



partners

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About Partners

Partners in Research for Development is the quarterly publication of the Australian Centre for International Agricultural Research (ACIAR). *Partners* presents articles that summarise results from ACIAR-brokered research projects and puts ACIAR research initiatives into perspective.

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Front cover: LIFE participants working in their community garden in Koronadal City, South Cotabato, Philippines (page 3).

Photo: Jeffrey Maitem.

Back cover: Eggplants on sale in Maguindanao in the Philippines.

Photo: Jeffrey Maitem.





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From the CEO

Professor Andrew Campbell



While the COVID-19 pandemic and responses to it continue to shape our world, some fundamentals haven't changed.

People still need to eat, and our food systems and food security are as important as ever. Vulnerabilities in food system resilience have been exposed and amplified, and it is these we need to focus on.

This issue of *Partners* explores ACIAR-supported research that is building resilience—to COVID-19 and to other existing and emerging risks.

An obvious area to zoom in on is One Health and zoonotic diseases, which *Partners* featured in the last issue. This issue digs deeper into other animal and plant diseases including African swine fever and wheat blast, and pests like fall armyworm. All loom as threats to food security, and tackling them has become both more difficult and more urgent due to COVID-19.


The ACIAR partnership model is key to solving these issues. For 38 years, ACIAR has focused on building partnerships and in-country capacity. Now is the time to take those partnerships to the next level, and build on them to sustain or even increase momentum across our research portfolio.

Notwithstanding international travel restrictions, in many ACIAR partner countries our in-country partners can still get out into the field, work on experiments and continue their research—arguably more easily than would be possible in Australia. ACIAR and its Australian partners are now adapting to better support our in-country partners remotely, to maintain this in-country research activity.

The ACIAR Alumni Research Support Facility is a great example of our rapid response to the pandemic. We received more than one hundred applications for support for COVID-related research projects. The first 40 projects led by ACIAR alumni are now getting underway, with alumni working in their home countries and receiving formal scientific mentoring and support organised by ACIAR.

Our medium- and long-term responses to the pandemic will be informed by the three-stage Rapid Assessment of Indo-Pacific Food System Risks and Resilience. More information on that critical strategic project is shared in this issue.

ACIAR has deep experience in supporting partners during difficult times and in challenging contexts. Two projects—one current and one from the past—in this issue describe research activities in conflict-vulnerable regions.

How we conduct our research and manage research projects is changing. Some responses to COVID-19 may well endure for the long-term, as we discover better ways to do our work. ACIAR is adapting and we will continue to support our partners to adapt as well. 

A handwritten signature in black ink, appearing to read 'A. Campbell'.



From conflict to LIFE

A call from a community leader looking to help his people on the conflict-affected island of Mindanao in the Philippines triggered an ACIAR-supported team to adapt its effective agricultural extension 'Landcare' model to help farmers living amid hostilities.

Farmers participating in LIFE like Leonila Lagunday from Ampatuan, Maguindanao, have diversified their crops, learnt new skills and increased their incomes as a result of the program. Photo: Jeffrey Maitem.

Key points

- 1 Conflict has significantly disadvantaged communities and dislocated extension services on the Philippine island of Mindanao.
- 2 Mindanao farmers are now reaping the rewards of the 'LIFE' agricultural extension program.
- 3 LIFE supports farmers to identify what they want to improve in their farming enterprises and lives, and taps into their social capital to help them achieve it.

Mindanao is known as a 'land of promise', with potentially one of the richest agricultural areas in South-East Asia owing to its warm temperatures, abundant rainfall, large areas of fertile soil and innovative farmers. But this potential has been hampered by conflict arising from a range of religious, cultural and political differences.

Conflict disrupts farming activities, reduces investment in farm infrastructure, breaks down social structures within communities and makes it difficult for governments to provide much-needed extension services.

For decades, ACIAR has had a presence in supporting agricultural extension in the Philippines using a Landcare-based approach that brings farmers together in groups where they can coordinate what they want to do, particularly in managing natural resources. But it wasn't until one of the local partners received the call from the community leader that they recognised an opportunity and began the development of LIFE (Livelihood Improvement through Facilitated Extension): the new approach to improving farmer livelihoods in the presence or threat of conflict.

Local focus, local solutions

Dr Mary Johnson, Research Fellow, RMIT University, leads an ACIAR-supported project that is working in the Philippines to implement LIFE in three conflict-affected or conflict-vulnerable sites across Mindanao: in Zamboanga Sibugay, Maguindanao and South Cotabato. The project works with local partners, the University of the Philippines (UP) Mindanao, UP Los Baños and Landcare Foundation of the Philippines, Inc.

LIFE involves a 15-step approach that starts with the appointment of a facilitator who lives in and is part of the community—ensuring they are culturally attuned and have existing local relationships.

'Formerly, extension processes have come from a position of "Here's a problem; here's a solution; this is what you do" but this is not the approach we took at all,' says Dr Johnson. 'We focused on working with farmer groups and communities—people as the solution, not the problem.'

Instead, the team supported the development of local farmer groups who worked with their facilitators to help them achieve what they wanted through their networks.

LIFE participant Vidal Moreno feeds his goats at his farm in Koronadal City, South Cotabato. Photo: Jeoffrey Maitem.





Central to the success of LIFE is bringing together people and capitalising on social networks. Here residents who participate in LIFE work in their community garden in Koronadal City, South Cotabato. Photo: Jeffrey Maitem.

'It's about shoring up existing or developing new networks between farmers, farmer groups and, for example, in the Philippines, local government units or NGOs that are operating in their area,' says Dr Johnson.

Core to this work is building on social capital within communities. Dr Johnson explains, 'Social capital is about how the community gels together, the social links and networks, who's talking to who, and how connections are made for social and business interactions.'

For example, in Maguindanao the farmers were mostly growing just corn or coconuts in a monocropping regime, with little knowledge of, or capacity to grow, other crops. The facilitators helped the farmers look for various opportunities and they identified vegetable production as a priority. The facilitators then linked the farmers to a local government program to access inputs such as seeds and get the advice they needed to start production. Now they are growing vegetables to eat and are growing enough to sell as well.

Jury Alimonjanid is a farmer from Ampatuan, Maguindanao, which is the site of the infamous Maguindanao Massacre of 2009 where 58 people were killed in an attack sparked by political rivalry. Unrest remains and continues to threaten the lives and wellbeing of the local people.

As a result of the project, Mr Alimojanid still grows corn and coconuts but now also grows rice, bananas, vegetables and fruits. 'Before the LIFE project, we only had a few crops and a low income because we lacked knowledge on farming technology,' he says.

'When the project arrived we learned a lot, especially on the proper use and application of mulching, water

impounding and organic fertiliser, which we then used on our crops.

'The project helped us learn how to properly plant and manage these crops. This is a big help for us since we get our income for education and household needs from these.'

In some cases, farmers' annual incomes have increased by up to 80% where LIFE has been implemented. Moreover, through part of the broad consultation and engagement steps that form part of LIFE, visits to neighbouring farms and conversations can take place that would not have otherwise occurred. This has allowed relationships between previously distant Muslim, Christian and Indigenous farmers and communities to improve.

Scaling out

In South Cotabato, the impact of the project is also being felt by local government agencies. Helen Anaud, an officer of the Koronadal City Agriculture Office, South Cotabato, who works with the project team, says the LIFE approach has changed the way her office implements its programs with farmers.

'LIFE really changed the way we prioritise projects [and] identify beneficiaries and the areas to implement our programs,' Ms Anaud says. 'Before, we just accepted projects that were downloaded to us by the national government through the Department of Agriculture.'

