Building more productive and sustainable agriculture and food systems

House Standing Committee on Agriculture inquiry into Australian agriculture in Southeast Asian Markets

Submission by the Crawford Fund

Summary

The Crawford Fund is pleased to provide this submission to the inquiry into Australian agriculture in Southeast Asian markets.

We focus on your second term of reference, strengthening partnerships to build capability in the region. Capacity building is an essential element of building more productive and sustainable agricultural systems that will enable the countries of Southeast Asia, and Australia, to contribute to the goal of feeding the world without destroying the planet.

> *"Capacity development is arguably one of the central development challenges of the day, as much of the rest of social and economic progress will depend on it."*
>
> Fukuda-Parr, 2002

We note however that the committee's terms of reference are interrelated and mutually reinforcing. For example, when Australian agricultural researchers or businesses engage in capability building activities, the relationships they form may also help them to identify and build market opportunities (term of reference a) or identify emerging opportunities and challenges (term of reference c).

In other words, capability building is not a one-way street. When we partner with other countries to build their capability, we also build our own. The evidence for the benefits to Australia arising from international agricultural development assistance have been documented in the Crawford Fund publication *Doing Well by Doing Good* and subsequent reports (link here).

The Crawford fund mission is to encourage sharing of Australian agricultural research expertise with developing countries, enabling farmers to be more productive and sustainable. We work closely with the Australian Centre for International Agricultural Research (ACIAR), which aims to achieve more productive and sustainable agricultural systems, for the benefit of developing countries and Australia, through international agricultural research partnerships. ACIAR facilitates, invests in and manages those partnerships. It plays the lead role in this aspect of Australia's development program.

The Crawford fund complements ACIAR's work through our information sharing, networking and advocacy work, and a range of projects, facilitated primarily by our State and Territory committees, that support Australian researchers to engage with counterparts in the Indo-Pacific region.

Background

In his book *Doing Well by Doing Good* former Crawford Fund CEO Professor Derek Tribe made the case for investing in agricultural research in our developing country neighbours. Tribe argued that Australia not only 'did good' by alleviating poverty and protecting natural resources in these countries – the goals of Australia's overseas development program – but also 'did well', as many benefits flowed back to Australian agriculture and the wider community.

Continued investment by Australia in international agricultural research will deliver a strong flow of economic, environmental and social benefits to Australia and its developing country partners.

ACIAR is the primary vehicle for Australia's overseas development program in agricultural research.

The Crawford Fund adds value to ACIAR activities by building the capacity of agricultural and food systems researchers in developing countries through subject-focused Master Classes, targeted training, and mentoring. The Fund also has a strong outreach program highlighting the benefits to Australia from involvement in and support of international agricultural R&D.

The Crawford Fund also undertakes capacity building activities on its own initiative, mainly through its network of State and Territory committees. Many of these are based on support and engagement from State/Territory departments of primary industries/agriculture.

Demonstrated benefits from agricultural research for development – recent evidence.

In 2022 the Crawford Fund commissioned a consortium of university researchers (John Mullen, Julien de Meyer, Caroline Lemerle, Garry Griffith, Bill Malcolm 2022) to examine the returns from investment in agricultural research and development. They prepared seven case studies of research programs to illustrate how investments by the Crawford Fund and ACIAR contribute to ACIAR's six objectives[1].

The case studies were:

- Productivity in the South African beef industry
- Direct seeding and drought tolerant varieties in the lowland rice sector of Laos
- Developing an oyster industry in Vietnam
- Reducing biosecurity threats to the Australian honey industry
- Improved smallholder livelihoods from oil palm in lowland Papua New Guinea

[1] These strategic objectives which are aligned with the 2030 Sustainable Development Goals, are:
- Food security and poverty reduction
- Natural resources and climate change
- Human health and nutrition
- Gender equity and women's empowerment
- Inclusive value chains
- Capacity building.

- Development of the Happy Seeder to incorporate crop stubble in India
- Stocking rate management in China's grasslands.

Key findings of this study included:

- An increase in agricultural productivity reduces poverty by twice as much as a comparable increase in productivity in other sectors of the economies of developing countries.
- Adoption of new technologies enhances productivity, alleviates poverty and facilitates the achievement of ACIAR's strategic objectives.
- Productivity growth in rich countries is slowing, partly because of falling public investment in agricultural R&D.
- ACIAR plans and manages research resources with care, particularly in the project development, and monitoring and evaluation phases.
- The benefit cost ratio for ACIAR's investment in its multilateral program is likely in the order of 10:1, with a lower bound estimate of about 3:1.

