Sydney University
Vietnamese native tree species for improved livelihoods	FST/2020/134	Southern Cross University
Developing the cocoa value chain in Bougainville	HORT/2014/094	The University of Sydney
Developing vegetable value chains to meet evolving market expectations in the Philippines	HORT/2016/188	Applied Horticultural Research
Preparedness and management of huánglóngbìng (citrus greening disease) to safeguard the future of citrus industry in Australia, China and Indonesia	HORT/2019/164	NSW Department of Primary Industries
Increasing the productivity and profitability of smallholder beekeeping enterprises in Papua New Guinea and Fiji	LS/2014/042	Southern Cross University
Improving small ruminant production and supply in Fiji and Samoa	LS/2017/033	University of New England
Goat production systems and marketing in Laos and Vietnam	LS/2017/034	University of New England
Development of a third party verified voluntary sustainable certification program for beef and other key commodities in Vanuatu	LS/2020/155	Sustainable Island States
Farmer options for crops under saline conditions in the Mekong River Delta, Vietnam	SLAM/2018/144	Charles Sturt University
Optimising soil management and health in Papua New Guinea integrated cocoa farming systems - Phase 2	SLAM/2019/109	The University of Sydney
Building the evidence base on the impacts of mobile financial services for women and men in farming households in Laos and Cambodia	SSS/2020/160	Western Sydney University
Climate-smart coastal landscapes for sustaining fisheries-based livelihoods and food security in the Pacific	SSS/2021/120	Southern Cross University
Adapting to salinity in the southern Indus Basin	LWR/2017/027	Charles Sturt University
Groundwater management in Pakistan	WAC/2021/134	Charles Sturt University
Northern Territory		
Improving mango crop management in Cambodia, the Philippines and Australia to meet market expectations	HORT/2016/190	Department of Industry, Tourism and Trade
Developing strategies to reduce brucellosis transmission in Timor-Leste based on One Health collaboration (ACIAR–IRDC One Health Research Program)	LS/2022/161	Menzies School of Health Research
Evaluation of livelihood zones, rural household trajectories, research and development partners and initiatives in Timor-Leste	SLAM/2021/108	Charles Darwin University
Queensland		
Developing competitive and inclusive value chains of pulses in Pakistan	ADP/2017/004	The University of Queensland
Pacific Agribusiness Research in Development Initiative Phase 2 (PARDI 2)	AGB/2014/057	University of the Sunshine Coast
Agribusiness-led inclusive value chain development for smallholder farming systems in the Philippines	AGB/2018/196	CSIRO
Planning and establishing a sustainable smallholder rice chain in the Mekong Delta	AGB/2019/153	The University of Queensland
Defining priority commercialisation pathways and potential private commercialisation partners for viable long-term commercialisation of products emerging from FST/2019/128	AGB/2021/172	Buck Advisory
Supporting greenhouse gas inventories and targeted rice mitigation options for Vietnam	CLIM/2019/150	Queensland University of Technology
Institutional barriers to climate finance through a gendered lens in Fiji, Samoa and Solomon Islands	CLIM/2021/110	Queensland University of Technology
Weed management techniques for mechanised and broadcast lowland crop production systems in Cambodia and Laos	CROP/2019/145	The University of Queensland

Project title	Project code	Commissioned organisation
Finding a genetic basis for oil palm responses to basal stem rot in a long-term infected block	CROP/2021/130	The University of Queensland
Demand-led plant variety design for emerging markets in Africa	FSC/2013/019	The University of Queensland
Increasing technical skills supporting community-based sea cucumber production in Vietnam and the Philippines	FIS/2016/122	University of the Sunshine Coast
Half-pearl industry development in Tonga and Vietnam	FIS/2016/126	University of the Sunshine Coast
Improved productivity, efficiency and sustainability of the culture-based fishery for finfish and giant freshwater prawn in Sri Lankan reservoirs	FIS/2018/157	James Cook University
Towards more profitable and sustainable mabé pearl and shell-based livelihoods in the western Pacific	FIS/2019/122	University of the Sunshine Coast
Improving nutrition through women's and men's engagement across the seaweed food chain in Kiribati and Samoa	FIS/2019/125	University of the Sunshine Coast
Spatially integrated approach to support a portfolio of livelihoods	FIS/2020/111	James Cook University
Supporting grouper-farming smallholders in Vietnam to improve their SME businesses by engaging with aquafeed companies to produce commercial feeds	FIS/2021/121	James Cook University
Enabling community forestry in Papua New Guinea	FST/2016/153	University of the Sunshine Coast