'Now, our farmer partners are involved in the cycle of program implementation, from planning to monitoring and evaluation. I think LIFE is a useful tool or model for other local government units because our farmer beneficiaries, at the end of the project, become entrepreneurs—empowered and capacitated.'

Since the pilots at the three sites, additional local government units and development agencies have expressed interest in adopting LIFE. Moreover, the Department of Science and Technology–Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD) has provided 30 million Philippine pesos (A\$878,500) over three years to expand and evaluate the use of LIFE in three other conflict-vulnerable sites in South Cotabato, Maguindanao and Zamboanga Sibugay. 🌱

ACIAR PROJECT: Improving the methods and impacts of agricultural extension in conflict areas of Mindanao, Philippines, ASEM/2012/063.



COVID-19 response aims for food systems resilience

While we know the COVID-19 pandemic has caused health and economic crises across the globe, it is also threatening to cause a prolonged food crisis in countries where food supply chains are vulnerable to disruption, including many of Australia’s neighbours.

In Timor-Leste, for instance, crop productivity in nutrient-poor soils relies on seasonal application of fertiliser. Farmers also rely on outside supplies of seed and other crop materials.

However, COVID-19 travel and transport restrictions have seen farmers go without these essential resources due to scarcity or price constraints. The results for many may include lower crop production, less food availability and, for smallholder farmers, inability to invest in future crops.

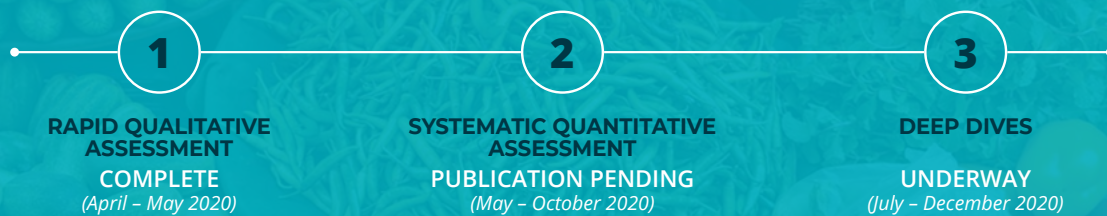
Then there’s the impact of government intervention. Australians have had the benefit of social protection from the pandemic through a range of government

financial relief payments. But in other countries across the Indo-Pacific, the extent of relief schemes is variable, with countries having little social protection being more vulnerable to the impacts of COVID-19 on food security.

These are just some of the threats being identified in a three-stage assessment initiative being undertaken by ACIAR.

The first assessment—‘Food systems security, resilience and emerging risks in the Indo-Pacific in the context of COVID-19: a rapid assessment’—was released in May and involved significant input from people on the ground in partner countries.

Three stages



Key points

- 1 ACIAR is undertaking a three-stage assessment initiative to understand and better respond to COVID-19.
- 2 The first assessment (May 2020) was a rapid qualitative assessment that identified 10 key impacts.
- 3 The second assessment (scheduled for October 2020) is a detailed assessment of key threats, impact hotspots and potential solutions for a selection of ACIAR partner countries.

ACIAR is identifying intervention options that can be implemented to help respond to COVID-19.



The impacts identified in that first assessment include the sudden movement of people from urban to rural areas, putting pressure on local food-growing systems; freight restrictions disrupting the transport of food, fertiliser and other resources; adverse consequences of government policy—for example, around food trade restrictions and ‘wet’ markets; and long-term health implications for groups such as the urban poor as existing food insecurity is amplified by the latest disruption.

Since that first assessment, a team from the Australian National University (ANU) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) have been working with ACIAR and in-country partners to do a more detailed assessment of key threats, impact hotspots and potential solutions in Timor Leste, Papua New Guinea (PNG), Indonesia, the Philippines, and some Pacific island nations.

Partners recently discussed the COVID-19 impact assessments with three of the contributors: Dr Dan Walker, ACIAR Chief Scientist; Dr Todd Sanderson, ACIAR Economics and Policy Program Manager; and Dr Steven Crimp, a Research Fellow with the Fenner School of Environment and Society at the ANU.

Smallholder farmer vulnerability

In some countries—for example, Pacific island nations, where infection rates were low at the time of writing—the pandemic’s most damaging effect is not so much its direct health impact but the indirect impact on food supply chains and markets.

Dr Walker relates an example of a smallholder vegetable farmer in PNG who was unable to sell his harvest of one hectare of sweetpotatoes as the PNG Government issued a state of emergency and closed all local food markets.

The farmer was left with no income, a surplus of sweetpotatoes—now his family’s sole source of food—and no cash to invest in future crops.

‘It’s a simple story but it brings home the impact of COVID-19 on smallholder farmers in countries like PNG. Coronavirus is happening on top of other threats to food security in the region, like fall armyworm and African swine fever,’ says Dr Walker.

‘The impact assessments will help ACIAR and its partners explore how to build more resilient food-production systems and more resilient value chains to minimise the impact of future disruptors.’

Impacts of government policies

Dr Sanderson says COVID-19 impacts on food value chains can be further weakened or strengthened through the ‘knock-on’ effects of other factors, such as government policy.

An example is the balance between trade policy and options to support farmers in the Philippines. With the onset of the pandemic, Filipino farmers faced difficulties getting their crops to storage and processing centres quickly enough, resulting in spoilage and loss of income, leaving farmers with limited funds to invest in the next cropping cycle.

With the Philippine Government facing pressure to protect domestic production, the option to reverse the liberalised trade policies that led to the country’s greater reliance on lower-cost rice imports could be appealing. However, if this led to higher prices for rice and other food staples, the urban poor would be the most likely to be negatively affected.

Year to decade timeframes for action


Dr Crimp was involved with compiling the second assessment, which included input from governments, NGOs, community groups, and food producers and processors in PNG, Indonesia, the Philippines, Timor-Leste and a group of Pacific island countries.

This information is being used to assess the resilience and recovery potential of food systems in each of these places and will inform the third assessment.

‘That report will provide recommendations for short-term (within the next year), intermediate (up to five years) and long-term (up to a decade) interventions,’ he says.

‘They will include suggestions on how to pivot existing ACIAR projects to address some of the research gaps and identify new investment and partnership opportunities to address other gaps and bring about solutions.’

‘It’s a complicated series of drivers and sensitivities. Some of them cut across all five geographical regions but others are specific in how they’re impacting local food security.’

All three assessments are progressively providing ACIAR with deeper insights and knowledge. This is allowing ACIAR to act quickly where help was needed quickly and to plan for an effective long-term response to best support its partners. 



People power forges new Myanmar supply chain

Myanmar farmer U Sar Saw Myint and his wife traditionally sell their ripe tomatoes and capsicums in local markets around the fertile shores of Inle Lake (Nyaung Shwe) but a new best-practice program has them aiming for distant city supermarkets.

In May 2020 the couple teamed up with another five farmers from Taung Boet Gyi village to pack 2,000 kg of ripe tomatoes into boxes and truck them 600 km to Yangon city, where they sold the produce for 34 cents/kg—triple the usual price at home.

Key to the success of this new supply chain was the careful crafting of links between the farmers, food consultancy Fresh Studio, logistics company Future Glory and the Yezin Agricultural University in Shan State.

The connections had already been made through an ACIAR project, run by Applied Agricultural Research, but it was the appointment of an in-country coordinator that gave the project the local boost it needed.

