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IN RESEARCH FOR DEVELOPMENT

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. Technical enquiries will be passed on to the appropriate researchers for reply.

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In this issue

Front cover: Dinh Thi Xoa and other farmers are growing vegetables under the VietGAP accreditation program, helping them to access high-value retail markets in Hanoi. Photo: Khanh Long, TTXVN.

Back cover: Mungbeans.

From the CEO

Professor Andrew Campbell

The global spread of a new strain of coronavirus reminds us of our increasing global connectedness, with complex flows of people, goods and animals within and between countries. This brings great economic opportunities and efficiencies, but also risks.

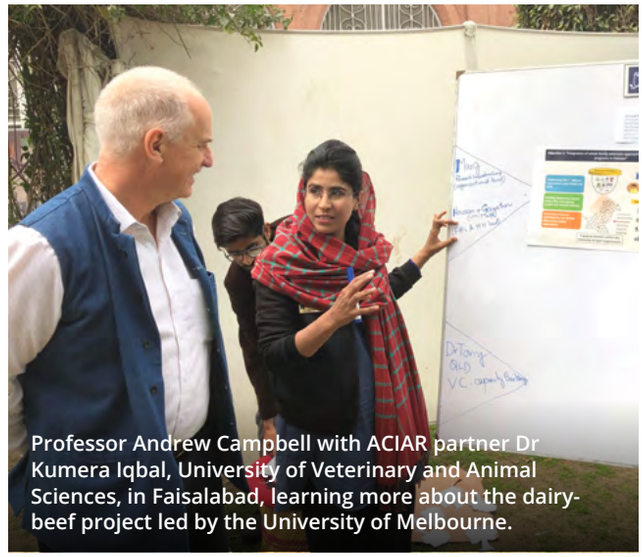
Farmers who can differentiate their products and reliably supply agricultural produce can tap into this global marketplace, which can add both security and value to their farming income. This is as relevant to a cocoa producer from Vanuatu as it is to a beef producer from Australia.

This issue of *Partners* focuses on globalising agrifood chains. Under our 10-Year Strategy 2018–27, ACIAR is increasingly working further along supply chains, particularly through our Agribusiness Program. Our focus is on being inclusive of smallholder farmers (especially women), on providing healthy, nutritious, safe food, and developing more sustainable and resilient food systems.

We have articles on the supply of accredited safe vegetables by smallholder indigenous farmers in northwest Vietnam to high-value markets in Hanoi and beyond. In Africa, we explore our work on innovation platforms that are bringing together people along the honey and milk supply chains to improve production and access to markets.

ACIAR Commissioner Dr Sasha Courville shares her insights into the value of engaging with the private sector on shared value projects that address development challenges and social issues profitably. This is a real opportunity for ACIAR. Most large agribusinesses prefer to partner with research organisations further along the supply chain. Our work complements the private sector and lends itself well to these types of partnerships.

I have just returned from a fascinating week in Pakistan meeting local research partners and graduate students. It was informative and inspiring to see ACIAR-funded work in the field on smallholder irrigation, dairy cattle and small ruminant management, pulses, and post-harvest work in horticulture value chains.



Professor Andrew Campbell with ACIAR partner Dr Kumera Iqbal, University of Veterinary and Animal Sciences, in Faisalabad, learning more about the dairy-beef project led by the University of Melbourne.

This issue showcases the collaborative learning models that are being developed and implemented to help Pakistani farmers and other local stakeholders improve water management. I was delighted to meet village women who have benefitted enormously from the insights and work of Dr Sandra Heaney-Mustafa who manages this project and who has a long-standing relationship with the country and its people.

Lastly, I want to remind you that the John Allwright Fellowship (JAF) is accepting applications now. Having recently helped to launch the Meryl Williams Fellowship, I am reminded of the transformative impact of fellowships on participants and everyone around them. Please help us promote them and encourage eligible people to apply.

Events

3RD ASIAN HORTICULTURAL CONGRESS–AHC2020
7–9 May 2020
Bangkok, Thailand
ahc2020.org

6TH WORLD ONE HEALTH CONGRESS
14–18 June 2020
Edinburgh, UK
worldonehealthcongress.org

4TH INTERNATIONAL CONFERENCE ON GLOBAL FOOD SECURITY
16–19 June 2020
Montpellier, France
globalfoodsecurityconference.com

8TH INTERNATIONAL CROP SCIENCE CONGRESS
21–25 June 2020
Saskatoon, Canada
icsc2020.com

33RD POULTRY SCIENCE SYMPOSIUM
10–12 August 2020
Cambridge, UK
wpsa2020.org

INTERNATIONAL DAIRY FEDERATION: WORLD DAIRY SUMMIT 2020
28 September – 1 October 2020
Cape Town, South Africa
idfwds2020.com

WORLD FISHERIES CONGRESS
11–15 October 2020
Adelaide, Australia
wfc2020.com.au

IWA WORLD WATER CONGRESS & EXHIBITION 2020
18–23 October 2020
Copenhagen, Denmark
worldwatercongress.org

Learning the language of leadership

A new capacity-building program aims to redress the gender imbalance in leadership within the Indo-Pacific's agricultural research sectors.

Sonnthida Sambath is Deputy Head of the Agricultural Engineering Division at the Cambodian Agricultural Research and Development Institute (CARDI) in Phnom Penh.

Already successful in her career, Ms Sambath aspires to advance further in senior decision-making roles traditionally filled by men, while at the same time encouraging other Cambodian women—especially younger generations.

Adi Loraini Baleilomaloma-Kasainaseva, a forestry technician in Fiji, is also eager to develop her decision-making and leadership skills to enable her to further advance in her male-dominated profession. Ms Baleilomaloma-Kasainaseva works for the Pacific Community (SPC) in Suva, a key international development organisation in the region owned and governed by 26 Pacific member countries and territories.

To help these women—and others like them in international agricultural research-for-development—to realise their goals, ACIAR has initiated the Meryl Williams Fellowship leadership training program. The program is named after Dr Meryl Williams, a prominent scientist in Australian agricultural research and former Director-General of the CGIAR research centre WorldFish.

Dr Williams has more than 40 years' experience working in international fisheries, aquaculture, aquatic resource conservation and development. She is an advocate of gender equality in fisheries and aquaculture, and of science aimed at fair, inclusive and responsible fish production for food security and nutrition.

At the launch of the Meryl Williams Fellowship (l-r): Dr Huyen Thanh Le Thi, mentor, Vietnam; Trinh Thanh Thao, fellow, Vietnam; Dr Hai Ly Hoang, fellow, Vietnam; Dr Meryl Williams; Dr Tran Thi Thuy Ha, fellow, Vietnam; Dr Rebecca Spence, lead trainer, UNE.

For the Asian Fisheries Society, Dr Williams led a team that initiated global symposia on women/gender in fisheries and aquaculture.

It was Dr Williams who chaired the Advisory Board of the CGIAR Gender and Diversity Program that launched the ground-breaking African Women in Agricultural Research and Development (AWARD) program.

Training commences

The first 20 successful Meryl Williams Fellowship holders met in late January for initial training conducted at the Armidale campus of the University of New England (UNE).

Over the subsequent 15 months they will complete a program of intensive workshops, mentorships, networking, online learning and an internship. There will also be an institutional workshop—involving the participants' employer organisations—that will explore potential gender bias in workplace cultures.

This year's intake of participants come from Papua New Guinea, Fiji, Vietnam, Cambodia, Laos and Indonesia. They include research scientists, managers in government agriculture/forestry departments, senior academics, an aquaculture centre director, an agribusiness manager, a seed company researcher and a sustainable-palm-oil consortium manager.

Key points

1. The Meryl Williams Fellowship is a new program for women, with a focus on supporting gender equity in leadership in agriculture research-for-development.
2. The inaugural cohort of fellows commenced training in Australia in January and will complete a 15-month training and leadership program.

Values key to behaviours

Eleanor Dean, ACIAR General Manager of Outreach and Capacity Building, says the idea for the fellowship came about in 2017, soon after she joined ACIAR.

At the time the organisation was formulating its 2017–22 gender equality policy and strategy which recognised that the need for more women in positions of authority and influence in regional agricultural research was not just social but economic as well.

'Women already play a key role in agriculture and do a lot of the manual work,' says Ms Dean.

The inspiration for the fellowship program came from the Bill & Melinda Gates Foundation's successful AWARD program, which Ms Dean saw as a model that could be broadly adapted to the Indo-Pacific region.

Dr Rebecca Spence, who is running the workshops for UNE, says a key strength of the training program is that it's 'values-led'.