Enhancing private sector-led development of the canarium industry in Papua New Guinea - Phase 2	FST/2017/038	Griffith University
Promoting smallholder teak and sandalwood plantations in Papua New Guinea and Australia	FST/2018/178	University of the Sunshine Coast
Coconut and other non-traditional forest resources for the manufacture of engineered wood products	FST/2019/128	Queensland Department of Agriculture & Fisheries
Building an effective forest health and biosecurity network in South-East Asia	FST/2020/123	University of the Sunshine Coast
Livelihoods in forest ecosystem recovery	FST/2020/135	Griffith University
Aligning genetic resources, production and post-harvest systems to market opportunities for Pacific island and Australian cocoa	HORT/2014/078	Queensland Department of Agriculture & Fisheries
Development of area-wide management approaches for fruit flies in mango for Indonesia, Philippines, Australia and the Asia-Pacific region	HORT/2015/042	Queensland Department of Agriculture & Fisheries
Responding to emerging pest and disease threats to horticulture in the Pacific Islands	HORT/2016/185	The University of Queensland
An integrated management response to the spread of *Fusarium* wilt of banana in South-East Asia	HORT/2018/192	Queensland Department of Agriculture & Fisheries
Protecting the coffee industry from coffee berry borer in Papua New Guinea and Australia	HORT/2018/194	Queensland Department of Agriculture & Fisheries
Improving root crop resilience and biosecurity in Pacific island countries and Australia	HORT/2018/195	Queensland Department of Agriculture & Fisheries
Enhanced fruit systems for Tonga and Samoa (Phase 2): Community based citrus production	HORT/2019/165	University of the Sunshine Coast
Developing a biosecurity system for small banana growers resilient to *Fusarium* wilt TR4 in southern and eastern Africa	HORT/2020/128	Queensland Department of Agriculture & Fisheries
Improving smallholder wellbeing through participation in modern value chains: sustaining future growth in the Pakistan citrus industry	HORT/2020/129	The University of Queensland
Biosecurity planning	HORT/2021/151	The University of Queensland
Understanding school food provision in the Pacific: Scoping the potential of local food systems to improve diets, nutrition and livelihoods	HORT/2021/159	University of the Sunshine Coast
A farm planning approach to increase productivity and profitability of smallholder cattle systems in Vanuatu	LS/2018/185	Central Queensland University
Global burden of animal disease initiative: Indonesia case study	LS/2020/156	CSIRO
Land management of diverse rubber-based systems in the southern Philippines	SLAM/2017/040	Griffith University
Crop health and nutrient management of shallot-chilli-rice cropping systems in coastal Indonesia	SLAM/2018/145	The University of Queensland

Project title	Project code	Commissioned organisation
Managing heavy metals and soil contaminants in vegetable production to ensure food safety and environmental health in the Philippines	SLAM/2020/117	The University of Queensland
Developing and translating soil health information in Bangladesh with farmers and for farmers to build resilient agricultural systems	SLAM/2021/107	Griffith University
Embedding knowledge and exploring future research opportunities in sloping land agricultural systems in northern Laos and Northwest Vietnam	SLAM/2021/152	The University of Queensland
Sustaining soil fertility in support of intensification of sweetpotato cropping systems	SMCN/2012/105	The University of Queensland
Improving maize-based farming systems on sloping lands in Vietnam and Laos	SMCN/2014/049	The University of Queensland
Enhancing livelihoods through forest and landscape restoration	ASEM/2016/103	University of the Sunshine Coast
South Australia		
Agricultural policy research to support natural resource management in Indonesia's upland landscapes	ADP/2015/043	The University of Adelaide
Creating resilient communities through smallholder-inclusive tourism markets in Indonesia	AGB/2021/125	Primary Principles Pty Ltd
Intercropping for intensification and diversification in the Eastern Gangetic Plains	CROP/2021/155	CSIRO
Enhancing livelihoods through improved forest management in Nepal	FST/2017/037	The University of Adelaide
Safe, fresh, year-round vegetables in Cambodia and Laos through research and development support of whole supply chain agribusiness networks	HORT/2021/143	The University of Adelaide
Soil management in Pacific island countries Phase 2: Investigating nutrient dynamics and the utility of soil information for better soil and crop management	SLAM/2020/139	CSIRO
Management practices for profitable crop livestock systems for Cambodia and Laos	SMCN/2012/075	The University of Adelaide
Water management for smallholder farmers: Outscaling ACIAR research in the Andhra Pradesh Drought Mitigation Program	WAC/2018/164	CSIRO
Transforming smallholder food systems in the Eastern Gangetic Plain	WAC/2020/148	The University of Adelaide