Other important aspects of the case studies included the positive impacts of the projects on women's empowerment, protection and restoration of natural resources, reduced biosecurity threats to Australia, and more efficient value chains. These are all priorities for the Crawford Fund, and an important aspect of Australian agriculture's engagement with Southeast Asia.

We note that the Moore report (2023) itself documented returns on investment from Australia's agricultural development programs. It noted:

> For the period from 1982 to 2022, ACIAR-supported research helped deliver A$14.7 billion of additional value realised in Indonesia, A$11.5 billion in Vietnam, A$4.8 billion in the Philippines and A$1.7 billion in Thailand. ACIAR found that its projects globally over the past 20 years had realised an average benefit–cost ratio of 43:1 (implying that for every A$1 invested, A$43 of benefits are generated). Of this, projects assessed in Indonesia averaged a benefit–cost ratio of over 160:1, 90:1 in Vietnam, over 70:1 in the Philippines, and over 40:1 in Malaysia.

These rates of return are exceptionally good, comparing favourably with any other type of government investment. Against the potential objection that these returns are realised in partner countries we note that international agricultural development projects generate considerable benefits to Australia as well as partner countries through two-way transfers of knowledge and innovation.

An impact assessment review conducted by the Centre for International Economics (ACIAR 2022) found that in terms of country share of benefits Australia ranked sixth, after Indonesia, India, Vietnam, China and the Philippines (Figure 10, p.15).

The report noted "Most of the benefits [to Australia] accrue to forestry, crops and livestock systems" and that "in a number of assessments, benefits accruing to Australia arose for biosecurity reasons." This provides further evidence that agricultural research projects conducted with partner countries have considerable return benefits that flow back to Australia.

The activities of the Crawford Fund in promoting capacity building and fostering networks among agricultural researchers are an important contributor to realising those benefits.

Capacity building, partnerships and networks

Capacity building, whether for individuals or whole institutions, enhances skills and knowledge through formal training and study as well as by informal means, such as on-the-job training, leadership, mentoring, two-way-transfers of ideas and technologies, and other steps that empower colleagues to undertake research. Capacity building is fundamental for creating and maintaining effective agricultural research and innovation systems.

In the last 10 years, more than 5,000 Australian and international scientists have participated in training courses supported by the Crawford Fund, and 800 more researchers have received ACIAR fellowships to pursue academic or leadership studies in Australia. Of the 5,000 plus participants in Crawford Fund activities over the past ten years we estimate more than half have been from Southeast Asia, with the remaining researchers spread through the Pacific, South Asia and Sub-Saharan Africa. In its 35+ years the Crawford Fund has delivered training to around 15,500 farmers, extension professionals and researchers across the world.

Two areas where continued or increased investment in R&D is highly desirable are understanding and mitigating/adapting to the impacts of climate change on agriculture in Southeast Asia, and control of exotic pests and diseases.

Climate change threatens agriculture in Australia and neighbouring countries in numerous ways. Rising sea levels lead to salinity in low lying cropping areas, reducing productivity or causing relocation of farms. It makes extreme weather events, including floods and heatwaves, more likely, with devastating effects when they occur. The viability of some crops and livestock production systems are threatened by rising temperatures. Development of technologies that can help farmers adapt to and mitigate the impact of climate change is an important element of Australia's international development program.

Exotic pests and diseases pose a serious threat to Australian agriculture and the wider community. Conducting research on them in neighbouring countries makes sense as a means of protecting Australia from biosecurity risks, while also helping our neighbours control them.

The Moore report (2023) also drew attention to opportunities in other areas:

> Strengthening Southeast Asian trading partners' capability to implement international biosecurity standards can yield mutual benefits. Supporting precision agriculture, farmer service platforms and livestock health improvement, and combating illegal logging and illegal, unreported and unregulated fishing will present further opportunities for collaboration.

These are all fields where Australian researchers have an interest in collaboration with counterparts in Southeast Asia, for mutual benefit.

How the Crawford Fund relates to ACIAR work in Southeast Asia

The Crawford Fund's niche and focus on capacity building allows it to complement ACIAR work and leverage its extensive networks. An independent review commissioned by the Crawford Fund and conducted by Alluvium International (2022) found this work "allows CF to 'punch

above its weight' and achieve lasting outcomes (networks, reputation) beyond initial investments in international agricultural research".