'We start off helping the women learn more about themselves and how they can use this knowledge to help them understand how their personality affects the way they work within their team and within the workplace,' Dr Spence says.

"...the program will greatly contribute to my career as a woman working in a male-dominated field in the Pacific'

Adi Loraini Baleilomaloma-Kasainaseva, Meryl Williams Fellowship recipient

'It's all about understanding yourself, working out which values—for example, empathy, security, steadfastness, collaboration, family relationships—are integral to you.

'Once the participants get a clear understanding of where their strengths lie and how their values align with, or complement, or diverge, from their team's values and workplace values, they can better understand why people around them act the way they do.

'We also explore how gender dynamics manifest in each country and what that means for practising leadership as a woman.

'The other thing is that they learn to network [and] to support each other and get a clear understanding of which strategies have worked for others in terms of navigating gendered workplaces and how they might apply them in their own workplace.'

Engaging employer institutions

Dr Spence says the fellowship team is taking a flexible approach to the institutional workshop to be held within the region later in the program. The plan is to ensure the workshop environment is a 'safe space' for all participants.

'We aim to bring a values focus to these workshops as well, demonstrating how culture and workplace values align,' she explains.

Women participating in the fellowship will also take part in research being led by UNE's Professor Alison Sheridan, who is exploring factors affecting women's leadership in agricultural research institutions in the Indo-Pacific. This research will be integral to assessing program outcomes.

Plans are already underway for a second intake of 20 women to begin the program in 2021. Ms Dean says that for the 2021 intake ACIAR will target participants from the Philippines, Myanmar, Nepal, Tonga, Samoa and Vanuatu.

Off to a good start

Ms Dean says she felt extremely satisfied seeing the enthusiasm and energy of the women attending the first workshop in January.

'They're switched on, engaged and embracing the opportunity to learn. They come from different backgrounds and cultures but have a lot in common because they're all researchers working in the same general field.'

For Ms Sambath, the takeaway from the first workshop was the result of a panel discussion on how other women in leadership dealt with uncertainty in their jobs.

'The lesson I learned is to keep pursuing the main goal,' she says. 'You have to be bold, rely on the information and experience you have, and own the decision you have made so the thing can at least be started.'

Ms Baleilomaloma-Kasainaseva says she also feels more optimistic about her future thanks to the fellowship.

'Leadership is a skill for any role, either in the workplace or at home,' she says. 'In this case, the program will greatly contribute to my career as a woman working in a male-dominated field in the Pacific.'

Vietnam farmer Vang A Sa is one of the farmers growing accredited safe vegetables using VietGAP. Photo: Khanh Long, TTXVN.

Accredited 'safe' vegetables help Vietnamese farmers earn more

Farmers in Northwest Vietnam are accessing a new path to market for their vegetables—via an accreditation program—to help them sell into high-value modern retail markets in Hanoi.

The vegetable sector is an important source of employment and income for the people of Moc Chau and Van Ho, Son La province. The region's favourable climate and soil conditions are suitable for growing tropical, subtropical and some temperate vegetables.

With the development of supermarkets and food service market channels in Hanoi and other big cities, customers are now demanding high-quality agricultural products—especially ones from

Key points

1. Farmers in the remote mountainous regions of Northwest Vietnam are changing how they grow vegetables.
2. By adhering to good growing practices under the VietGAP accreditation program, farmers can supply vegetables to supermarkets in urban centres.
3. Customers who purchase VietGAP-certified vegetables can be assured the produce has been managed in a way that excludes food-borne diseases and pathogens.

mountainous areas like Son La province—because customers believe they taste better and are more nutritious. Furthermore, customers want 'safe' vegetables which are grown using good agricultural production techniques and are managed to ensure the food is free of food-borne diseases and pathogens. However, in retail markets customers find it difficult to distinguish safe vegetables from vegetables that are not grown using sound practices or are not managed to maintain food safety.

The supply of vegetables to distant urban markets can be difficult. Vegetable production is small-scale, scattered and managed by individual farmers and small households, making it difficult for farmers to ensure continuity of supply. Moreover, widely practised farming methods don't meet the safe standards demanded by city consumers, precluding produce from high-value markets.

'After only a short time of implementation the project has brought economic changes.'

Bui Van Tung, Northern Mountainous Agriculture and Forestry Science Institute

Complicating the issue is the problematic connection between retailers and farmers, and in which contracts are often broken. As a result the local vegetable producers usually just sell their vegetables to the local markets or to Hanoi via traders.

VietGAP certification

To help, ACIAR is supporting a project that helps Moc Chau and Van Ho farmers supply temperate vegetables such as tomatoes, lettuces and cabbages to Hanoi. The project centres around the Vietnamese Good Agricultural Practices (VietGAP) accreditation program. VietGAP provides guidelines on how to grow crops and manage them post-harvest to ensure food safety and improve product quality and traceability while supporting the health of producers, consumers and the environment.

According to project leader Dr Gordon Rogers, Applied Horticultural Research, the approach the project team took to help the farmers was to first identify market drivers and consumer attitudes to certified safe vegetables. The project team then selected groups of smallholder vegetable farmers in Moc Chau and Van Ho to work with who in turn then demonstrated how to use VietGAP on their farms and apply sustainable and inclusive smallholder vegetable value-chain models and quality assurance systems. They were also helped to develop pilot value chains and understand effective farmer group governance.

As a result farmers participating in the project have doubled their income to 300–380 million dong (A$18,000–23,000) per hectare by supplying VietGAP-certified vegetables to markets in Hanoi compared with supplying vegetables through traditional channels.

In 2018, 160 project farmers across 10 villages in Moc Chau and Van Ho supplied 1,130 tonnes of VietGAP-certified safe vegetables to supermarkets and vegetable stores in Hanoi.

The project is actively trying to engage new retail markets to increase demand for VietGAP-certified safe vegetables.

'Key to success is engaging new retail markets. In Hanoi, AEON supermarkets Long Bien and the Hapro chain of safe vegetable stores are now being supplied by project farmers,' says Dr Rogers.

'Long-standing collaborators including Big C Supermarkets, Bac Tom and Mega Market (formerly Metro) continue to market certified safe vegetables from Moc Chau and Van Ho.'

Farmers reap benefits

Van Ho farmer 61-year-old Ms Dinh Thi Xoa is one of the first women to participate in the project. She set up a group—now called the Van Ho Safe Vegetable Cooperative—of seven initial members. In the beginning they faced many difficulties because they were not familiar with the process of growing and supplying safe vegetables. With technical support from the project, Ms Xoa has disseminated information to the group on how to grow vegetables to comply with VietGAP standards. The members have gradually changed their cultivation practices around soil preparation and fertiliser and pesticide use and have succeeded in growing many kinds of tomatoes, cabbages and lettuces.

'At first people found it hard to strictly follow the VietGAP process—from writing reports and composting animal manure to using fertilisers and plant-protection chemicals properly and applying

Project officer Bui Van Tung (right) shows farmer Vang A Sa (left) common pests on cabbage and outlines prevention measures. Photo: Khanh Long, TTXVN.

the right pre-harvest interval [the time that must elapse between a chemical being applied and the crop being harvested],' says Ms Xoa.

'If any households fail to follow the process they will be immediately reminded by the inspection and supervision teams and warned that they will be excluded from the group.'

She added that the first few times the group grew vegetables they did not look good, were damaged and could not be sold.

'People were discouraged but now everything is much better. Currently, the area in Van Ho where VietGAP vegetables are grown has reached 14.6 hectares and we are trying to recruit new members,' she says.

In 2018, with the support of the project, Van Ho Safe Vegetable Cooperative sold more than 230 tons of vegetables to Big C in Hanoi and earned nearly two billion dong (around A$160,000).

One of the members of Ms Xoa's group is H'Mông farmer Mr Vang A Sa from Bo Nhang village, also in Moc Chau district. Mr Sa also participated in training to develop vegetable value chains organised by ACIAR.

Mr Sa established a group to grow VietGAP-certified vegetables, then developed a cooperative called Bo Nhang 2. He also bought a truck—with the capacity to carry between 1.5 and 2 tons of vegetables in each load—to transport produce to BigC, Metro, Aeon and Fivimart supermarkets in Hanoi on a regular basis.

'Before, I planted one crop of rice or vegetables in a year and my income was only around 10 million dong [A$630] a year. Since growing VietGAP-certified safe vegetables, my family's income has increased several times,' Mr Sa said. He adds that, after costs, his family's income is now closer to 100 million dong [A$6,300].