ACIAR Research Program Manager for Agribusiness, Howard Hall, says a robust mid-term review of the project last year showed that while farmers had the accreditation they needed to supply affluent city shoppers who require a high level of food safety, they lacked the confidence and contacts to take the next steps.

Mr Hall explains that farmers participated in the six-month Myanmar Good Agricultural Practices (GAP) program to accredit them in best-practice farming. However, he says, 'without someone on the ground encouraging them to connect with retailers it was not getting any traction'.

'The mid-term review recommended the appointment of an in-country local coordinator, which was to be Ms Shoon Lae.'

Appointed in December last year, Ms Lae is an agronomist with food consultancy Fresh Studio, based in Nyaungshwe in the 'vegetable bowl' of southern Shan State.

Ms Lae became the main contact point for market engagement and promoting vegetable selling and production to local farmers. She and her Fresh Studio colleague, agricultural economist Hnin Hnin Wai, established a rigorous pesticide monitoring program to ensure production of safe vegetables to MyanmarGAP standards, and through regular visits encouraged market linkages with Yangon.

The final step was to appoint Myanmar logistics company Future Glory to package and transport the initial truckload of tomatoes to Yangon and liaise with retailers there. Future Glory labels the tomatoes as MyanmarGAP-accredited for easy recognition at the point of sale.

'The first shipment of tomatoes was very well received by shoppers at Metro and City Mart and we are now sending capsicums and snow peas to Yangon from MyanmarGAP farmers in the Pindaya region,' Ms Lae says.

Urban supermarkets also require farmers to sort and grade their vegetables according to size and colour, and this has created feedback to a fourth partner: Yezin Agricultural University (YAU).

When some of the initial shipment of tomatoes was judged to be overripe, Ms Lae—a graduate of

Key points

- 1 The support of an in-country coordinator in Myanmar has been key to helping GAP-accredited vegetable farmers access high-value markets in Yangon city.
- 2 Collaboration across the supply chain is ensuring farmers get support to respond to feedback from retail outlets to improve the quality of their produce, to shore up these high-value markets.



MyanmarGAP-accredited farmers Ms Daw Ohnmar Win (lt) and Mr U Sar Saw Myint (rt) sent 2,000 kg of tomatoes to Yangon, tripling their usual return.



YAU—contacted the university to initiate post-harvest trials and give feedback directly to the farmers.

The university was already running farm-based trials to assess new vegetable varieties, improve crop establishment and expand the range of crops that could be grown by the small landholders of Shan State.

‘This has shifted the university’s focus from research gathering to acting on information received directly from the retailers to advise farmers on ensuring their produce is market-ready,’ Ms Lae says.

Having local staff on the ground in southern Shan State has greatly helped the supply chain to weather the effects of the COVID-19 pandemic and subsequent restrictions on travel.

‘I can monitor consignments for pesticide residue and manage the packing with the farmers while our Fresh Studio staff in Yangon can assess the quality of consignments when they arrive at the supermarkets,’ Ms Lae says.

‘Future Glory has been very happy with the process and is steadily increasing its orders.’

Mr Hall says this type of local interaction and support is the key to establishing more supply chains in developing countries.

‘It’s local coordinators working with the local people and then the science, in that order, that has made the difference,’ he adds.


MyanmarGAP alone was not enough to give farmers the confidence to question how they had been doing business for generations. ‘Support from local hands-on people like Shoon Lae and Hnin Hnin empowered them to be more inquisitive and questioning of their traditional methods,’ says Mr Hall.

‘The project has successfully developed the framework and approach necessary to initiate high-quality vegetable supply chains in developing countries.’

Liam Southam-Rogers

Liam Southam-Rogers, the project’s coordinator from Applied Agricultural Research, says the supply chain will enable smallholder farmers with MyanmarGAP accreditation to produce high-quality vegetables in the highlands in the off-season, for much higher prices.

‘There is great potential for farmers to negotiate even higher prices because tomatoes delivered to the Yangon markets can reach 1,200 MMK/viss (A\$1.30/kg) at this time of year,’ he says.

‘The project has successfully developed the framework and approach necessary to initiate high-quality vegetable supply chains in developing countries.’ 

ACIAR PROJECT: Improving livelihoods in Myanmar and Vietnam through vegetable value chains, AGB/2014/035.



Catherine Marriott: elevating women in leadership

With experience ranging from working as a cattle nutritionist in South-East Asia to establishing a rural women’s mentoring program between Australia and Indonesia, it was unsurprising Catherine Marriott was appointed to be on Australia’s Commission for International Agricultural Research six years ago.

Since then she has been bringing her expertise to the table, including her background in agricultural and policy research in northern Australia.

In June this year Ms Marriott’s tenure as a Commissioner concluded. However, she believes she is leaving an organisation that has built a greater public presence, has a sharper focus on gender outcomes and will lead Australia’s foreign aid program on One Health issues in a post-COVID-19 environment.



Ms Catherine Marriott

Communicating ACIAR

‘Something I pushed really hard for early on—which I am so happy we have achieved—is a stronger communication strategy,’ explains Ms Marriott. ‘I could see that there was a risk for ACIAR in not sharing the “good news” stories we had built.

The good news ACIAR can share, Ms Marriott says, is more than just a foreign aid story.

‘ACIAR is the most incredible organisation. It delivers benefit not only to countries around the world but, importantly, also to Australia,’ she says.

‘When Panama Disease broke out in [the Australian state of] Queensland, it could have annihilated the banana industry but we had a researcher in Australia who had been working on an ACIAR project in the Philippines who recognised the disease, and this enabled them to stop it in its tracks.

‘This is one of many examples, and it is these stories—and more—that we need to promote.’

In an environment where Australia’s budget—particularly its foreign aid budget—is tightening, demonstrating broad benefits and clear impacts from investment remains a high priority.

‘We need to be sharing more of what ACIAR does and its wide-ranging benefits so influencers are inspired by the benefit we are able to deliver,’ Ms Marriott adds.

Responding to COVID-19

With greater awareness and appreciation of ACIAR also comes the opportunity to mobilise partners and resources and help respond to emerging issues—including COVID-19. ‘Because ACIAR is a small agency it can be flexible and facilitate [a response to] changing needs,’ Ms Marriott says.



One Health—an integrated approach encompassing human, animal and environmental health—is at the heart of nine new projects jointly funded by ACIAR and the Australian Government’s Department of Foreign Affairs and Trade.

‘ACIAR has research capacity in animal diseases, production systems and biosecurity, and is extremely well placed to represent Australia and collaborate globally to proactively manage and predict future pandemics, limiting their impact,’ she says.

‘A real example of this is the memorandum of understanding ACIAR has formed with the Eijkman Institute for Molecular Biology to forge cooperation between Australia and Indonesia looking at zoonotic malaria.

‘I hope to see more partnerships like this in future. Never has there been a more important time than now to understand the interrelationship between animal and human diseases.’

Ms Marriott adds that, like many other organisations, ACIAR is changing how it operates to include fewer site visits and more remote engagement in response to COVID-19. It is the strong human-to-human connections that the organisation has fostered that provide a resilient base upon which to address new challenges.

‘The thing I really love about ACIAR is the people focus—and that will remain,’ she says. ‘ACIAR has an extraordinary reputation globally because of the effort we have put into human-to-human connections.

‘We have developed strategies with partners to manage current projects as proactively as possible and begin research programs again but be flexible in the project development stage.’

Key points

- 1 Greater awareness of the impact of ACIAR is one of the legacies Ms Catherine Marriott leaves following her six-year stint on Australia’s Commission for International Agricultural Research.
- 2 Maintaining its people focus and a greater attention to gender issues and One Health will position ACIAR to further increase its impact.