That review found

> "The Fund is already doing well, with very little, significantly enhancing:
>
> • Knowledge base – for increased food security and productivity, more effective and sustainable management of natural resources
>
> • The pool of people in Australia and overseas who are eager and equipped to contribute significantly, especially in capacity development
>
> • Relationships and career development opportunities, at multiple scale.
>
> Capacity building has changed over time, and it is perhaps harder than ever to monitor progress in monetary terms. It is more important than ever to have a broad view and holistic approach. We examined which factors help or hinder not just the transfer of skills but the translation of knowledge and knowhow into capacity building. The Crawford Fund has evolved with these trends in recent times: courses are holistic and network based; and the Fund offers mentoring and two-way knowledge exchange. Respondents noted that the organisation had evolved, and the philosophy now was on building learning relationships, not just imparting knowledge…."

A list of recent Crawford Fund projects in various countries of Southeast Asia[2] is at Attachment A. It illustrates the span and diversity of the work supported by the Crawford Fund. These projects are primarily sponsored and organised by the Fund's network of State and Territory committees. An incidental benefit from the federated structure of the Crawford Fund is that the experience gained, and networks formed, result in benefits spread widely, helping to build skills and knowledge in our own agricultural research institutions across the country, in every State and Territory.

Similar benefits from creation of productive collaborations and networks arise from Crawford Fund Master Classes. Conducted in locations in Southeast Asia, and focusing on topics such as research leadership, these bring together seasoned researchers from different countries both to deepen their technical expertise and to generate contacts and networks. These Master Classes are delivered by experience practitioners and are distinguished from other training by being presented in the context of improving the management and delivery of real-time projects.

The committee should note that Crawford Fund projects are relatively small by comparison to the large and diverse portfolio of research and capacity building activities conducted by ACIAR.

Other benefits to Australia

The Alluvium report noted benefits to Australia from international agricultural research, in addition to the widely recognised benefits to partner countries, include:

• Practical knowledge that can enhance Australian agricultural productivity by studying crops of interest in different climatic or agro-ecological conditions

[2] Cambodia, Indonesia, Laos, Malaysia, Philippines, Timor L'Este, Vietnam

- Biosecurity benefits of studying potential pests and diseases (to both cultivated plants and domesticated animals and to native flora and fauna) before they reach Australia

- IAR [international agricultural research] relationships and networks that enable prompt and coordinated responses to emerging issues in international plant/animal science

- Detailed knowledge on international trade and value chains that are potentially useful to Australian production and trade.

All of the above, in combination, contribute to influence, "soft power" and an enhanced international reputation for Australia as a serious and significant contributor to the international community, through willingly and freely sharing Australian intellectual property in agriculture.

Recommendations

Three recommendations from the Moore report are particularly relevant to the work of the Crawford Fund:

> "30. Develop and deepen cooperation on sustainable agrifood systems through existing mechanisms and development programs.
>
> 31. Expand training programs to support regional farmers on world's best agriculture practices (including water, soil, and broader environment and sustainability practices).
>
> 32. Provide long-term support for Southeast Asian trading partners' capacity to address biosecurity threats, including by in-country deployments of specialist technical capabilities."

We commend these recommendations to the Australian government. They are all soundly evidence based.

Investment to "deepen cooperation…through existing mechanisms and development programs" is a sensible approach. Australia's agricultural development programs have proven to be effective, delivering exceptional rates of return. Using existing mechanisms and programs reduces risks to the Australian government from adopting untried approaches and allows activity to be rolled out efficiently and effectively, making use of the implementation skills that have been built up over many years in bodies like ACIAR.

Training programs to support regional farmers is very much in line with the observations of the Crawford Fund on what works in practice to deliver improvements in productivity and sustainability. Supporting farmers to adopt leading practices enables them to make better use of the resources (which are limited in many parts of Southeast Asia), resulting in a virtuous cycle where their higher productivity generates better returns, in turn enabling more investment to improve productivity. We strongly support the Moore report recommendation that this should include care for soil and water, and broader environment and sustainability practices: improvements in agriculture should be considered holistically, including the broader ecosystem on which agricultural systems rely.