Key to supporting the work in Vietnam is local project officer Bui Van Tung from the Northern Mountainous Agriculture and Forestry Science Institute.

'After only a short time of implementation the project has brought economic changes,' says Mr Tung. 'And, importantly, changed farmers' mindsets regarding applying new and more modern farming practices.

'As the H'Mông people are a very close community there are now more farmers in the area participating in developing and expanding the scale of VietGAP vegetable production.'

The project commenced in 2015 and many farmers have learnt and adopted the new agricultural production method and are now growing VietGAP-certified safe vegetables. They have also been able to develop supply chains into Hanoi, access high-value markets and earn higher incomes.

ACIAR PROJECT: Improving livelihoods in Myanmar and Vietnam through the vegetable value chains, ABG/2009/053.

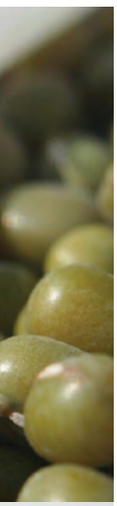
Mungbean sprouts are a popular and high-value market. Photos: Evers Specials.

Sprouting a new market through mungbean research

ACIAR-funded research promises to help Myanmar, Bangladesh and Pakistan mungbean growers modernise production practices and improve incomes. At the same time, it may help Myanmar find more suitable varieties for Europe's lucrative 'sprout quality' mungbean market.

Mungbean is prized in Asia's rice-based rotation farming systems for good reason. As a crop it is drought-tolerant, fast-growing, requires little fertiliser input and provides additional income for farmers during the rice-fallow season. Being a legume, it improves soil nitrogen content for subsequent rice crops.

In human diets, mungbean is a good source of protein, iron and other nutrients. The dried seed is a staple ingredient used in different versions of dahl or bean stew in Asian countries; the processed flour and paste is used in noodles and sweet and savory snacks; and the sprouts are a sought-after ingredient in both eastern and western kitchens.



Its resilience and versatility mean mungbean can be grown in different environments for a range of end-uses. In India, Bangladesh and Pakistan mungbean—also known as green gram—is a nutritious supplement to the staple grain, rice.

In Myanmar, on the other hand, mungbeans are increasingly being grown as a cash crop for export, particularly in the drought-prone Central Dry Zone (CDZ), which produces half the country's pulse and oilseed legumes. In fact, for smallholder farmers in Myanmar's CDZ, mungbean as a dryland crop is more profitable than rice.

The quest for new export markets

Average yields from mungbean crops in the CDZ are low due to poor soil management, an absence of improved high-yielding plant varieties, and limited options for pest and disease management.

Recent research led by Dr David Herridge from the University of New England, involving Myanmar's Department of Agricultural Research, has led to improvements in soil and fertiliser management.

At the other end of the crop cycle, mechanical harvesting has helped improve harvesting efficiency—but may pose a problem for farmers producing grain for the European sprout market.

Until recently, Myanmar sold most of its mungbean export crop to India. When India, the world's largest mungbean producer, began imposing quotas on imported mungbean, Myanmar had to change tack.

It turned its sights to Europe, which imports about 100,000 metric tonnes of mungbean grain from Myanmar and China.

Only 25% of this grain, however, finds its way to the premium sprout sector. This is because of Europe's strict rules around food hygiene and supply-chain traceability, as well as the sector's high-quality expectations in terms of grain and sprout appearance, consistency, taste and texture.

European Union regulations require mungbean grain to be free of microbial contaminants and within tight maximum residue limits for chemical residues. European mungbean grain importers also reject mechanically harvested product, because of the higher percentage of grain likely to be hardened and split due to machine and chemical impacts.

Introducing machines

Hand-harvested mungbean results in a high-quality grain, prized by the sprout market. Yet hand harvesting accounts for 50% of production costs. Additionally, workers are not always available to harvest—for example, during rice transplanting. In some environments mechanically harvested crops must be desiccated before harvest.

This is why ACIAR is funding research to evaluate the introduction of improved mechanical harvesting methods to help farmers overcome labour cost and availability issues, and get a better return on their crop.

Apart from investigating mechanisation systems, the research—being carried out in Bangladesh and Pakistan as well as Myanmar—will also focus on crop desiccation alternatives and the impact of mechanical harvesting on women in local communities.

This mechanisation project is being led by Dr Ram Nair, an expert in legumes based at the World Vegetable Center (WorldVeg) in Hyderabad, India. Dr Nair, a plant geneticist, also heads an ACIAR-funded project that has seen the establishment of an International Mungbean Improvement Network (IMIN) in which the Myanmar Department of Agricultural Research, WorldVeg and Australia are key partners.

Key points

1. In Myanmar, mungbean farmers are looking to export their seed to high-value European markets where it is used for beanshoots.
2. The International Mungbean Improvement Network is helping with the development of new varieties to suit both farmers needs and market demands.
3. Adapting mechanical harvesting may also play a role alongside hand harvesting, but its development must reduce drudgery and maintain employment for women.

Part of the ACIAR mechanical harvesting project is evaluating a 'bean kit' accessory for adapting the small rice harvesters that are commonly used in Myanmar. Photo: Dr Ram Nair, World Vegetable Centre.

Australian experience handy

For smallholder farmers in developing countries like Myanmar, Bangladesh and Pakistan, large combine harvesters like those used in Australia are a distant dream.

But big and expensive is not always better. Australian mungbean farmer Xavier Martin—the 2011 winner of the Australian Mungbean Association's production excellence award—has been working with Dr Nair's team to adapt the small rice harvesters that are already in use in Myanmar.

'These farmers can't afford new machines for each crop but if it's the right brand of rice harvester, we can now adapt it using the "bean kit" that Xavier helped us develop,' says Dr Nair.

'If there's too much loss with machine harvesters, they won't be adopted by local farmers. But we've already reduced crop losses in mechanical harvesting trials and Xavier reckons we can reduce the losses even further.'

Pre-empting potential problems

Dr Nair says researchers are also beginning to assess more natural alternatives to herbicide-assisted desiccation. One of these is dry-season harvesting. Another solution may lie within the seed itself—unlocking the potential of the mungbean gene pool.

'Ideally, in mechanically harvested crops all pods mature at the same time,' says Dr Nair. 'Our researchers have identified lines with natural senescence at the same time.

'It's still early days but it may mean you don't need to desiccate the plants for harvesting; they naturally shed their leaves at maturity.'

A key challenge being addressed by the project is the impact of mechanisation on women labourers in Bangladesh as well as Myanmar. Will it free them from low-paid 'drudgery' to work in better jobs, or will it rob them of an important source of income?

Surveys of women harvesters are being carried out in Myanmar and Bangladesh and Dr Nair says team members have also participated in GREAT—Gender Responsive Researchers Equipped for Agricultural Transformation, a global training program supported by the Bill & Melinda Gates Foundation.

In areas where women's income is affected Dr Nair says the solution may lie with a mixed-harvesting approach, where the first harvest is done by hand and a second by machine.

As it stands, while the ACIAR mechanical harvesting project promises to bring productivity gains for smallholder farmers in Myanmar, Bangladesh and Pakistan, it has yet to resolve the dilemmas of social impacts and producing a grain product suitable for the European sprout seed market.

Mapping and testing genes

The germplasm stored by IMIN is a valuable source of diversity for breeding new mungbean cultivars with sought-after traits that perform better than landraces planted and grown in the same area for generations.

Dr Nair explains that WorldVeg has assembled a collection of 7000-plus plant accessions, represented within IMIN's more manageable 'core' collection of 1500 accessions.

IMIN has further established a 'mini-core' collection of 296 accessions which have undergone molecular characterisation and genotyping, enabling plant breeders in its partner countries to produce new varieties more reliably and quickly. Importantly, performance data from these breeding trials is shared between partner countries.

Dr Nair's group has used material from IMIN's mini core germplasm collection to breed a mungbean variety that is resistant to dry root rot, a fungal disease that affects Myanmar's mungbean crop. These varieties are undergoing testing in the CDZ with encouraging early results.

Australia contributes expertise to the IMIN network by running a commercially focused mungbean breeding program, developing varieties that meet the needs of both farmers and discerning global markets.

Mungbean in Bangladesh and Myanmar are mostly harvested by women—research will help discover the potential impact of mechanical harvesting on their livelihoods. Photo: Ram Nair, World Vegetable Centre.

Research staff from Myanmar's Department of Agricultural Research visit a trial crop with Dr Ram Nair (left). Photo: Dr Ram Nair, World Vegetable Centre.