Women in leadership

Another central tenet of Ms Marriott’s contribution to ACIAR was in elevating women to leadership roles. As the founding CEO of the Kimberley Pilbara Cattlemen’s Association and as director on multiple boards, Ms Marriott knows the value women bring to leadership positions. She has supported ACIAR in its own transition to improving gender balance at senior levels.

Since Ms Marriott’s appointment the composition of the ACIAR senior leadership team has changed. Six years ago, ACIAR had two women in leadership roles. In 2020, 14 out of the 18 senior leadership positions were filled by women.

‘ACIAR is the most incredible organisation. It delivers benefit not only to countries around the world, but, importantly, also to Australia.’

Catherine Marriott

ACIAR CEO Professor Andrew Campbell says that better gender balance at higher levels within ACIAR demonstrates that gender equity can be improved rapidly, even within small organisations and that ACIAR is ‘walking the talk’ when it advocates for gender issues internationally.


A vision for the future of ACIAR

ACIAR is also shifting towards deliberately measuring the impact it has across the Sustainable Development Goals (SDGs), including gender, health and climate change, among others.

Ms Marriott says she sees a strong future for ACIAR in helping deliver on the SDGs as well as driving the One Health and international research agendas.

‘This has been important for us to monitor and shape our programs but also to effectively communicate the impact our organisation is having, both here in Australia and internationally,’ Ms Marriott says.

‘With the current management and capacity of ACIAR we are very well placed to contribute to and indeed lead some of the most important animal and human science the world needs into the future.’

Recognising the need to respond to a rapidly changing world, Ms Marriott supports ACIAR work that invests in agricultural research differently. She says it is important to recognise not just the finances countries and partners contribute but their intellectual input and research capacity. 



Wheat blast researchers striving to gain upper hand in Bangladesh

Four years ago, Bangladesh wheat-grower Musharraf Hossain's crop was hit so severely by the fungus *Magnaporthe oryzae* pathotype *Triticum*—or wheat blast—that within days he had nothing left to harvest. The following winter he did not plant wheat at all.

Mr Hossain was among many Bangladeshi farmers affected by the virulent disease.

A commitment to rein in further outbreaks is now propelling researchers. It's a time-sensitive race to out-manoeuvre a pathogen that could shatter the food security and economic wellbeing of not only Bangladesh but also its neighbours across the South Asian 'bread basket', including India and Pakistan.

It is expected that in the season completed in March 2020, Bangladesh will have produced about 1.3 million tonnes of wheat—roughly 19% of its total domestic requirement. A further 5.5 million tonnes will be sourced internationally, making Bangladesh the fifth-biggest buyer worldwide.

Key points

- 1 Wheat blast—a devastating fungal disease—has emerged as a threat to the livelihoods of up to 1.7 million wheat-growers in Bangladesh.
- 2 Researchers in Bangladesh and Mexico are collaborating to expand the range of resistant wheats available to farmers not only in Bangladesh but internationally.
- 3 Supplying varieties selected to resist wheat blast is considered essential to safeguarding the economic wellbeing and food security of Bangladesh and its neighbours.

Production under threat

Wheat blast—caused by airborne spores or through contaminated seed—was found for the first time in Bangladesh in February 2016. Previously it had been confined to South America, where it has plagued Brazil, Argentina, Bolivia and Paraguay since the mid-1980s.

Dr Pawan Kumar Singh is Head of Wheat Pathology at the International Maize and Wheat Improvement Centre (CIMMYT), based in Mexico. He is also leader of a four-year, ACIAR-supported multilateral collaboration between CIMMYT, the Bangladesh Wheat and Maize Research Institute (BWMRI) and other stakeholders. He says wheat blast thrives in tropical environments with high humidity, and that the fast-moving infection shrivels and deforms wheat spikes within a matter of days. This gives farmers no chance to apply fungicide and causes grain losses of up to 100% in severe cases.

'Currently wheat blast-vulnerable districts cover 60–65% of the total wheat area of Bangladesh,' Dr Mohammad Israil Hossain, director-general of BWMRI, says. 'If there is a typical hot, wet year conducive to wheat blast it will be disastrous. This will have a huge impact on food security, with an estimated economic loss of US\$17 million [A\$26 million] considering a 10% wheat blast-induced yield loss.'

Southwestern Bangladesh is particularly susceptible, and it was there—at Dighirpara, Meherpur: a wheat blast hotspot near the Bangladesh-India border—that Mr Hossain was forced to write off his entire crop of the wheat variety BARI Gom 24 when wheat blast swept across 15,000 ha in eight districts in 2016.

'That was only about 3% of the total wheat-growing area so it did not affect the national yield that much,' Dr Hossain says.



‘However, the alarming message is that it’s spreading to new districts each consecutive year even under unfavourable disease development conditions.’

Dr Singh adds that researchers are also seeing worrying evidence that the fungus could eventually adapt to lower temperatures, potentially exposing additional areas of Bangladesh, Asia and the world more generally to enormous risk.

‘Our wheat-growing area this year is roughly 0.34 million hectares, with a particularly good yield of about 3.7 t/ha, from the 8–10 million hectares that are suitable for this crop,’ Dr Hossain says.

Communicating with the wheat sector in Bangladesh is complicated by the prevalence of small-area producers: 1.7 million in total. Educating and training extension officers is part of the project, and workshops hosted by CIMMYT and BWMRI have been delivered to dozens of participants. ‘Our major initial challenges were identifying the disease, building awareness and establishing a “wheat holiday” [during which alternative crops were grown to minimise reinfection rates]. The wheat holiday is now over for the most vulnerable districts, so we have been working on replacing susceptible varieties,’ Dr Hossain says.

A lack of commercial seed suppliers is another obstacle. ‘To date the lion’s share of wheat seed is coming from farmers’ own sources,’ he says.

‘A government-owned agency, Bangladesh Agricultural Development Corporation (BADC), provides about 25% of the total requirement, and there are some private companies but that’s a very small quantity, so the rest is retained by farmers. For the past two years we have been supplying breeder seed of the resistant variety BARI Gom 33 to BADC and we are also working on the multiplication of another two high-yielding and tolerant varieties: BARI Gom 30 and BARI Gom 32.

‘We want to support farmers by replacing the older wheats. In the coming year we hope to cover 10% of Bangladesh’s growing area with new-variety seed and the following year we hope that will be at least 30%.’

Positive results

Abnormally cool, dry weather has complemented scientific intervention and government efforts to contain wheat blast in Bangladesh since 2017, Drs Hossain and Singh say, but the risk of future epidemics remains.

‘In the coming year we hope to cover 10% of Bangladesh’s growing area with new-variety seed and the following year we hope that will be at least 30%.’

Dr Mohammad Israil Hossain



The ACIAR-supported project aims to help the 1.7 million farmers who grow wheat in Bangladesh by developing varieties resistant to wheat blast. Photo: BWMRI.



For growers like Mr Hossain, further respite has arrived in the form of two closely related but more robust BARI Gom wheat varieties. ‘In 2018–19 Mr Hossain cultivated BARI Gom 30 on 10 *katha* [670m²] which were affected by wheat blast at low intensity,’ Dr Hossain says. ‘This year he grew BARI Gom 33 on 200 *decimal* [8,000m²] and harvested a good yield, and he wants to keep seed for future use.’

BARI Gom 33 is the first joint release from BWMRI–CIMMYT through the ACIAR-funded project that was established in 2017.