The issue of biosecurity threats has been addressed earlier in this submission. We note that one of the sometimes-overlooked impacts of climate change is that it has increased biosecurity risks – particularly, by creating more favourable conditions for crop and livestock pests and

diseases in both Southeast Asia and Australia. This emphasises the need for increased effort to build capability to deal with these threats.

Finally, we note that agriculture remains fundamental to countries in Southeast Asia. It is an important contributor to the economies of many of them (Singapore and Brunei Darussalam are exceptions) and the source of employment or livelihoods for more than half of the population in the region.

Agricultural research and development, improving productivity and sustainability, is thus one of the most effective means of fostering further development, as well as producing mutual benefits for Australia and Southeast Asian partner countries.

In light of this, we would suggest the committee consider recommending there be more explicit[3] recognition of the importance of agriculture in Australia's international development program. This would have the likely effect of encouraging more partnerships and exchanges between Australia and Southeast Asian countries in agriculture related fields, generating economic, social, cultural, and environmental opportunities.

[3] Although agriculture is not featured explicitly in the international aid program document released on 8th August 2023, it is mentioned in much of the published material that accompanied its announcement. It features prominently in the stories published on the Department of Foreign Affairs and Trade website to illustrate the new program, and "Climate resilient agricultural development and food security" is the first topic covered under the "Development issues" heading on that site.

References

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Nicholas Moore AO 2023 *Invested: Australia's Southeast Asia Economic Strategy to 2040* A report for the Australian Government

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Attachment A – a sample of Crawford Fund projects in southeast Asia

Note: the list below provides the titles of a selection of projects funded by the Crawford Fund since 2012-13 by country. Although some project names suggest a broad scope, the committee should be aware that these are primarily small-scale research projects, researcher exchanges, information sharing visits, or capacity building projects in the form of mentoring, networking, workshops or training. In some cases they complement larger ACIAR projects underway in the country or countries concerned; in others the initiative to undertake the project has come from the State or Territory. Many of the projects conducted by researchers in Australian and partner country universities have led to publication of research findings. If the committee has an interest in any specific project the Crawford Fund can provide further details on request.

Cambodia

- Development of train-the-trainer programs in sustainable intensification of rice
- The socioeconomic benefits for smallholder households from improved livestock health and biosecurity
- Improved irrigation management through enhancing on-farm participatory extension approaches
- Improving smallholder linkages to high value markets through direct marketing
- Training of trainers in practical rice agronomy for lecturers, trainers and extension advisors in NW Cambodia (and S.E Asia)
- Investigating farmer knowledge and awareness of best practice and alternatives for sustainable cassava production systems
- Nutrient budgets and limitations in established forages in low-fertility soils
- Integrated pest management for rice stem borers
- Insect pest management in Northwest Cambodia
- Accelerating the scaling of mechanised drill seeding of rice

Indonesia

- Development of an illustrated identification system for pest species of Thysanoptera
- Cost benefit analysis of adopting new technology for the mangosteen industry
- Post harvest management of mangoes.
- Collection and identification of culicoides species
- Development of procedures to rear entomological specimens and associated quality control procedures
- Workshop on sustainable management of soil in oil palm plantings
- Furniture design and the application of the design into finished furniture products
- Integrated catchment management for increased agricultural productivity in West Timor
- Master Class on methods for assessing data-poor fisheries
- Training in the development and application of biological control technologies for insect pests and fungal diseases in tropical tree plantations
- Exploiting the banana microbiome to suppress Panama disease

- Management of Banana Blood disease
- Modelling environmental impacts of cattle grazing in oil palm plantations
- Nutrition-sensitive methods: training to measure the contribution of mangroves to gendered household food and nutrition security

Lao People's Democratic Republic (Lao PDR)

- Determining critical tolerances of fish to hydraulic conditions
- Strengthening food security in Laos through improved family poultry production - scoping, training and mentoring activity
- Pig nutrition and management
- Diagnostics and integrated disease management of bacterial plant pathogens
- Identification and integrated pest management of key pests in southern Lao PDR
- Capacity building in crop health, extension, biosecurity and food safety in the Lao PDR- a continuing program of development
- Weeds - diagnostics and management
- Promoting modern statistical principles of field sampling - train the trainer
- Zoonotic and high-impact production animal diseases in Laos: socio-economic impact and epidemiology at the human-animal interface

Malaysia

- Resilient small-scale fisheries research program
- The contribution co-management & community-based approaches to small-scale fisheries in developing countries: a global analysis
- Capacity building for tropical rock oyster industry development projects
- Numerous master classes in agricultural research leadership
- Modelling fertilizer usage efficiency to increase productivity for plantation crops

