



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

## SESSION 2

### **On-farm risks for resilient food and nutrition systems**

Professor Wendy Umberger

CEO, Australian Centre for International Agricultural Research (ACIAR)

#### **Abstract**

Our demands on the world's food producers continue to grow as we look to the global food system to efficiently provide growing populations with safe, nutritious and higher quality food, while also using fewer inputs and preserving vulnerable ecosystems. At the same time, rapid economic transition in many countries, increased integration of global markets and new technologies provide many opportunities for the farming sector. Smallholder farmers, who feed a significant portion of the global population, remain amongst the world's poorest people, and they are one of the groups most vulnerable to impacts of climate change such as more extreme weather events, less predictable weather patterns, threatened water security, emerging pest and disease threats and soil and land degradation. They face complex livelihood decisions which will see many leave the sector for opportunities in urban areas, leaving increasing labour shortages in rural areas. This presentation explores options for innovation by smallholders to address these on-farm risks and the technologies, policies, and economic and social enablers needed to facilitate more resilient food and nutrition systems.



First I want to say some words about the Crawford Fund. In Adelaide, South Australia, the Crawford Fund has offered me an outstanding opportunity, as someone new to the country, to get to know some of the 'legends' of agriculture and development. They have been very good mentors and friends. And it is exciting for me every time I come to the Crawford Fund conferences to see so many young people including former students and early career researchers and colleagues here. There's no other organisation like this anywhere in the world. At ACIAR we are grateful for the work that you do. Thank you. For those of you that don't know, the Crawford Fund has only a small budget, and they leverage that money very well through the work of many volunteers and in-kind support across the generations. Congratulations. And thanks also to RAID, who are our future generation of people contributing in-kind to this area.

#### **Addressing on-farm risks to add resilience to food and nutrition systems**

Risk is a challenging topic. On-farm risks are at the root of many of our global food security and nutrition problems, and global conflicts. The world relies on farmers, at all scales, to address and mitigate the risks posed by issues such as climate (droughts, storms), pests and diseases, often simultaneously. Such risks are at the heart of many problems in food system resilience and our economic stability more broadly, and that is something people not working in this space do not always understand.

People engaged in resource-based production via farming, as well as by fishing or forestry, face price/market, financial, institutional and human risks, as well as from climate, that I'd say no other sector in the world faces. Small-scale producers such as smallholders are particularly vulnerable



Figure 1.

(Figure 1). Often, they are insecure, or they are very dependent upon agriculture for cash, for education, and to buy food if they're not consuming their own food. They may have less capital – not just typical capital assets such as tractors but also finance and human capital. Often, smallholder farmers have very low levels of education. There is poor infrastructure such as roads in many countries. There can be issues with post-harvest facilities, with land tenure (an issue that is often forgotten about), with open access (such as, who has rights in fisheries and forestry? who has property rights?), with informal market institutions and lack of standards, with poor information systems, lack of extension, and poor social safety nets, as well as little market power. Larger-scale farmers in Australia complain about lack of market power, but it's even worse when you're a smallholder.

The outcomes of those risks, and how they are dealt with, have compounding effects throughout our food system because they flow on to the consumers. For example, ACIAR has been working in north-west Vietnam to modify the farming system by encouraging farmers, many of them women, to plant vegetables into traditionally rice-farming systems to add to people's nutrition, aiming to help reduce stunting in their children. Consider how changing a farming system can affect the overall impacts on households. What are the livelihood impacts not only for the farmers but also for the consumers?



Figure 2.

Global change is a risk multiplier, as Figure 2 shows and as previous speakers at this conference have already touched on. We know that climate issues on-farm can lead to conflicts such as happened in 2007, 2008, when we saw price spikes, export restrictions and overall instability in some countries. All those simultaneous risks I've mentioned are now more important because of

the climate emergency. It's not just climate issues of variability, volatility and changing weather patterns. As climate changes in a region so we see new pests, new diseases coming in because of the different conditions that now allow these invading organisms to thrive. Climate also affects water quality and quantity.

Global change multiplies the risks of economic volatility, and conflict through globalisation and trade issues. We have seen that when countries impose export bans on particular commodities they can cause very big problems for farmers as well as consumers. Part of global change is the world's growing urbanisation, with the effects shown in Figure 2, as well as effects on peri-urban agriculture, opportunities to earn off-farm income, to affect gender equity, and to generate changes in food demand.