'Through IMIN, the partner countries have access to a much wider and richer range of genetic diversity, research capacity and up-to-date plant breeding tools and technologies than would otherwise be possible for small, isolated public sector breeding programs,' says Col Douglas, a plant breeder with the Department of Agriculture and Fisheries and leader of Australia's National Mungbean Improvement Program.

'Fourfold growth of the Australian industry, double-digit yield gains and improved agronomy have demonstrated a great deal of untapped potential in mungbean. This can also be harnessed to improve outcomes for smallholder farmers in IMIN's target countries.'

Seeds that grow to order

One of the main centres for sprout importing and production in Europe is the Netherlands, and one of the Netherlands' largest sprout producers is Evers Specials.

The Dutch company sources much of its sprout seed from Myanmar and has run mungbean quality workshops there explaining how European beansprout production lines work and why a genetically consistent seed and a traceable supply chain based on good agricultural practice are important in creating a saleable product.

Evers Specials requires seed that germinates to produce beanshoots of uniform length and colour and longer shelf life. Dr Nair notes such uniformity is an outcome of an improved supply chain that starts with the right variety and smarter farm practices, like rogueing off-type plants.

'We are educating younger farmers to make them aware that when you send grain for sprouting, the sprout companies want a uniform crop. This is also why farmers need to have access to a good seed supply.'

ACIAR PROJECTS: Improved mungbean harvesting and seed production systems for Bangladesh, Myanmar and Pakistan, CIM/2016/174, and International Mungbean Improvement Network, CIM/2014/079 and CROP/2019/144.

Dr Sasha Courville:

The private sector can help solve development challenges

Advising the Australian Minister for Foreign Affairs on the formulation and funding of agricultural research and development programs is the Commission for International Agricultural Research—a seven-person body chaired by Mr Don Heatley OAM.

The Commission plays a role in guiding the operating and governance framework in which ACIAR functions.

Among the Commissioners is Dr Sasha Courville, bringing with her more than two decades of expertise in supporting business to address societal challenges—including in her current position as General Manager Social Impact at National Australia Bank where she identifies, incubates and supports the scaling up of shared-value initiatives.

'There are many things that are attractive about ACIAR,' Dr Courville explains. 'It is a powerful, little organisation in the development-aid world. The focus on agricultural development through a research lens I found to be incredibly important. And the private sector being increasingly engaged in development and business opportunities in the region I found very exciting.'

Dr Sasha Courville—one of seven commissioners on Australia's Commission for International Agricultural Research.

A shared-value future

The Commission meets four times a year, with one meeting per year held in an ACIAR partner country. This encourages the Commissioners to see projects and engage with local partners and governments on the ground.

'The meetings often do require a lot of background reading, and in addition to that there are a number of events Commissioners can participate in to better understand and represent ACIAR.'

Since her tenure as Commissioner began in December 2017 Dr Courville has been encouraging ACIAR research programs to better connect with the private sector and to identify ways to work with businesses that deliver both commercial and development outcomes.

'There's a lot more thinking around shared value and how to integrate this fantastic research organisation with the business side of things,' she says. 'We want to encourage [ACIAR] Research

What is 'shared value'?

Shared value is a business strategy designed to solve social issues profitably.

Program Managers and the broader research community to think a bit differently around the role the private sector can play. This is an important transition for ACIAR to be making.'

Building connections with the private sector and looking at projects through a business lens may be new for staff of ACIAR and their partners, but where possible, Dr Courville is getting hands-on by helping to build connections with private-sector organisations as well as build greater awareness of ACIAR among her industry partners.

Key points

1. Engaging with the private sector can help to solve social and development issues but requires a new way of working together.
2. Commissioner for International Agricultural Research Dr Sasha Courville is using her expertise in shared-value approaches to help ACIAR work with the private sector more effectively.

'ACIAR is an incredibly powerful organisation that the private sector can benefit from,' she said.

'At conferences and events, I always have two hats on, and I'm always on the lookout for opportunities or people I need to connect ACIAR teams with.'

But she says there is a lot more that can be done to help build private-sector connections within ACIAR, and encouraging ACIAR staff and partners to attend shared-value conferences and impact investment workshops is an important step towards achieving this and helping ACIAR understand the funding tools that may be available to it.

Building on partnering strengths

Dr Courville says private-sector engagement can be challenging for some ACIAR partner countries or regions where there is a lack of trust. Ensuring everyone involved in a project has the same long-term interests, she says, is the priority.

'You can start small, piece by piece, to build and create trust. It's that unique link that ACIAR has in being able to bring to the table governments, research, agriculture and aquaculture sectors and the private sector to collaborate. The convening power of ACIAR is a powerful attribute, and this is because they have had these partnerships for years and years. ACIAR is a stable, long-term partner.'

There is a lot more that can be done to help build private-sector connections: start small, build trust and find common long-term interests.

ACIAR's strengths in research that benefits agricultural sectors in both partner countries and Australia, Dr Courville says, cannot be underestimated in building private-sector interest. And its approach to research for development is also a standout for businesses looking at investment in initiatives that have both development and commercial benefits.

'I am just so thrilled with ACIAR's strategy in terms of having an incredible, multi-pronged approach to research for development outcomes in terms of considering climate change and gender as cross-cutting initiatives among others,' she says.

With this approach, Dr Courville says she has seen ACIAR develop a more networked and connected approach to delivering its research projects, with more effective ways to measure outcomes and impact.

'It's been fascinating to see how ACIAR had taken an amazing strategy and brought it to life, getting the infrastructure to support this approach to its research.'

Caliandra can be grown on farms where it can improve soil fertility, and provide bees with forage and dairy cows with fodder. Photo: Emmie Wachira, ACIAR.

Innovation platforms sweeten milk and honey value chains

By coming together in larger groups called 'innovation platforms', farmers in eastern Uganda are using their collective knowledge and scale to develop their milk and honey products and access new markets.

This effort is seeing the farmers—in the Mount Elgon region—increase their farm-based income.

Two innovation platforms, the SIKAKO Women Beekeepers Innovation Platform and the Namabya Dairy Innovation Platform, have proven highly successful with the support of a project funded by ACIAR.

Key points

1. Innovation platforms in eastern Uganda are bringing together farmers, other experts and key stakeholders along the supply chain to unlock the potential of key agricultural value chains.
2. Capacity building activities, including training, are helping farmers from the Mount Elgon region improve their management of bees and dairy cows to increase production of honey and milk respectively.

Honey a sweet success

Each farmer in Kapchorwa district typically has two beehives on their landholding which supply their household's needs. The low productivity of the hives, lack of post-harvest handling equipment and reliable buyers, and limited access to extension and market information means the honey is rarely traded or sold.

Wild bees are abundant in the area so the farmers—mostly women—do not have issues related to beehive colonisation. In other words, there are always plenty of bees naturally present in hives and on each farm. That very abundance of bees inspired local farmer Ms Sophie Chekwoti.

'I saw a swarm of bees pass by my house and perch on a tree in my farm,' Ms Chekwoti says. She says she wanted to keep the bees but didn't want to have them close to her homestead as she needed to avoid unwanted stings from bees out foraging and looking for water.

Ms Chekwoti is a member of the SIKAKO Women Beekeepers Innovation Platform, which was formed in 2016 when three entities combined: the Siron, Kaptokwoi and Kokwomurya women's beekeeping groups.

It was the members of the SIKAKO Women Beekeepers Innovation Platform who came up with the idea of hosting previously wild bees in bee houses—manmade structures to house beehives—positioned away from human dwellings and closer to the nearby Mount Elgon National Park.

Supporting the innovation platforms is an ACIAR project led by Dr Clement Okia, Country Representative, World Agroforestry (ICRAF) Uganda. 'We found that communities living adjacent to Mount Elgon National Park had traditionally been placing beehives within the park but they experienced several challenges, including destruction of hives by wild animals, theft of honey and use of mainly traditional beehives. The project team sought to improve honey yields by building the capacity of innovation platforms to keep bees on their farms.'

'There are old sayings that when the flowers of a local tree, commonly known as *tobongwet*, appeared, it indicated the time of harvesting honey,' says Fatumah Chelimo, one of the SIKAKO Women Beekeepers Innovation Platform members. 'This would mislead us to harvest very little honey and prematurely.'

Crude harvesting methods were also used whereby small sticks were tied in a bundle called a *namoryeek*. One end of the bundle was lit and inserted into the beehive to burn out the bees. The harvested honey was of poor quality and low value.

The process destroyed bees at the pupae stage of development as they were removed with the honeycombs, breaking the bees' lifecycle. To process the honey it was boiled, which further reduced its quality and prospects for sale.