Philippines

- Rice: research to production (various activities)
- Introduction to seagrass watch monitoring.
- The Identification and taxonomy of mango gall flies
- Rice: Research to Production
- Research and development of integrated crop management for mango production in the southern Philippines and Australia
- National Papaya breeding and evaluation program
- Improving seedling quality of frequently planted tree species in the Philippines
- Food safety in fruit and vegetable supply chains

Thailand

- Nematodes in cropping systems and informal training at CSIRO, DAFF and Plant biosecurity CRC
- Training in ecosystem characterisation and mapping for member country participants of the Bay of Bengal large marine ecosystem

- Improving household income for indigenous coffee farmers in northern Thailand
- Master Class in fish passage engineering design, construction, ecology and monitoring
- Enhancing animal disease investigation and post-mortem skills through practical workshops in Thailand and Bhutan
- National papaya breeding and evaluation Program
- Genome-wide association study for anthracnose resistance and fruit quality traits in Thai chilli germplasm
- Masterclass on effective investment in innovation for agri-food systems
- Biosecurity and genetic improvement for disease resistance in large scale shrimp aquaculture
- Identification of novel rice resistance genes to bacterial leaf streak disease through transcriptomic analysis

Timor L'Este

- Plant pathology and entomology training
- Protecting potato germplasm through seed certification
- Mentoring laboratory technicians to undertake soil chemical analysis
- Training of selected local Balibo people in the installation and maintenance of Skyhydrant ultra filtration systems.
- Strengthening food and nutrition security through improved family poultry production
- Examining youth engagement in agriculture: a case-study
- Mentoring for water purification
- Improving maternal and child nutrition through agriculture: designing, implementing and monitoring impactful projects - mentoring
- Investigation of the development of commercial vegetable and fruit production in Timor Leste
- Understanding gender dimensions in managing Spodoptera frugiperda or the Fall Armyworm (FAW) in Timor-Leste and the Solomon Islands

Vietnam

- Training in glass house, laboratory management and analytical chemistry of soils and plants
- Techniques for using molecular markers in tree breeding studies
- Learning from farmers- training in beef cattle production for Vietnamese farmers and extension workers
- Improving market and value chain research: workshop on agribusiness research for development methods
- Fish pathology workshop
- Improving cassava silage production for small-holder beef cattle producers
- Sustainable rice production by innovative herbicide solutions
- Analysis of genetic diversity for sea cucumber conservation in Vietnam and Australia

- Identifying the constraints and/or opportunities in a One Health surveillance system for antibiotic resistance in Vietnam
- Capacity building for soil salinity measurement and monitoring in the Mekong Delta
- Ecological control of liver flukes: training in ecological tools and concepts
- Food spray training program to manage fall army worm
- Mentoring visit to support acacia and eucalypt breeding, Vietnamese Academy of Forest Sciences

Multi-country

- Assessment and quality control of beneficial microbes in agriculture in Laos, Burma and Cambodia
- Building an effective forest biosecurity network in SE Asia
- Biosecurity workshop
- Training extension agents and researchers in evaluation of agricultural innovations in Laos and Cambodia
- Indonesia, Philippines, Thailand: training in fungal plant pathogen identification and plant biosecurity
- Indonesia, Vietnam, Philippines, Malaysia, Cambodia: developing and regulating agricultural biotechnology products: sharing expertise from Australia and Southeast Asia
- Laos, Cambodia: methods of extension and participatory engagement in farming systems research; review of three fish-friendly irrigation guidelines written for the Lower Mekong; biosecurity training for forage and livestock systems for mid-career scientists.
- Identifying and supporting best-bet nature-based solutions in aquaculture in Malaysia and Solomon Islands.
- Philippines, Indonesia, Thailand, Singapore: workshop on managing grain storage pests in South East Asia
- Thailand, Indonesia, Malaysia, Vietnam: ecological control of liver flukes: defining local situations and training in ecological control tools and concepts.
- Timor Leste, Indonesia: practical strategies to reduce calf wastage in northern herds.
- Improving mango crop management in Cambodia, the Philippines and Australia to meet market expectations
- Developing capacity for enhanced integrated weed management within the rice-based farming systems of Lao PDR, Cambodia and Vietnam.
- Veterinary training program, Australia / Thailand / Timor Leste linkage.