Tasmania		
Integrating smallholder households and farm production systems into commercial beef supply chains in Vietnam	AGB/2020/189	University of Tasmania
Harvest strategies for Indonesian tropical tuna fisheries to increase sustainable benefits	FIS/2016/116	CSIRO
Blue economy: Valuing the carbon sequestration potential in oyster aquaculture	FIS/2020/175	University of Tasmania
Managing risk in South-East Asian forest biosecurity	FST/2018/179	University of Tasmania
Intensification of beef cattle production in upland cropping systems in Northwest Vietnam	LPS/2015/037	University of Tasmania
Improving community fire management and peatland restoration in Indonesia	FST/2016/144	CSIRO
Victoria		
Kwale agricultural research for development project, Kenya	AGB/2021/123	Business for Development
Landscape and opportunity analysis in the Pacific tuna sector: Foundation analysis to identify innovation pathways to enhance participation by the Pacific community and value retention in the region	AGB/2021/173	Business for Development
Sustainable intensification for climate-resilient development in Pacific island countries	CLIM/2020/186	The University of Melbourne
Advancing enhanced wood manufacturing industries in Laos and Australia	FST/2016/151	The University of Melbourne
Forest restoration for economic outcomes	FST/2020/137	The University of Melbourne
Drug sensitive and resistant tuberculosis and zoonotic infections as causes of lymphadenitis in 3 provinces in Papua New Guinea	LS/2018/217	Burnet Institute

Project title	Project code	Commissioned organisation
Strengthened surveillance for vector-borne zoonotic and livestock diseases in Papua New Guinea	LS/2021/158	CSIRO
Validating technologies for assessing and monitoring the impacts of re-wetting of peatland Indonesia using eddy flux towers coupled with the Chameleon sensors	SLAM/2020/118	RMIT University
Uptake of agricultural technologies amongst farmers in Battambang and Pailin provinces, Cambodia	ASEM/2013/003	The University of Melbourne
Next generation agricultural extension: Social relations for practice change	SSS/2019/138	The University of Melbourne
Landcare: An agricultural extension and community development model at district and national scale in Fiji	SSS/2019/140	RMIT University
Western Australia		
Incorporating salt-tolerant wheat and pulses into smallholder farming systems in southern Bangladesh	CIM/2014/076	The University of Western Australia
Faba bean in Ethiopia: Mitigating disease constraints to improve productivity and sustainability	CIM/2017/030	The University of Western Australia
Rapid breeding for reduced cooking time and enhanced nutritional quality in common bean (*Phaseolus vulgaris*)	CROP/2018/132	The University of Western Australia
Protecting Ethiopian lentil crops	CROP/2020/164	The University of Western Australia
Agricultural Innovations for Communities: Intensified and diverse farming systems for Timor-Leste (AI-Comm 2)	CROP/2021/131	The University of Western Australia
Enhancing farm-household management decision-making for increased productivity in the Eastern Gangetic Plains	CSE/2012/108	The University of Western Australia
Investigating and developing interventions to mitigate food borne parasitic disease in production animals in Laos	LS/2014/055	Murdoch University
Land suitability assessment and site-specific soil management for Cambodian uplands	SMCN/2016/237	Murdoch University
Improving livelihoods of smallholder coffee communities in Papua New Guinea	ASEM/2016/100	Curtin University
Climate-smart landscapes for promoting sustainability of Pacific island agricultural systems	ASEM/2016/101	The University of Western Australia
Analysing gender transformative approaches to agricultural development with ethnic minority communities in Vietnam	SSS/2018/139	Murdoch University
Nutrient management for diversified cropping in Bangladesh	LWR/2016/136	Murdoch University
Water for fish and irrigation in the Mekong	WAC/2021/135	Australia Mekong Partnership for Environmental Resources and Energy Systems
International		
Inclusive agriculture value chain financing	AGB/2016/163	International Food Policy Research Institute
Establishing sustainable solutions to cassava diseases in mainland South-East Asia	AGB/2018/172	International Center for Tropical Agriculture
Increasing the sustainability, productivity and economic value of coffee and black pepper farming systems and value chains in the Central Highlands Region of Vietnam	AGB/2018/175	World Agroforestry
Developing food loss reduction pathways through smart business practices in mango and tomato value chains in Pakistan and Sri Lanka (Food Loss Research Program)	CS/2020/193	Quaid-i-Azam University
Food loss in the *Pangasius* catfish value chain of the Mekong River Basin (Food Loss Research Program)	CS/2020/209	Health and Agricultural Policy Research Institute