To support the women's beekeeping endeavours the World Agroforestry Centre (ICRAF), Makerere University and Kapchorwa District Landcare Chapter (KADLACC) have provided training to help the group identify crops to plant as forage for their bees. As a result, the farmers are now planting calliandra and other plants that contribute to the area's biodiversity.

Bee houses can host up to 150 hives and be positioned in suitable locations to make their management easier. Photo: Joan Kimaiyo, ICRAF.

Hives are arranged individually inside a bee house. Photo: Joan Kimaiyo, ICRAF.

ICRAF and Uganda's National Forestry Resources Research Institute (NaFoRRI) provided *Calliandra calothyrsus* seedlings to the SIKAKO Women Beekeepers Innovation Platform members while Makerere University and the KADLACC trained the farmers on how to plant them as bee forage and provided advice on apiary siting, bee feeding (bee forage and supplementation), hive inspections, bee stings and their management, pests and parasites, and honey harvesting.

Each bee house has the capacity to host more than 150 hives managed by various members of the innovation platform. The members are harvesting honey twice a year and each hive is able to produce 20 litres annually.

The impact of the project is already showing with SIKAKO Women Beekeepers Innovation Platform members saving more than nine million Ugandan shillings (A$3,500) in 2018.

The impact of the project is already showing. SIKAKO Women Beekeepers Innovation Platform members now meet every week and have established a credit and savings scheme which has resulted in the group saving more than nine million Ugandan shillings (UGX) (A$3,500) in 2018. This money was used to buy hives and some was also distributed among the group members according to their share while the rest was kept aside for lending to other members.

In addition, through the innovation platform, the women have identified better markets for their honey. Through their regular meet-ups they discovered a good place to sell honey in Kampala at 25,000 UGX (A$10) a kilogram. They usually bulk their honey and send it to the shop through one of the farmers' children, who is a university student. They also sell their honey to local traders in Kapchorwa at 20,000 UGX (A$8) a kilogram.

Members can purchase local beehives at a low cost from within the innovation platform for about 15,000 UGX (A$6) each compared to beehives imported from Kenya which could cost up to 95,000 UGX (A$25) per unit.

Dairy—a good option

Like honey, the value chain for dairy is underdeveloped. Farmers in Manafwa—on the southern end of Mount Elgon National Park—typically keep one or two cows that are actually not very productive.

'We've found that over 90% of rural households in Manafwa own one or two dairy cows,' says Dr Okia.

'The cows are generally improved breeds with a potential for high milk yields. However, poor feeding has been leading to low milk yields.'

To help, the project team, which includes partners from ICRAF, Makerere University, NaFORRI, KADLACC and the University of Adelaide, sought ways to improve milk yield and the dairy value chain in general.

'Two dairy cows have the potential to move a rural household out of poverty if properly managed,' says Dr Okia.

'For improved dairy cows, about 60% of milk yield is attributable to improved feeding—that is why the project team focused on this aspect. The other aspects are housing and animal health.'

Working in Manafwa, the project team conducted a baseline study that uncovered poor feeding practices as one of the causes of the low milk yields. This initiated the formation of the Namabya Dairy Innovation Platform in 2017.

Makerere University and NaFORRI delivered dairy practices training to farmers and introduced the calliandra shrub as a supplement to the cows' feed through a citizen scientist approach to foster adoption. This entailed identifying two farmers in each village who had lactating dairy cows. Over a period of 40 days, one farmer was given calliandra as a feed supplement for their cows and the other fed their cows using normal practices. These farmer citizen scientists were also given diaries in which they recorded every day what and how much they fed the cows, and the volume of milk that the cows produced at each milking.

In the middle and at the end of the trial period, the project team and the district veterinary staff met with the local community. The farmer citizen scientists were at the forefront of the meetings, sharing the results of the trials and showing the changes in daily milk production. The farmer citizen

scientists and other community members then discussed the results with the project team.

The results consistently showed that the cows that were fed on calliandra as supplementary feed increased their milk yield from two to up to five litres per day. As a result, more farmers planted calliandra on their farms.

'We were impressed by the key role played by citizen scientists as they were able to demonstrate to their peers improvements in milk yields as a result of improved animal feeding,' says Dr Okia.

'Some of the citizen scientists pointed out that a dairy cow can be a household's bank account if it's managed and fed well.'

The team also conducted general dairy animal husbandry trainings and established village calliandra nurseries, distribution centres and sales mechanisms. Calliandra seedlings were then sold to farmers at the rate of 100 UGX (a fraction of A$1) for two seedlings.

A local farmer in Manafwa district feeding calliandra to his dairy cow, a technique that is improving cow nutrition and milk yields. Photo: Jeff Kimenya, ICRAF.

In addition to improving milk yields, calliandra also improves soil fertility—a double win for the farmers. The fodder from the plant contains about 22% protein, which is essential for the animals' protein needs.

Through the Namabya Dairy Innovation Platform, farmers who hadn't personally attended the training heard about the results, encouraging them to adopt calliandra in their feeding to increase milk yields. Farmers also decided to plant more forage species and properly care for and manage their animals. The district and sub-county agricultural officers are part of the innovation platform and able to dispense information to the farmers.

Dr Clements adds, 'By involving the local government structures in field experiments and information dissemination, the project team built local capacity for scaling the impact of the project.'

Way forward

The project wrapped up at the end of 2019 but the members of both innovation platforms are looking forward to not only continuing the innovation platforms but also seeing how they can tap into markets beyond Kapchorwa and Manafwa.

Members of SIKAKO Women Beekeepers Innovation Platform are now seeking the means to package and market their honey to sell it internationally. Honey can be sold locally and production is liked by farmers because it is less labour-intensive than other enterprises. Additionally, farmers are seeking to invest in high-quality harvesting equipment as a group.

Not to be left behind, the Namabya Dairy Innovation Platform is seeking to obtain better breeds of cattle to further increase their milk yields to help increase local supply and sell into bigger towns such as nearby Mbale. Additionally, they are working to establish more calliandra nurseries to produce seedlings for planting and sale to other farmers.

ACIAR PROJECT: Developing value-chain innovation platforms to improve food security in eastern and southern Africa (Uganda, Zambia), FST/2014/093.

UN-honoured scientist guides ACIAR

Honoured this year by UN Women as one of seven female scientists dead or alive who have shaped the world, Dr Segenet Kelemu is one of the newest members of the ACIAR Policy Advisory Council—sharing her expertise to help ACIAR investment in research for development to have the biggest impact.

Dr Kelemu says ACIAR can leverage its expertise and standing in the donor community. 'ACIAR is a small funding agency relative to the global portfolio of funding but what ACIAR has been really successful in is that its investment has been strategic and selective in putting its funding where it really matters,' she says.

Two key research areas where Dr Kelemu says ACIAR has a strategic advantage in investing are invasive species including pests, weeds and disease-causing pathogens, and climate change mitigation.

'Countries like Australia have protected their agricultural system largely from invasive species, invasive weeds, invasive pests and diseases, although they have had their own share of bad experiences from these,' says Dr Kelemu.

'I think that area would be very critical to invest in for Australia, both to protect Australian agriculture and also to protect other countries.'

She acknowledges that Australia has 'suffered a lot' due to climate change, noting the recent bushfires that have ravaged the country. She says 'there is not enough done in climate change mitigation' but that Australia has an important role to play to help.

Dr Kelemu intends to share these insights and many others as part of her role on the ACIAR Policy Advisory Council. The eight-member council advises the Minister for Foreign Affairs on matters relating to the agricultural problems of developing countries as well as programs and policies on agricultural research. The council fills a valuable overview role by advising not just the minister but also ACIAR on important matters, including national and regional research priorities—particularly those of ACIAR partner countries—as well as modes of operation for the Centre.

With current members sprinkled throughout the Asia-Pacific region, Dr Kelemu brings a fresh perspective from her home base of Africa. The molecular plant pathologist worked her way up from being the first woman in her region in Ethiopia to get a college degree to now occupying the position of Director General and CEO of the International Centre of Insect Physiology and Ecology (icipe) in Nairobi, Kenya. Before taking up her current position Dr Kelemu was the Vice

Key points

1. ACIAR Policy Advisory Council member Dr Segenet Kelemu says Australia has an advantage in investing in biosecurity and climate change mitigation.
2. With dryland agriculture common to Australia and Africa, Dr Kelemu says there can be mutual benefit in supporting in this area of research, too.
3. Institutional and individual capacity strengthening/building is the main backbone of any country's development.