The variety was identified at the project’s precision phenotyping platform (PPP): the first facility of its type in Asia, established at Jashore to provide high-throughput screening of wheat germplasm, generate phenotypic data, develop and multiply wheat blast-resistant seed, and transfer wheat blast resistance to existing local wheats.

Scientific Officer Dr Muhammad Rezaul Kabir says expanding the program to test samples from countries including Australia is a priority for the PPP. ‘In three cropping cycles we have evaluated more than 14,000 germplasms from Bangladesh, China, India, Nepal, Pakistan, and Mexico,’ Dr Kabir says.

Wary of relying on this limited gene pool, Dr Kabir is now looking further afield. ‘We have already received some germplasm with genes from wild wheat relatives that we found in gene banks in Japan and CIMMYT and we need to explore more from South America,’ he says. ‘We are only midway through our journey.’

Maintaining momentum

By the time authorities began restricting movement in response to COVID-19 in March 2020, the project was exceeding expectations and harvesting of the 2019–20 crop in Bangladesh was complete.

Working largely from home, the team has been able to keep its core operations running. In Bangladesh, Dr Hossain has moved into on-campus accommodation at BWMRI; in Mexico, data analysis is being carried out remotely while laboratory work continues. Preparation for the release of a second wheat blast-resistant variety has been postponed temporarily, threshing of this season’s Bangladesh wheat has been delayed and trial plots at the PPP have been streamlined in size, Dr Singh says.

Agriculture, having been declared an ‘essential activity’ in both Bangladesh and Mexico, has assisted, he says, ‘but the safety and security of our colleagues and staff is paramount—that’s non-negotiable—so instead of

Cross-border relationships

ACIAR support of the CIMMYT–BWMRI project marks a coming together of two particularly long-standing relationships: ACIAR–CIMMYT and CIMMYT–Bangladesh.

‘CIMMYT has been present in Bangladesh since 1966,’ Genevieve Renard, Director of CIMMYT Communications says. ‘At that time the country of Bangladesh didn’t even exist; it was still East Pakistan. We started working there before the first formal agreement was signed.’

‘Most of the wheat varieties that have come out in Bangladesh are either direct CIMMYT releases or are from CIMMYT parents used in local breeding programs.’

‘And Australia as an investor, through ACIAR, has always had a long-term commitment to the work we’re doing. Some donor states can be slightly reluctant to become involved in projects with durations of up to 10 years but ACIAR has always been willing to invest in these.’

The wheat blast research is one of five current CIMMYT projects supported by ACIAR; a further four either have been or are being finalised.

having 200 people working in a field we spread them out to maybe 20.’

A mid-term project review conducted by ACIAR last September praised CIMMYT and BWMRI for their achievements, reporting that the ‘outputs are larger than anticipated’ and noting the high number of women contributing: five female scientists or staff among 13 individuals in Bangladesh alone. One BWMRI Research Associate, Tonusree Roy, was awarded an ACIAR Developing Nation bursary to attend the Australian Plant Pathology Society Conference in Melbourne last November, further cementing ties between the two countries in this global battle to mitigate wheat blast. 🌾

ACIAR PROJECT: Identification of sources of resistance to wheat blast and their deployment in wheat varieties adapted to Bangladesh, CIM/2016/219.



Zero-till project leaves legacy in Iraq

When Australian scientist Dr Stephen Loss returned to northern Iraq in 2019, four years after the end of an ACIAR conservation agriculture project, he was overwhelmed by the warm welcome he received from enthusiastic researchers and farmers who had already resumed their work.

Dr Loss had been project leader for the last three years of a 10-year ACIAR project that raised awareness and promoted adoption of zero-tillage and early sowing of crops throughout the Middle East and North Africa. The project ended in 2015 at the same time as civil unrest expanded in Syria and spread into Iraq.

As the conflict escalated and occupying forces gained control of parts of Iraq, he stayed in communication with some of the farmers, engineers and scientists

who had successfully convinced hundreds of farmers across four countries to implement practices such as zero till, early sowing and enhanced seed production.

'Their resilience is nothing but inspiring. Back in 2014 one farmer and seeder manufacturer emailed me from the basement of his home where he and his family were sheltering from the bombing, not knowing whether they'd be alive in the morning,' Dr Loss recalls.



Professor Abdulsattar Alrijabo teaches conservation agriculture to extension trainees in Iraq in 2020.

Key points

- 1 Five years after it concluded, an ACIAR project on conservation agriculture continues to have an impact in Iraq and beyond.
- 2 Despite ongoing conflict, Iraqi researchers, manufacturers and farmers are continuing to advance the development of zero till.
- 3 Recovered equipment is being put to use again, with an estimated 12,000 ha planted using zero till for the 2018 growing season in Iraq alone.



'Militia took control of research facilities, destroyed valuable seed stores and confiscated machinery, as well as damaged workshops and farms, but the commitment and ingenuity of the project participants was remarkable.

'One Iraqi farmer hid his zero-till seeder from them under a pile of hay and recovered it several months later when it was safe to do so.'

Dr Loss says the continued comradery and contact among the network of project participants during the conflict has been the key to ensuring the sustainability of conservation agriculture in the country.

Between 2005 and 2015, the ACIAR/AusAID three-phase project promoted conservation farming practices to reduce fuel costs, boost crop production and increase farm incomes.



Seeder manufacturer and farmer Mr Sinan Jalili checks the performance of his crop established using zero till. In his zero-till trial plot his wheat yield was 2,400 kg/ha, compared to 2,000 kg/ha in a ploughed field.

The project was a partnership led by the International Centre for Agricultural Research in Dry Areas (ICARDA), initially based in Aleppo, Syria, but later relocated to Amman, Jordan. The Centre worked in collaboration with the Ministry of Agriculture and Directorate of Agriculture in the Iraqi governate of Nineveh (and later in the governorates of Anbar, Salahaddin, Kirkuk and Erbil), the University of Mosul and other Iraqi universities, together with the universities of Western Australia, Adelaide and South Australia.

Conservation agriculture uptake

While most people associate the Middle East with desert, the farming areas targeted by the project have a similar climate to southern Australia, with hot dry summers and cold wet winters. Rainfall can be as high as 600–700 mm/year in parts of northern Iraq, but the majority of crops—mainly wheat, barley, lentils and chickpeas—receive an average of 300–450 mm/year.

The average Iraqi farm is 20–30 ha, however the project targeted larger landholders with up to 1,000 ha as early adopters because they owned their own machinery and were often influential community leaders.

Dr Loss says the uptake of conservation agriculture over the life of the project was remarkable, given it turned entrenched local farming practices on their head.

'When we asked farmers to abandon the plough, this was a huge change in mindset because traditionally they tilled two or three times to kill weeds and make a fine seed-bed before sowing,' he says.

'But they quickly realised that by using zero till and planting into undisturbed soil immediately after the first autumn rains, evaporation of soil water was reduced and this lengthened the crop's growing season, which resulted in increased yields while saving fuel.'

Researchers successfully engaged farmers using specific techniques such as on-farm testing of zero-till seeders and permanent demonstration sites to show them the broader agronomic aspects enabled by conservation agriculture.

Farmer surveys estimated the average yield increase in Iraq was about 160 kg/ha. Together with cost savings, this boosted incomes by A\$140/ha. The project has also influenced neighbouring Syria, where zero-till wheat yields were increased by 465 kg/ha (31%) and profit boosted by about A\$260/ha.

Before the escalation in the Iraqi conflict in 2014 it was estimated that the area of zero till had increased from none to 15,000 ha in seven years, while in Syria about 30,000 ha of commercial crops were sown with zero till.