### Individual circumstances matter

Figure 3 shows a group of women from the same country and from the same community, who happen to be involved in an ACIAR project. You might think that they are all facing similar household and family situations, but from our social scientists' interviews with them we realise that they face very different issues: their spouses may have died; they're having to work off-farm; they are carers for young children or elderly parents; and so on. It is very important to understand that risk involves more than just culture; that at the household level, in trying to help farmers deal with risk we need to understand the family circumstances and how they affect individual farmers' decisions. We often think that keeping people in farming is the right thing to do, but Figure 3 shows four options for smallholders in dealing with risk: stepping up, hanging in, stepping out, stepping in.

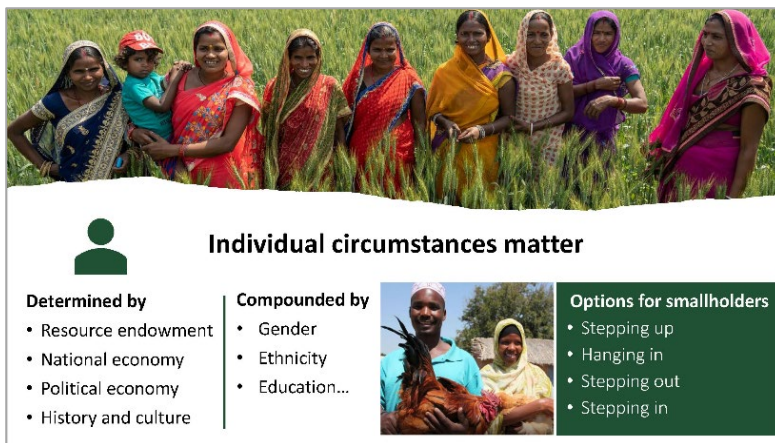


Figure 3.

### How can research and capacity-building contribute?

ACIAR aims to help farmers mitigate risk and build resilience, via management tools, and by offering options to adapt the family farm business. For example,

- helping reduce production variability in both yield and quality (Figure 4): through smallholder irrigation schemes and the Chameleon Soil Water Sensor [see *Jamie Pittock's talk in this Proceedings*]; through dealing with pests and diseases, such as via new wheat varieties resistant to wheat blast; through offering different farming systems such as conservation agriculture; through sustainable intensification; and there have been many other examples over 40 years' work.



Figure 4.

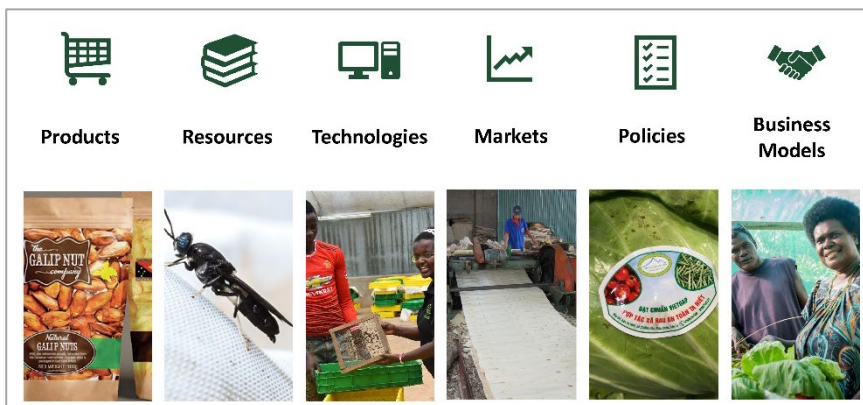


Figure 5.



Figure 6.

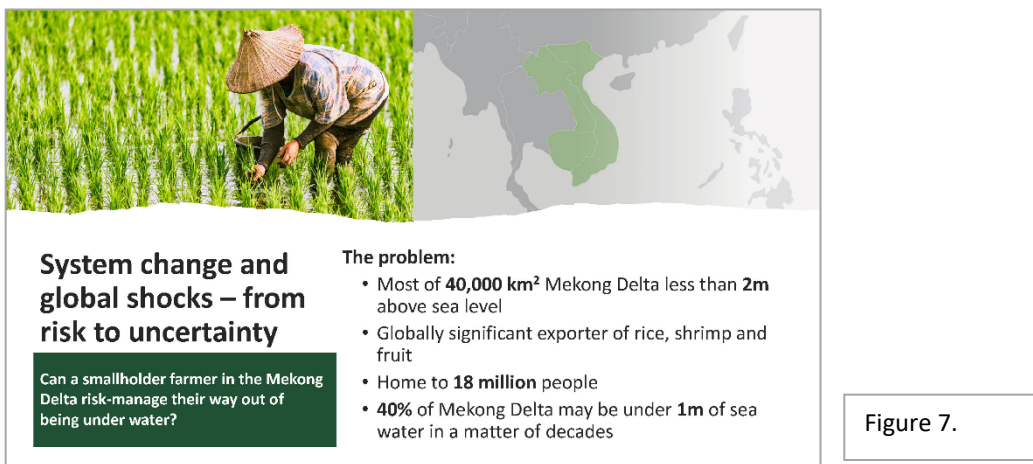
- Offering options for diversification and addressing situations that constrain attempts to build resilience (Figures 5,6). For instance: different markets selling different products, including value-adding for the (native) galip nut in Papua New Guinea, where ACIAR worked with smallholders, universities and a private-sector processor to help increase the value of the nut, ready for market; new resources, such as turning waste into protein with Black Soldier Fly larvae; new technologies, such as innovation in weed control, and two-wheeled tractors to bring mechanisation to African agriculture; new institutions and expertise, such as Plant