President for Programs at the Alliance for a Green Revolution in Africa (AGRA) based in Nairobi and spent more than 25 years in the USA and Latin America in an exceptional career as a scientist. It is of no surprise, then, that she has been recognised by Bill Gates as one of five 'Heroes in the Field' using their talents to fight poverty, hunger and disease.

Dr Kelemu would also like to communicate through the council to the government and ACIAR the importance of Australian universities in capacity building and research for development.

Now as part of the Council Dr Kelemu wants to use her expertise to help ACIAR enhance its strategic position and pinpoint where the research centre can add value. ACIAR has made a name for itself by putting smaller amounts of money into 'very promising projects that traditional funders might not immediately move into but which they then are enticed to support because of ACIAR, says Dr Kelemu. That selectiveness and thoughtfulness is perhaps one of the reasons why she thinks 'in the CGIAR system and elsewhere in the research for development arena, ACIAR sits in a very strategic position'.

As proof of the Centre's clout, Dr Kelemu points to INSFEED, a project her organisation is currently involved in which proposes to develop insect-based feeds for sustainable poultry and fish production in sub Saharan Africa. When ACIAR decided to co-fund with the International Development Research Centre (IDRC) in Canada on this 'very innovative project', Dr Kelemu says ACIAR and IDRC became the first to provide funding for research on insects as a protein source. Not long after, traditional funders like the German Government—including the Federal Ministry of Economic Cooperation and Development (BMZ) and the development agency GIZ—and the Rockefeller Foundation stepped into the space. 'ACIAR has played the global funding arena extremely well,' she says.

Dr Kelemu says she hopes Australia will invest more in Africa. In her first meeting as a Council member she emphasised the mutual benefit of funding research in the continent, given that the two places shared many similarities like dryland agriculture and could therefore share any lessons learned. She also discussed the value Australia got back from investing in the continent through trade and foreign policy.

Moving forward, Dr Kelemu would also like to communicate through the council to the government and ACIAR the importance of Australian universities in capacity building and research for development. She uses herself as an example of the possibilities when developed countries support the education of future scientists in developing countries. 'I was educated in America with funding from the USA and I remain extremely eternally grateful, because I wouldn't be where I am today without that investment in me,' says Dr Kelemu. '[USA support] enabled me to contribute to the continent in a big way.'

Dr Kelemu estimates that when she was doing her PhD, roughly 70% of her peers were foreign students. 'America benefits from all these discoveries and research outputs and so on because the research is largely done by graduate students and postdocs in every laboratory in the USA,' she says. 'You get the best and the brightest support from developing countries and you get a tenfold benefit or more from that research output and contribution also to the development of the country where that particular student comes from.'

Workshops bring farmers, scientists and government officials together to share knowledge and discuss realistic solutions.

Collaborative approach to water learning yields significant rewards

Up until a couple of years ago, Sughran Mehboob knew nothing about modern irrigation.

Like many farmers in Pakistan, the mother of four living in the central eastern province of Punjab simply flooded her crops with water from the canal. But that was not efficient, because many crops do not grow well when the soil is consistently wet and evaporation from the field is significant. Water availability in the province is also declining due to more frequent dry spells.

Now Mrs Mehboob and her husband allocate water efficiently, taking into account variables such as the time of year and soil conditions. To capitalise on better irrigation planning, they have even started growing high-value crops like onion seeds which have yielded 'big income'.

'I am feeling good,' says Mrs Mehboob. 'Many of my relatives and friends even come to get free vegetables from [me].'

Mrs Mehboob is one of 900 beneficiaries of the ACIAR-funded project 'Developing approaches to enhance farmer water management skills in Balochistan, Punjab and Sindh in Pakistan' which has been operating since October 2016. By creating and scaling up irrigation techniques, the four-and-a-half-year project aims to improve the livelihoods of small and middle-sized farmers at the frontline of a deepening water crisis.

Over the past decade Pakistan has been hit with major floods and long periods of drought. Rising temperatures, more intense rainfall and a growing threat of floods stemming from melting glaciers are just some of the risks that are exacerbated by climate change and will add additional strain on what is already one of the most water-stressed countries in the world.

To help tackle these issues the project team led by Dr Sandra Heaney-Mustafa, Senior Lecturer of community education at the University of Canberra, took a collaborative approach that emphasises the importance of local knowledge.

In practice that started with drawing together stakeholders—farmers, agricultural scientists, government officials—to both share their thoughts on the challenges farming families face and offer realistic solutions. That way, each person could understand and benefit from the others' perspectives.

Afterwards, Dr Heaney-Mustafa and her colleagues tested three different learning models designed to improve water management:

- value management, which aimed to get people to think of value as being multi-faceted rather than just in terms of money
- collaborative problem solving, which put farmers in the driver's seat to identify priorities and create and then implement an action plan
- discovery learning, which provided farmers with the resources to experiment rather than imposed specific solutions.

Each of the models also introduced soil moisture monitoring tools from project partners, including the Pakistan Council for Research on Water Resources (PCRWR) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). For instance, a PCRWR-produced tensiometer visually monitored soil moisture conditions, while the CSIRO-developed FullStop wetting front detector measured the progress of water across the field and collected a sample of irrigation water to measure salt and nitrate levels.

Feedback showed that the individual leaning models were not ideal, but aspects of each were useful.

Key points

1. **The customised Farmer Integrated Learning Model (FILM) is helping Pakistani farmers develop and learn new irrigation understanding and share it.**
2. **Through FILM, farmers are introduced to new tools and techniques, and now they are using less water for irrigation and less fertiliser yet improving the quality and yield of their crops.**

Farmers found value management too complicated but liked the 'SWOT' (strength, weaknesses, opportunities and threats) institutional analysis method. Collaborative problem solving 'engaged farmers but they lacked the support of a learning mechanism in the field'. Discovery learning was 'a really good way' to let farmers be researchers but they needed ongoing support and received limited visits by facilitators.

So, the researchers took the best parts of each model and used them to create a fourth model: the Farmer Integrated Learning Model (FILM). FILM is still under trial in six districts but Dr Iftikhar Hussain, Project Coordinator of the Pakistani Society of Facilitators and Trainers, which is one of the project's partners, says the model and the tools it has introduced have already resulted in less water and fertiliser being used for irrigation. Farmers have also seen improvements in the quality and yield of their crops.

"This project has given [me] confidence and I am feeling good that I am providing services to other farmers.'

Sughran Mehboob, Pakistani farmer

More recently, Dr Heaney-Mustafa and her colleagues undertook their biggest challenge yet: scaling out. Knowing that farmers trusted their peers more than anyone else, the team trained volunteer farmer beneficiaries to go to neighbouring villages to teach other farmers FILM.

Mrs Mehboob was one of these. She says her trips have not only helped her female students learn better irrigation techniques but have had positive effects on her as well. 'Before this [project] I was feeling hesitant in communication,' says Mrs Mehboob. 'This project has given [me] confidence and I am feeling good that I am providing services to other farmers.'

Dr Heaney-Mustafa says she hopes Pakistani farmers continue to use FILM even after the project ends this year—'not just for water and irrigation management, although that is vital, but for other aspects of agriculture and improving livelihoods'.

ACIAR PROJECT: Developing approaches to enhance farmer water management skills in Balochistan, Punjab and Sindh in Pakistan, LWR/2014/074.

Dr Sandra Heany-Mustafa's journey to working with people in Pakistan is helping build farmer skills and share local knowledge.

Dr Sandra Heany-Mustafa.

A common faith: help others to help themselves

In 1982 a local guide in India gave Dr Sandra Heaney-Mustafa words of wisdom that shaped her life forever. The future Senior Lecturer of community education at the University of Canberra was at the time a practising nurse and had just begun a three-year journey from Scotland to Australia on the back of a Bedford truck.

Along the way Dr Heaney-Mustafa stopped to help struggling earthquake survivors in Turkey, then Afghan refugees in Pakistan. Amid the chaos and destruction, what really struck Dr Heaney-Mustafa was the resilience of some of the poorest of the poor in the face of unimaginable hardship.

When she shared this thought with a local guide in India, he said to her: 'We all have the strength within us but we often don't know how to use it.'

Reflecting on that advice today, more than 35 years later, Dr Heaney-Mustafa says, 'What really focuses the work that I do is trying to find that strength within people, to help them realise that strength and to use it.'

Nearing 70 years of age, Dr Heaney-Mustafa has extensive experience in primary healthcare and community development work. She has spent the past 12 years working on ACIAR-funded research for development projects in Pakistan focusing on improving the livelihoods of farmers by enhancing water and irrigation practices.