Although rebuilding has been slow since the Iraqi government regained control of Mosul in July 2017, researchers, farmers and extension workers have managed to regroup, exchange information and build and restore seeders to encourage the expansion of conservation agriculture.



From the field

A shortage of zero-till seeders remains the main constraint to widespread adoption of conservation agriculture in Iraq.

It's a shortage exacerbated by the COVID-19 pandemic, which has restricted travel and prevented the importation of seed boxes and seed metering components from Turkey, according to engineer and farmer Sinan Jalili.

'During the 2014–17 conflict, my colleague and I lost to bombardment all the imported seeder parts and locally made parts and prototypes, except for the eight seeders which we salvaged and gave to Professor Abdulsattar to lend to farmers,' says Mr Jalili.

'Through the difficult years of 2015–16 large zero-till farmers who were previously planting 15,000 *donum* (1,500 ha) stopped zero-till planting and some abandoned their farms altogether because of the danger.

'This season modifying RAMA seeders, made in Jordan, to zero till was popular in Mosul and maybe six new big farmers joined in. We are planning to manufacture more of the new tines with resistant blades, more press wheels and contour-following seeding arms but it is difficult.'

Following excellent rainfall in 2018–19 the first rains in northern Iraq fell very late in 2019 and the growing season was very dry. Mr Jalili used his equipment to run an experiment on two 45 ha plots: one ploughed and sown conventionally and the other sprayed with glyphosate then sown with a zero-till seeder.

'As expected, the wheat yield was better in the zero-tilled plot (2,400 kg/ha) compared to the ploughed plot (2,000 kg/ha) and labour and fuel costs were reduced. Despite the dry conditions, our season was very good in the end and yields varied from 1,600 kg/ha to 4,000 kg/ha depending on location and varieties and seeding time,' he says.

Flow-on benefits

At Iraq's Directorate of Agriculture, a new manager and graduate of the University of Western Australia, Ayman Taher, is leading a government-funded wheat development project and using this to demonstrate conservation agriculture principles.

The new Centre for Conservation Agriculture at Mosul University suffered some minor damage and has still not been officially opened, but in 2017 the university held its first conservation agriculture symposium for several years, attracting 70 participants.

The ACIAR project's former leader in Iraq, Professor Abdulsattar Alrijabo, hosted a second university symposium for more than 100 people where adopter farmers were given prominence for the first time, delivering presentations on seeder manufacturing and their experience of conservation agriculture benefits.

On average, zero-till has increased wheat yield by 160 kg/ha. Together with cost savings, this boosted incomes by A\$140/ha.

Before the start of the 2018 sowing season, eight zero-till seeders built during the ACIAR project were recovered and provided to farmers in tandem with field demonstrations on farms, leading to an estimated 12,000 ha being sown.

Professor Abdulsattar says while COVID-19 has restricted travel, work continues through student education and video conferencing with extension specialists, farmers and research centres.

'Last year I enabled an Arabic translation of the book *Disc Seeding in Zero Till Farming Systems*, in collaboration with the Australian authors and professors from The King Saud University,' he says.

Dr Loss says many of his former collaborators on the ACIAR project, like Professor Abdulsattar and seeder manufacturer and farmer Sinan Jalili, are keen to boost research and extension efforts in conservation agriculture but this requires further support and funds from the Iraqi government or other sources.

He has been encouraged by the UN's Food and Agriculture Organization working on a conservation agriculture project proposal as one of the avenues for the development of sustainable agriculture in Iraq. 🌱

ACIAR PROJECT: Development of conservation cropping systems in the drylands of northern Iraq, CIM/2008/027.



PNG's NAQIA Animal Health Program Manager of Field Services Mr Pius Clements with village pigs at the Papa-Lealea sentinel site near Port Moresby where pigs are tested for African swine fever. Photo: David Williams, CSIRO.

Two threats highlighted in the shadow of COVID-19

Despite attention on COVID-19, pre-existing biosecurity threats remain important and, in the case of African swine fever (ASF) and fall armyworm (FAW), are emerging as significant problems for farmers and food systems in the Pacific region.

According to the Food and Agriculture Organization (FAO), ASF is 'an unprecedented animal health crisis' that presents a global risk of significant impact to food security. FAW is similarly threatening. FAO estimates that in 12 African countries alone, FAW could cause losses of 8.3–20.6 million tonnes to maize annually. That's enough to feed 40–100 million people.

Both are now bearing down on the Pacific region, where they are feared to cause further damage.

Key points

- 1 With global attention on COVID-19, ACIAR is ensuring critical attention is given to serious and emerging regional threats to food security.
- 2 African swine fever (ASF) and fall armyworm (FAW) have both become major threats to agricultural production in Pacific island countries.
- 3 Additional support from ACIAR to tackle ASF and FAW, which have the potential to devastate pig and crop production respectively, will help to improve regional biosecurity—including for Australia.



ACIAR is responding by ramping up and targeting its support in high-risk areas. For ASF, the focus is on increasing the surveillance and response capacity of the Papua New Guinea (PNG) Government. While for FAW, ACIAR is targeting fundamental research to determine how best to tackle the pest.

African swine fever

In March 2020, ASF was reported in the Highlands region of PNG. ASF is a contagious viral disease of pigs that is transmitted via contact between animals. It is also transmitted through human activities such as feeding pigs contaminated kitchen waste. It has a very high mortality rate and has been known to kill 100% of infected pigs. There is no vaccine for ASF and no effective treatments.

While ASF does not infect humans and infected pork is safe to eat, pigs are central to the life of PNG's Highlanders—for food, economic, cultural and ceremonial purposes—so the disease has the potential to be devastating. If ASF spreads to the cities of Port Moresby and Lae, commercial piggeries located there would also be at risk.

Since 2019 an ACIAR-supported project has been developing surveillance strategies to help detect mosquito-borne viral diseases that affect both animals and people. The project is also supported by the Australian Government's Department of Foreign Affairs and Trade (DFAT) as a One Health project. Now, with additional funding from ACIAR, the project team is extending its scope to provide further support to the national ASF response.

Working from the Commonwealth Scientific and Industrial Research Organisation's (CSIRO) Australian Centre for Disease Preparedness (ACDP), project leader Dr David Williams says the team aims to increase PNG's capacity to rapidly and accurately detect any incursions of ASF using diagnostic tests to ensure the country can mobilise its response.

'We were already using pigs at our sentinel sites that are set up to track the presence of the mosquito-borne viruses we are monitoring,' says Dr Williams. 'It was a natural add-on to include ASF.'

Ten sentinel sites have been established in PNG across three provinces from which samples have been collected for mosquito-borne virus testing by staff from PNG's National Agriculture Quarantine and Inspection Authority (NAQIA). NAQIA staff also travel into the Highlands to take samples from penned and free-range pigs to test them for ASF virus infections.

'The challenge with working in the Highlands is that it is very remote and it can take a day or more to get there and return to Port Moresby—and even longer if you have to send samples to Australia to be tested,' says Dr Williams. 'It is really important that the local lab has the essential equipment and training to do the testing itself.' This allows for a more rapid response by local NAQIA field teams to implement control measures to stop the spread of ASF.

As part of the project, upgraded machinery has been installed at the NAQIA lab in Port Moresby to test for the presence of viral antibodies and proteins to the ASF virus in animal samples. The next step is to support the NAQIA lab to build capability in the 'gold standard' for virus testing: genetic tests.