Doctors in the Pacific islands; new markets; new business models and information, such as price incentives in Indonesian dairying, and mobile financing in Laos and Cambodia; and other opportunities to diversify, for example helping farmers get certified so they can get into modern markets. And so on.

Addressing risk is about addressing different constraints. In order to do that, we need to understand the needs of the smallholders – to talk to them, in their households. It is about understanding these different constraints and different opportunities in terms of what fits with their values.

### Global shocks

Last year I had the opportunity to go with the ACIAR Commission and our Policy Advisory Council to look at ACIAR work in the Mekong Delta (Figure 7), which is really the food bowl of Asia. The region sends food to Australia, to Europe and elsewhere all over the world. It provides over 50% of the food for Vietnam alone, and it is home to 18 or 19 million people, many of them smallholders.



Yet 40% of this delta area may be one 1 m underwater in a matter of decades because of rising sea-level. In some areas already there are huge issues with salinity from the intrusion of water. How can smallholders in the Mekong manage the risks from that global issue? What can we do to help deal with this? Is it risk or is it uncertainty?

ACIAR has begun looking ahead at future risk, based on scientific projections: at new varieties that are salt tolerant; at using the mangroves differently; at growing different products in those areas. ACIAR now has a very good partnership with other institutions in that region, aiming for huge innovative approaches.

### Beyond ‘business as usual’

As all the speakers so far at this conference have said, there are huge challenges now for the world’s natural resource-based systems and for farmers – whether they are smallholders or large-scale – who are at the heart of the issues. It’s not just production variability; it’s all the other One Health issues (Figure 8). They need thinking about holistically.

Our innovation system requires rethinking, in terms of what we do and how we do it. On-farm risk can no longer just be managed on-farm, and I think that’s a very important thing to remember.



As the new CEO of ACIAR, I am very keen to talk to people and think together about how we address these matters. ACIAR has a small budget (about \$111 million) which I hope to enlarge. However, I think the only way we can do that in the short term is through innovative partnering, and more multi-disciplinary work, though not at the expense of disciplinary excellence. Can transdisciplinary work have a role; that is, having end users involved through sophisticated participatory methods? Can we broker new collaborations along whole value chains (e.g. public health, nutrition, energy, information and communication technology (ICT), finance)? Can we improve how we advise policy? Although I think ACIAR already does well in those fields, we could be doing significantly better.

We need to think about what we invest in, where we should invest, how we should invest, who should we partner with, and how can we partner differently? I think ACIAR in particular could be doing more with the private sector, and with not-for-profits, taking a climate and a nutrition approach.

Professor Wendy Umberger is the new CEO of ACIAR. Previously, she was the President of Australia's Policy Advisory Council (for International Agricultural Research and Development) and an Honorary Professorial Fellow in the School of Agriculture and Food at the University of Melbourne. She is an expert in agricultural economics and development and food policy. She has worked on food system issues across the Indo-Pacific region and led interdisciplinary value chain research projects in Asia, Australia, North America, the Pacific Islands and South Africa. Her research has explored opportunities for agricultural smallholder households in producing high value (horticulture, dairy, beef) food products and adopting new technology to gain access to modern food value chains.

From 2013 to 2022 she was the Foundation Executive Director at the Centre for Global Food and Resources at the University of Adelaide and a Professor in the School of Economics and Public Policy. She served on the Board of Trustees of the International Crops Research Institute for Semi-Arid Tropics (ICRISAT) from 2015 to 2021. She is also an Independent Director of Grain Producers South Australia (GPSA), a Director of the International Association of Agricultural Economists, a board member of Food Bank SA, an Honorary Fellow of Food Standards Australia New Zealand, and a Distinguished Fellow of the Australasian Agricultural and Resource Economics Society. Wendy has a B.S. in Animal Science (1996) and M.S. in Economics (1998) from South Dakota State University and PhD in Agricultural Economics (2001) from the University of Nebraska-Lincoln.