Managing food value chains for improved nutrition for urban vulnerable populations in Lusaka City (Zambia) (AfricitiesFood)	CS/2020/210	University of Zambia
Managing food value chains for improved nutrition for urban vulnerable populations in Mzuzu City (Malawi) (AfricitiesFood)	CS/2021/115	Mzuzu University
Transformation pathways for Pacific coastal food systems	CLIM/2020/178	Cawthron Institute
MAC-B: Mitigation adaptation co-benefits modelling trial in Bangladesh	CLIM/2021/109	Columbia University
Locally led learning to turn polders into flexible assets for adaptation	CLIM/2021/137	CIMMYT
Preparing for mangrove-based climate and agribusiness transformation in the Mekong Delta	CLIM/2021/138	CIFOR

Project title	Project code	Commissioned organisation
Supporting the tracking sharing learning platform of the Adaptation Research Alliance	CLIM/2022/108	SouthSouthNorth
International Mungbean Improvement Network 2	CROP/2019/144	The World Vegetable Center
Managing wheat blast in Bangladesh: Identification and introgression of wheat blast resistance for rapid varietal development and dissemination	CROP/2020/165	CIMMYT
Harnessing appropriate-scale farm mechanisation in Zimbabwe	CROP/2021/166	CIMMYT
A nutrition-sensitive approach to fisheries management and development in Timor-Leste and Nusa Tenggara Timur Province, Indonesia	FIS/2017/032	WorldFish Center
Retaining the jewels in the crown: Kalimantan peat forest remnants	FST/2021/145	The Borneo Orangutan Survival Foundation
Growing the future: Better forestry in Uganda	FST/2021/147	National Forestry Resources Research Institute
Fruit trees for climate adaption and mitigation in East Africa	FST/2021/163	World Agroforestry
Adopting a gender-inclusive participatory approach to reducing horticultural food loss in the Pacific	CS/2020/191	Scientific Research Organisation of Samoa
Supporting an international initiative to maintain the coconut genetic resources network (COGENT)	GP/2018/193	International Coconut Community
Strengthening vegetable value chains in Pakistan for greater community livelihood benefits	HORT/2016/012	CABI
Safeguarding and deploying coconut diversity for improving livelihoods in the Pacific islands	HORT/2017/025	The Pacific Community
PICfood: Driving vegetable food environments to promote healthy diets in Pacific island countries	HORT/2021/141	World Vegetable Centre
Climate-smart interventions for smallholder farmers in Ethiopia (CultiAF 109038)	GP/2019/173	Ethiopian Institute of Agricultural Research
User-driven approaches to make government and farmer led smallholder irrigation in Mozambique more productive (CultiAF 109039)	GP/2019/174	University of Eduardo Mondlane
Alien invasive fruit flies in southern Africa: Implementation of a sustainable integrated pest mangement programme to combat their menaces (CultiAF 109040)	GP/2019/175	International Centre of Insect Physiology and Ecology
Harnessing dietary nutrients of underutilised fish and fish-based products in Uganda (CultiAF 109041)	GP/2019/176	Makerere University Uganda
Improving agricultural productivity and resilience with satellite and cellphone imagery to scale climate-smart crop insurance (CultiAF 109076)	GP/2019/177	Agriculture and Climate Risk Enterprise Limited (ACRE Africa)
Asian chicken genetic gains: A platform for exploring, testing, delivering, and improving chickens for enhanced livelihood outcomes in South-East Asia	LS/2019/142	International Livestock Research Institute
Resilient and low-carbon livestock systems for trade and food security in the rangelands of eastern and southern Africa	LS/2020/152	International Livestock Research Institute
Upscaling the benefits of insect-based animal feed technologies for sustainable agricultural intensification in Africa (PROTeinAfrica)	LS/2020/154	International Centre of Insect Physiology and Ecology
Rapid transformation of Lao beef sector - biosecurity, trade and smallholders	LS/2021/128	FocusGroupGo Asia Pacific
Global animal health governance: High-level consortium	LS/2021/157	Kevin Bardosh LLC
Policy Support to the Philippines' national surveillance and control programs for African swine fever, avian influenza and antimicrobial resistance: A One Health systems approach (ACIAR–IRDC One Health Research Program)	LS/2022/162	University of the Philippines at Los Banos
Livestock enhancement through ecohealth/One Health assessment in South-East Asia (ACIAR–IRDC One Health Research Program)	LS/2022/163	University of the Philippines at Los Banos
The role of agricultural and forest landscapes on human and environmental health in Cambodia (ACIAR–IRDC One Health Research Program)	SSS/2022/164	Royal University of Agriculture
Opportunities for brackish and saline aquaculture in Pakistan	WAC/2020/179	International Water Management Institute
Trees for salinity management, Sindh, Pakistan	WAC/2021/136	International Union for Conservation of Nature and Natural Resources

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