An ACIAR-DFAT One Health project has been developing surveillance strategies to help detect mosquito-borne viral diseases in PNG. Now, with additional funding, the work will encompass African swine fever.

'Genetic testing is nearly 100% accurate for virus detection, which is an improvement over the existing tests that may only pick up around 70% of samples with the virus,' says Dr Williams.

To identify which ones work best, ACDP and NAQIA are also testing the accuracy of ASF point-of-care test kits used in the field to provide an early indication of the presence of ASF.

While travel to PNG from Australia is restricted due to COVID-19, Dr Williams and his team are staying in touch with NAQIA and providing remote support. Another project partner, the PNG Institute for Medical Research, is assisting with the training of NAQIA laboratory staff.

With an increasing level of diagnostic capability, NAQIA will be able to independently conduct animal disease testing, test samples faster and be more confident in the test results, ensuring any efforts to control ASF and other livestock diseases are targeted and have maximum impact.

Dr Williams adds that existing surveillance activities at the pig sentinel sites—particularly those in village communities—also provide opportunities to talk to pig owners and farmers about ASF to raise awareness about the disease and what they can do to prevent it.



Fall armyworm

FAW is an invasive moth pest that has rapidly spread across Africa and Asia since 2016. In early 2020 it was detected for the first time in Australia. As a caterpillar, FAW eats crops including maize, sorghum, cotton, ginger and sugarcane.

FAW can develop resistance to commonly used pesticides and poses a major threat to crop production and food security. As an adult, FAW moths can fly up to 160 km in a single night, allowing them to infiltrate new areas quickly and easily.

FAW was detected in the Western Province of PNG in early 2020 but has not yet been found in other Pacific island countries. ACIAR is stepping up its response to help these countries better understand their FAW situations and develop their capacities to manage the pest.

An existing ACIAR project led by the University of Queensland is already building diagnostic and surveillance capacity for pests and diseases in the Pacific region. The project team will now expand its work to develop and test specific surveillance strategies for FAW, monitor the host plants used by the pest and run workshops to raise FAW awareness in regions where it has not yet invaded.

In South-East Asian countries, where FAW is well established, the research needs are different. A newly developed ACIAR project will focus on understanding the genetics of fall armyworm led by Australia's CSIRO and co-funded by the Grains Research and Development Corporation.

The project will provide a greater understanding of the pest's genetic make-up to inform which pesticides and other practices are the most effective for managing the pest. This knowledge will help to develop effective pest management plans.

Dr Sarina Macfadyen, ACIAR Associate Research Program Manager for Farming Systems Analysis, says she hopes the research will start developing the knowledge needed to guide individual country responses and facilitate co-ordinated actions.

'FAW can travel easily between countries and across large distances and therefore needs some degree of coordination in response and perhaps management,' says Dr Macfadyen.

'The team will develop new knowledge in two areas: firstly, conducting a genetic characterisation of the similarities and differences in the populations found in Australia and the countries in South-East Asia.'



CSIRO's Dr Wee Tek Tay examines fall armyworm: the subject of a new project he is leading to help address this devastating pest. Photo: Patrick Cape, ACIAR.

There are two strains of fall armyworm that appear identical. One preferentially feeds on rice and pasture grasses and the other feeds on maize. Looking at the genetics will help to determine the ecology of the species better.

'The second area of research involves testing populations that may already show some level of resistance to commonly used pesticides,' says Dr Macfadyen.

This knowledge will feed into the development of resistance management plans by individual countries and inform pesticide recommendations to farmers.

Not overshadowed by COVID-19

Both ASF and FAW continue to warrant significant attention, even as the world responds to COVID-19. If left unaddressed, their potential to cause further and significant harm to an ever-increasing number of people will increase.

Despite being a relatively small player in the global response to both threats, ACIAR plays a strategic role that fills knowledge and resource gaps where it can have the biggest impact by leveraging existing relationships and projects. 🌐

ACIAR PROJECTS:

- A One Health approach to establish surveillance strategies for Japanese encephalitis and zoonotic arboviruses in Papua New Guinea, LS/2018/213.
- Characterisation of *Spodoptera frugiperda* (fall armyworm) populations in South-East Asia and Northern Australia, CROP/2020/144.
- Responding to emerging pest and disease threats to horticulture in the Pacific islands, HORT/2016/185.



Doing hands-on research when you can't travel

Travel restrictions introduced in response to the COVID-19 pandemic have changed the way researchers work. They've posed a particular challenge for those involved in international agriculture, but also presented opportunities.

Lockdowns and domestic and international travel restrictions have seen hands-on experiments—such as laboratory research and field trials—put on hold as scientists, students, technicians and extension staff have had to stay at home.

Here, Australian researchers Dr Di Mayberry from CSIRO and Dr Bradley Campbell from the University of Queensland discuss how they have been adapting to the new work situation.

Adapting to change

Dr Mayberry leads an ACIAR-supported project to improve beef cattle production systems for farmers in Myanmar's Central Dry Zone (CDZ), one of the country's driest and poorest regions.

She leads a team from CSIRO, the University of Melbourne and—in Myanmar—the Livestock Breeding and Veterinary Department, University of Veterinary Science and Yezin Agricultural University.



University of Melbourne staff meet with partners in Myanmar before COVID-19. Strong relationships between Australian and in-country partners is key to success.

Key points

- 1 International agricultural research for development has continued despite COVID-19 travel restrictions, with new tools being adopted to help researchers adapt.
- 2 Good relationships and experience on the ground in-country remain important ingredients for successful delivery of projects.
- 3 Some changes brought about by COVID-19 may see long-term improvements to project delivery.

In March, when travel restrictions were imposed, some of the Australian researchers were preparing to travel to Myanmar to help conduct farmer surveys and set up field trials.

Instead, team members from both countries had to work from home, communicating via email, messaging and video-calls, and adjusting their work to the new situation.

'Nothing comes close to going out, kicking the dirt and talking to people in the villages to better understand the farming systems, the problems local producers face and where the opportunities are,' Dr Mayberry says.



'It also enables us to teach staff and students how to do things in a scientifically rigorous way. If it's a field experiment, we might mark plots and plant seeds together. If it's an animal experiment, we'd do the feeding together.'

However, the project team is adapting, with the University of Melbourne developing online training resources, which Dr Mayberry hopes will be helpful. The team will also use online data collection tools, such as CommCare.

'CommCare will be a lifesaver for us,' she says. 'It makes it easy for us to check data as it comes in and identify any issues early.'

The experience has led Dr Mayberry to adjust her expectations of what can and cannot be achieved within project timeframes.

'We're putting a lot of thought into how we can repurpose existing projects, so they are more reliant on people on the ground.'

Dan Walker

trips so the trips themselves can be more focused. I hope that in a year's time or whenever we can travel, we get more benefit from the field trips we do.'

In-country relationships

For Dr Mayberry, the time spent working in isolation has reinforced the value of working in-country and developing strong relationships with people on the ground. It is these relationships that can be relied upon during difficult times.

In Myanmar, Professor Aung Aung and Dr Lwin Naing Oo are two of the ACIAR project researchers working on the beef project with Dr Mayberry.

When the pandemic hit, Dr Lwin Naing Oo was in Australia as a John Dillon Fellow. He returned to Myanmar in late March, completing a two-week quarantine before heading back to his university. Professor Aung Aung had been preparing to travel to Japan this year with the support of the International Atomic Energy Agency to study forage plant breeding. Like so many others, he has had to postpone his visit indefinitely.

'Initially, we were a bit naïve about how long the restrictions would last. That's been one of the most challenging things: not knowing when we can get back out and do field work.'