But her path to research work and academia was not a smooth one. Disenchanted with work in medical centres and encouraged by a nursing colleague, at the age of 35 she went back to school full-time to pursue an undergraduate degree in education and biology.

Over the next three years she juggled school with part-time work as a nurse to pay the bills and still managed to graduate with first-class honours. Then she got a scholarship to do a doctorate at the University of Newcastle that would take her to a refugee camp in Sudan and unexpectedly steer her towards a path of faith.

One evening, in the midst of a measles outbreak in the refugee camp, Dr Heaney-Mustafa tried to save a little boy. Tragically, there weren't enough antibiotics to go around and the child died in her arms. 'I thought no God would put a child to suffer like this on Earth if there wasn't a Heaven for them in the end,' recalls Dr Heaney-Mustafa. That was a strong statement coming from a woman who had been questioning religion since she was 15 years old.

Then again, Sudan changed her. Dr Heaney-Mustafa saw how refugees who survived on the equivalent of a bowl of porridge a day still diligently prayed to the Islamic god, Allah, five times a day in gratitude for life's blessings. As a nurse and a woman of science, she had found that the concept of the afterlife always eluded her. But that night, with the child lying in her arms, everything fell into place. 'That was the night I really decided to focus on Islam,' she says.

When Dr Heaney-Mustafa returned to Australia in 1991 to finish her doctorate she converted to Islam. As part of her new faith she decided to learn Arabic and posted an ad on the student notice board looking for a language teacher.

Key points

1. A career in nursing, a degree in biology and education, and a common faith have led Dr Sandra Heaney-Mustafa to help farmers in Pakistan change their own lives.
2. For more than 10 years Dr Heaney-Mustafa has worked to improve the water and irrigation management skills of Pakistani farmers through work supported by ACIAR.

A Kurdish refugee and engineering student named Dilair replied. Dr Heaney-Mustafa laughingly says she didn't learn much Arabic from Dilair but she did find in him a soulmate. The couple eventually married in 1999. 'He's my rock,' says Dr Heaney-Mustafa. 'He doesn't do what I do but he understands how important the work I do is, not just for the people I work with but for me as a person.'

It wasn't until 2001 that Dr Heaney-Mustafa arrived at the University of Canberra for a part-time teaching position that a year later turned into a full-time job. For more than 10 years all her research has focused on Pakistan.

'What really focuses the work that I do is trying to find that strength within people, to help them realise that strength and to use it.'
Sandra Heaney-Mustafa

While she doesn't have quantitative proof, she feels being Muslim in an overwhelmingly Muslim country has led to a greater level of trust and cooperation from the local communities she works with.

'They often say to me, "Are you dressed like that [in a hijab] because you've come to Pakistan or are you Muslim?",' she says.

When Dr Heaney-Mustafa assures them she is indeed Muslim they tell her in Arabic 'You're our sister'.

Dr Heaney-Mustafa is currently wrapping up a four-and-a-half-year project on enhancing farmer water management skills in Pakistan that is funded by ACIAR (see page 20) and intends to scale down to a part-time teaching position in 2021.

Looking back on her colourful career she says she hopes her legacy will be one of self-empowerment: 'for people to realise they have the capacity to bring change to their own lives the way they want to change them'.

ACIAR PROJECT: Developing approaches to enhance farmer water management skills in Balochistan, Punjab and Sindh in Pakistan, LWR/2014/074.

Vietnam is the largest producer of robusta coffee and is developing its value chains through private sector engagement.

Private sector engagement adds spice to value chain

Mr Tran Van Nhuong should be celebrating. The 39-year-old farmer living in the Central Highlands of Vietnam has just sold four tonnes of green coffee beans for a total equivalent to almost A$8,000.

That's more than double the country's annual minimum wage. However, half that money went to production costs, leaving the father of two with less than A$4,100 for the current crop year—a fraction of the amount he says he needs to support his family. In order to pay for basic needs, including food and healthcare, Mr Nhuong and his wife are forced to work on other farms after finishing with their own.

'We are actually struggling with our life,' he says.

Mr Nhuong is the type of farmer two ACIAR small research activities (SRAs) are trying to help. Started in June 2019, one activity focuses on soil and land management and the other delves into stakeholder participation in agribusiness-led value chains—both for coffee and pepper.

Together, the year-long SRAs aim to explore holistic solutions that address the entire coffee and pepper value chains in the Vietnamese Central Highlands. With Vietnam ranked as the number one producer globally of both robusta coffee and pepper, the findings derived from the SRAs have the capability of benefiting more than a million smallholder farmers, many of them ethnic minorities.

'Yes,' says Mr Nhuong—he needs help with farming. 'Not just my farm but for the entire coffee community,' he adds.

Coffee and pepper struggles

When it comes to flavour and quality, robusta coffee has long come in second to its more popular cousin, arabica. Lately robusta, which is largely used for instant coffee, has been facing even greater challenges in Vietnam. According to local news agencies, smallholder farmers have been overproducing robusta, driving down its international market prices. Some farmers have even turned to overusing fertiliser in an effort to increase output. However, that has paradoxically resulted in reduced returns for coffee as disease outbreaks have proliferated. The increased popularity of mono-cropping and pesticides have only made the situation worse.

It is a similarly grim story for the king of spice. According to the state-run Vietnam News Agency, in 2019 pepper prices plummeted to as low as 40,000–45,000 Vietnamese dong (VND) (A$2.50–A$3.20) a kilogram—a steep drop from up to VND 260,000/kg (A$16.60/kg) that pepper commanded during its gold rush five years earlier.

'I imagine the farmers are now struggling to shift to more resource use efficient practices because they have been extremely successful in intensifying their cropping systems over the past 30 years,' says Dr Estelle Biénabe, one of the project managers for the "off farm" SRA and a senior agricultural economist at the French Agricultural Research Centre for International Development (CIRAD).

'They have been extremely productive and are used to using a lot of products and resources to the extent that now they are exhausting their soil and overusing water.'

Dr Biénabe and her colleagues are facing an uphill battle. Two years ago up to 40% of the local coffee farmers were trading certified sustainable coffee but now that figure has dropped to about 20% despite companies' continued commitment to the cause, notes the Vietnamese Institute for

Key points

1. Vietnam is the biggest producer of robusta coffee and black pepper in the world; however, both production and the value chain need improvement to get better outcomes for farmers.
2. Research into soil and land management and value chains for coffee and pepper aims to improve the sustainability of the sector.
3. ACIAR is also exploring a private-sector partnership within a 'shared value' approach to improving the pepper value chain.

ACIAR and its Vietnam partners are working on two small research activities to help improve the sustainability of coffee and black pepper production.

Policy and Strategy for Agriculture and Rural Development (IPSARD). Dr Biénabe says part of the reason is rising scepticism globally over how sustainability standards are being applied. So, to ensure accountability, landscape approaches to sustainable sourcing are being explored.

In the Vietnamese Central Highlands, a landscape approach is actively promoted through Verified Sourcing Area (VSA), where stakeholders ranging from local authorities to development agencies are starting to work together. Their aim is to establish locally adapted sustainability targets and verification schemes that will ideally be endorsed by private companies.

To ensure that the interests of farmers are protected, Dr Biénabe and her colleagues are looking at working with private companies to help farmers redesign their farming systems. This includes providing advice on ideal locations for planting pepper as well as understanding intercropping dynamics to ensure better resource use efficiency. It also includes empowering farmers with the technical capacity to address pressing issues such as soil-borne pests and diseases. Mr Nguyen Cong Chinh, a 38-year-old Vietnamese coffee and black pepper farmer, says he's struggling with root rot disease. 'I need to understand more about biological control in pests and diseases. How does it work?,' he asks.

Before the researchers can help farmers like Mr Nguyen through piloting farm trials, Dr Biénabe and her colleagues are busy consolidating existing knowledge and data, including from companies, on soil, farming systems and value chains.

Unfortunately, progress is being hindered due to several factors. From the researchers' perspective, one factor is that the data that companies do have are not necessarily robust since the information was collected for other purposes, says Dr Biénabe. The data might not include georeferences, and companies are reluctant to share sensitive information that might identify the specific farmers they are working with.

Another factor is the unforeseen need that private companies have for confidentiality agreements, which is taking time to negotiate. Nonetheless, at least one company has indicated an interest in engaging with ACIAR to work with researchers to improve value chains.

