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