'Now we have to rethink how we work in-country and focus more on communication between



ACIAR research leader in Myanmar Professor Aung Aung is maintaining forage trial plots set up under a previous ACIAR project while he waits to be able to establish new ones.

Now back at their university, the researchers plan to continue teaching, laboratory work, writing research papers and maintaining forage trial plots of mombasa grass, sorghum and stylo (a legume), already set up under a previous ACIAR project.

However, they too had been looking forward to getting new forage trials under way and engaging with farmers to improve animal feeding and nutrition, because in the wake of this pandemic food security will be more critical for their country than ever.

Exploring a Pacific food genebank

Dr Campbell is working on a Food and Agriculture Organization (FAO) project to help improve yields of taro, a staple crop throughout the Pacific.

The work involves identifying adaptive genes—for traits such as disease-resistance and salinity-resistance—within a large taro gene bank of cultivated and wild plant tissue.

Fiji became a major taro exporter in 1993 when taro leaf blight (TLB) annihilated crops in neighbouring Samoa—a problem since linked to the small gene pool of cultivated varieties commonly planted in the Pacific.

In response, a Centre for Pacific Crops and Trees (CePaCT) was established by the Pacific Community (SPC) to conserve tissue samples of taro and other valuable crop plants.

SPC has since distributed around 50 different types of taro to scientists and farmers across the region and globally, including TLB-tolerant varieties.

Dr Campbell is using his expertise to help identify even more promising genotypes from the gene bank for evaluation in plant-breeding trials.



The ultimate aims are to build Fiji's capacity in using new genetic technologies and equip Pacific taro growers with a range of resilient varieties able to withstand diseases like TLB.

Before COVID restrictions, Dr Campbell had hoped to run a workshop in Fiji later this year for the Pacific region explaining the latest in genomics technology and how it applies to germplasm conservation of traditional crops. He may now deliver the workshop remotely via videoconferencing.

Dr Campbell was also due to head to Fiji in March to set up genotyping experiments with his SPC colleagues. Instead, he and a network of geneticists from the Queensland Alliance for Agriculture and Food Innovation have used their time in lockdown to collaborate online and plan experiments 'more forensically' than otherwise would have been the case.

Dr Mayberry and Dr Campbell discussed doing research during COVID-19 at a RAID (Researchers in Agriculture for International Development) webinar, alongside other panellists. The webinar is available on the RAID Facebook page. RAID is funded by ACIAR through the Crawford Fund.

Some changes may stay

Since March, ACIAR Chief Scientist, Dr Daniel Walker, has been assessing the impact of COVID-19 on the organisation's research partnerships and future directions.

The challenges he faces in pivoting ACIAR research to respond to local and international COVID-19 restrictions are amplified by the day-to-day uncertainties.

For example, in May and June Dr Walker had hoped Australian researchers could continue working in the region under a Pacific 'travel bubble'. However, the second wave of community infection in Victoria, starting in July, put paid to that.

'It became clear that COVID-19 was here for the longer term,' says Dr Walker, 'so for existing projects researchers had to think about new ways of working remotely.'

Technologies like videoconferencing, online collaboration platforms and email are working well, he says, where relationships between researchers are already established.

'In fact, for some activities, such as our review processes, working online can be as good as, if not better, than face-to-face if it means people are more focused.

'In the future we might start using web-based tools for some of those processes and use travel only for activities that are more about building partnerships or co-designing new activities.

'We may also ask project teams to assess how much of their work depends on Australian researchers travelling to collaboratively conduct research, how much can be transferred to in-country partners and how we can best support those partners to do that.'

Dr Walker notes that every country has a different level of preparedness to take on more research responsibility. For some in-country partners, there will be an opportunity for increased research leadership, he says.

'However, in other places and for certain areas of science it's a more difficult thing to do.

'We're putting a lot of thought into how we can repurpose existing projects so they are more reliant on people on the ground. How can we redesign them to allow field work to continue? How do we provide effective capacity-building and mentoring guidance from Australia?

'It needs to happen project by project, country by country, and the devil is in the detail.'

Capacity-building activities will certainly be affected. Fellowship programs such as those offered by ACIAR depend on emerging researchers spending significant time both in-country and in Australia with peers and mentors.

'The capacity building team is thinking very hard about alternative ways of delivering those programs,' says Dr Walker.

He adds that ACIAR may also rely more on staff based within its 10 in-country offices to play a broader role in supporting research on the ground.

'This is a learning journey for everyone,' he says. 'We're trying to be creative and learn and try new things instead of just doing what we were doing before or giving up because it was all too difficult.

'From the project teams we've contacted there's a very strong commitment. They've each responded that "the project may not work out as we planned but we'll make it work somehow".'

ACIAR PROJECT: Improving cattle production in the Myanmar Central Dry Zone through improved animal nutrition, health and management, LS/2016/132.

Alumni to boost pandemic-resilient agriculture

ACIAR is supporting 40 alumni to research how to support agriculture amidst COVID-19.

Each alumni will receive up to A\$20,000 for their projects as part of the ACIAR Alumni Research Support Facility. They will also receive formal academic mentoring and support for international collaboration.

The University of New England (UNE), Australia, is partnering with ACIAR to help deliver the program.

Professor John Gibson, UNE's Director of International Development Activities, says the world has entered a new phase due to COVID-19.

'It's fantastic that ACIAR responded so rapidly to the pandemic, supporting their alumni network to run research projects, and really build their skills.'

The program will support agriculture's response to COVID-19 through locally-relevant research. It will strengthen long-term capacity and international collaboration for researchers and institutions in ACIAR partner countries.

Funded projects align with the strategies of the researcher's own institution. They also relate to one of four research themes: pandemic-related issues in the human-animal-ecosystem interface; food system resilience; integration of research into policy; and impacts on food supply.

Gender balance

Participants are alumni of ACIAR programs including the John Allwright Fellowship, University of the South Pacific Scholarship Program, and Meryl Williams Fellowship.

The successful applicants will support eight projects in the Pacific, 25 in South-East Asia (including Indonesia), four in South Asia and three in Africa.

Exactly 50% of successful applicants are women. 'This is a fantastic outcome,' says Professor Gibson, noting




Awardee Sonthida Sambath and her colleague Lim Sophornthida, Cambodia, working together on the small project proposal. Photo: Ly Darth.

that efforts by ACIAR and the agricultural sector to promote gender equity have helped develop 'a cohort of female alumni who are highly skilled and set to become the next generation of agricultural leaders in their countries.'

Dr Sonthida Sambath is a researcher in Cambodia who has received support under the program. Her project will research the impact of COVID-19 on the prices of fresh vegetables supplied through the main wholesale distribution centres in Cambodia. Dr Sambath will examine the Cambodian Government response with respect to ensuring food security and the impact on gender issues.

'The findings from this study will inform future crisis planning,' says Dr Sambath. 'It will allow the Ministry of Agriculture Forestry and Fisheries, especially ground level staff, to understand the potential economic impacts of doubling vegetable production and the gender dynamics of this.'

Dr Sambath is an alumni of the ACIAR Meryl Williams Fellowship where she learnt leadership skills that she will apply in this project. She adds that she is looking forward to doing in-depth collaborative social-economic research into the role of gender in agriculture. 

Key points

- 1 The ACIAR Alumni Research Support Facility is helping 40 alumni do small research projects that support agricultural system resilience amidst COVID-19.
- 2 Delivery partner, the University of New England, will establish a mentoring component to support the participating alumni.



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