The world's leader in flavour

McCormick & Company has sourced black pepper from Vietnam for more than 20 years. In its 2019 Purpose-Led Performance report, the US-headquartered company announced that by 2025 it would sustainably source 100% of its branded black pepper. 'McCormick & Company has always been committed to doing what's right for the communities where it sources its raw materials, and now we're beginning to put that leadership at the forefront of our sustainability efforts,' says Mr Gabriel Sarasin, a sustainability manager at McCormick.

In order to meet their goal, McCormick sources black pepper in Vietnam to ensure traceability back to farmers. This means the exporters McCormick works with are required to source an increasing proportion of black pepper directly from farmers. McCormick also works with other partners and suppliers to improve farmers' agricultural practices and livelihoods. Mr Sarasin says a major problem for Vietnamese pepper farmers is maintaining good soil health to prevent pests and disease and increase yield.

But, due to a lack of research and development across the spice industry, there are not many effective solutions to address these issues. 'We see a need to develop solutions across the industry and our partnership with ACIAR will be critical as we work to bring these solutions to farmers,' Mr Sarasin says. After evidence-based best practices are identified they will be incorporated into McCormick's supply chain.

ACIAR is currently working on formalising its relationship with McCormick, and Mr Sarasin sees the possibility of scaling up the current research program in the future. 'The idea is to form a collaboration with ACIAR that will be not just for Vietnam but potentially broader in scope,' he says.

ACIAR SMALL RESEARCH ACTIVITIES:
Coffee and pepper on-farm constraints in the Central Highlands of Vietnam, SLAM/2018/209, and Off-farm: Strategic review and planning for enhancing the livelihoods of coffee and pepper smallholders in the Central Highlands of Vietnam through improving stakeholders' participation in agribusiness led value chains, AGB/2018/208.

Regional roundup

Cambodian and Australian representatives gather at the ACIAR Country Program Strategy signing.

ACIAR Vietnam Country Manager Ms Nguyen Thi Thanh An has been awarded an Australian Public Service Medal.

New Cambodia strategy

On 5 November 2019, Her Excellency Ms Angela Corcoran, Australian Ambassador to Cambodia, signed the new 10-year ACIAR Country Program Strategy (2019–2029) with His Excellency Mr Veng Sakhon, Minister of Agriculture, Forestry and Fisheries.

The signing ceremony marked another chapter in cooperation between Australia and Cambodia and celebrates the long-running partnership and collaboration on agricultural research between the two countries.

The strategy will focus on non-rice crops in traditional crop-rice systems and alternative cropping systems, market-oriented smallholder livestock production systems and freshwater aquaculture production systems for both income and household nutrition.

ACIAR has reaffirmed to the Cambodian Government that it remains committed to building national research capacity to extend and maximise the adoption of new knowledge and technologies.

Commissioners in Indonesia

The Australian Commission for International Agricultural Research visited Indonesia in March this year to strengthen cooperation with some of Indonesia's leading research institutes. Their visit was accompanied by the ACIAR CEO Prof Andrew Campbell, Chief Scientist Dr Daniel Walker and General Manager Country Programs Dr Peter Horne, together with ACIAR country office staff.

The delegation met with smallholder cattle farmers who have shifted to collective farm management. They also saw the research-for-development of lobster grow-out technology.

The Commission visits different ACIAR partner countries each year to better understand challenges and opportunities, and to examine Australia's support to international agricultural research cooperation on the ground.

Public Service Medal

ACIAR Vietnam Country Manager Ms Nguyen Thi Thanh An has been awarded a Public Service Medal for her outstanding public service in fostering the Australia-Vietnam bilateral relationship in agricultural research.

Since 2007, Ms An has been responsible for stewarding an extensive program of research collaboration between Australia and Vietnam. Her leadership and innovation as a specialist in stakeholder management, building relationships with high levels of government, has led to the development of a 10-year strategy of collaboration between Vietnam and ACIAR.

Additionally, she has developed key relationships between Vietnam and other Australian Government agencies which together crafted the Australia in Vietnam Agricultural Strategy.

Ms An has also been instrumental in providing strategic advice to Australia's Ambassador to Vietnam and supporting an upgrade to the Australia-Vietnam bilateral relationship to a strategic partnership.

ACIAR alumni events build in 2020

Mekong countries

Twenty-six ACIAR alumni from the Mekong countries of Cambodia, Laos, Myanmar and Vietnam joined the regional workshop 'Bridging Science and Research to Policies' in Bangkok, Thailand, 18–20 December 2019.

The three-day event aimed to enhance and exchange knowledge and skills to bridge science and research into policies among the ACIAR alumni. Participants learned about key concepts and tools, and shared experiences, case studies and challenges. The event provided an engaging and interactive environment for the alumni, who are highly motivated to share knowledge with and learn from each other.

Pakistan

To share knowledge, stories and project updates the ACIAR Country Office in Pakistan held an event for local ACIAR alumni working across agriculture on a range of issues and projects.

The Pakistan Australian Agriculture Alumni Network comprises researchers, practitioners and project team members who came together from 27 to 28 January 2020 in two sessions. Session one was a storytelling workshop aimed at equipping participants with the knowledge, skill and tools to effectively communicate their work through stories that resonate with the non-scientific community. In the second session, different national and international agencies were invited to introduce their agencies and share their ongoing work in Pakistan.

The event provided an opportunity for alumni to connect and learn about ongoing projects of interest, while creating an environment to facilitate the exchange of research ideas and collaborative opportunities with local and international agencies.

Africa

In November 2019, the ACIAR Africa team held its second ACIAR Fellowship Alumni event via a Science Communication Series workshop titled 'Stakeholder NetMapping Workshop for Enhancing Use of Research Outcomes'. Eighteen alumni, including fellows from both the John Dillon Fellowship and John Allwright Fellowship, from six countries (Botswana, Ethiopia, Kenya, Malawi, South Africa and Uganda) were joined by two alumni from the Australia Awards Africa cohort in Kenya. The International Service for the Acquisition of Agri-biotech Applications (ISAAA) AfriCenter, the inventors of the NetMapping tool certified by the International Food Policy Research Institute, led the workshop and the alumni were excited to continue their engagement with ACIAR. They networked amongst themselves and went back to their respective countries equipped with the NetMapping tool, and re-energised to engage with their respective stakeholders.

Mekong countries: ACIAR alumni attend a workshop in Bangkok to learn and exchange knowledge to build bridges between science and policy.

Pakistan: The ACIAR Pakistan Australian Agriculture Alumni Network met to exchange knowledge and look for ways to collaborate.

Africa: Alumni from six African countries came together to learn about the NetMapping tool.

ACIAR fellowships

Building the capacity of individuals and institutions in developing countries to carry out agricultural research.

NOW OPEN

John Allwright Fellowship

Applications for the 2021 John Allwright Fellowship opened on **1 February 2020 and close on 30 April 2020, 11.59 AEDT.**

The John Allwright Fellowship supports people from ACIAR partner countries involved in ACIAR-supported collaborative research projects to obtain postgraduate qualifications at Australian tertiary institutions. Fellows may remain involved in the ACIAR project throughout their studies and can continue the research on their return home.

For the 2021 intake, up to 12 fellowships will be granted, with at least six awarded to women.

The 2021 intake will also be enrolled in the ACIAR John Allwright Fellowship Executive Leadership Program—a complementary-studies program, that equips fellows with management and leaderships skills for their return to the workforce.

The John Allwright Fellowship is funded by the Department of Foreign Affairs and Trade's Australia Awards Scholarships program.

Apply via the Australia Awards portal at **oasis.dfat.gov.au.**

APPLY NOW

Meryl Williams Fellowship

The Meryl Williams Fellowship supports women in agricultural research for development to enhance their leadership skills and increase their impact through a combination of immersive learning, mentoring, networking and professional development.

Applications open in **June 2020** and will be open to women from Pacific island countries, Myanmar, Mongolia, Nepal and the Philippines.

JOHN DILLON FELLOWSHIP

The John Dillon Fellowship supports the professional development of outstanding mid-career agricultural scientists, economists and researchers. It is available in two forms—one for individuals, and the other for institutions for up to 15 fellows from a group of institutions in the Pacific region.

Applications are expected to open in the **second half of 2020**.

Stay tuned into ACIAR on **Facebook** and **Twitter** for updates on eligibility and how to apply for all fellowships.

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The Australian Centre for International Agricultural Research (ACIAR) is part of Australia's international development cooperation program. Its mission is to achieve more productive and sustainable agricultural systems for the benefit of developing countries and Australia. ACIAR commissions collaborative research between Australian and developing-country researchers in areas where Australia has special research competence. ACIAR also administers Australia's contribution to the international agricultural research centres.