

APPENDIX 3: BENEFITS TO AUSTRALIA

ACIAR in the context of Australia's development assistance program

ACIAR was established in 1982 and holds a unique position as the interface between Australia's agricultural innovation system and development assistance program. Given that Australia's range of climates (temperate, subtropical and tropical) match those found in many developing countries, ACIAR's research focus is well suited to improving sustainable agricultural production in developing countries through a collaborative research

approach that tackles problems of mutual interest and benefit to developing countries and Australia. Research is funded both directly by ACIAR and through the IARCs, primarily members of the CGIAR.

The Australian benefits study published in ACIAR's Impact Assessment Series (IAS) 39 (*Benefits to Australia from ACIAR-funded research*) highlights schematically (Figure 1) where ACIAR sits in the aid and innovation system.

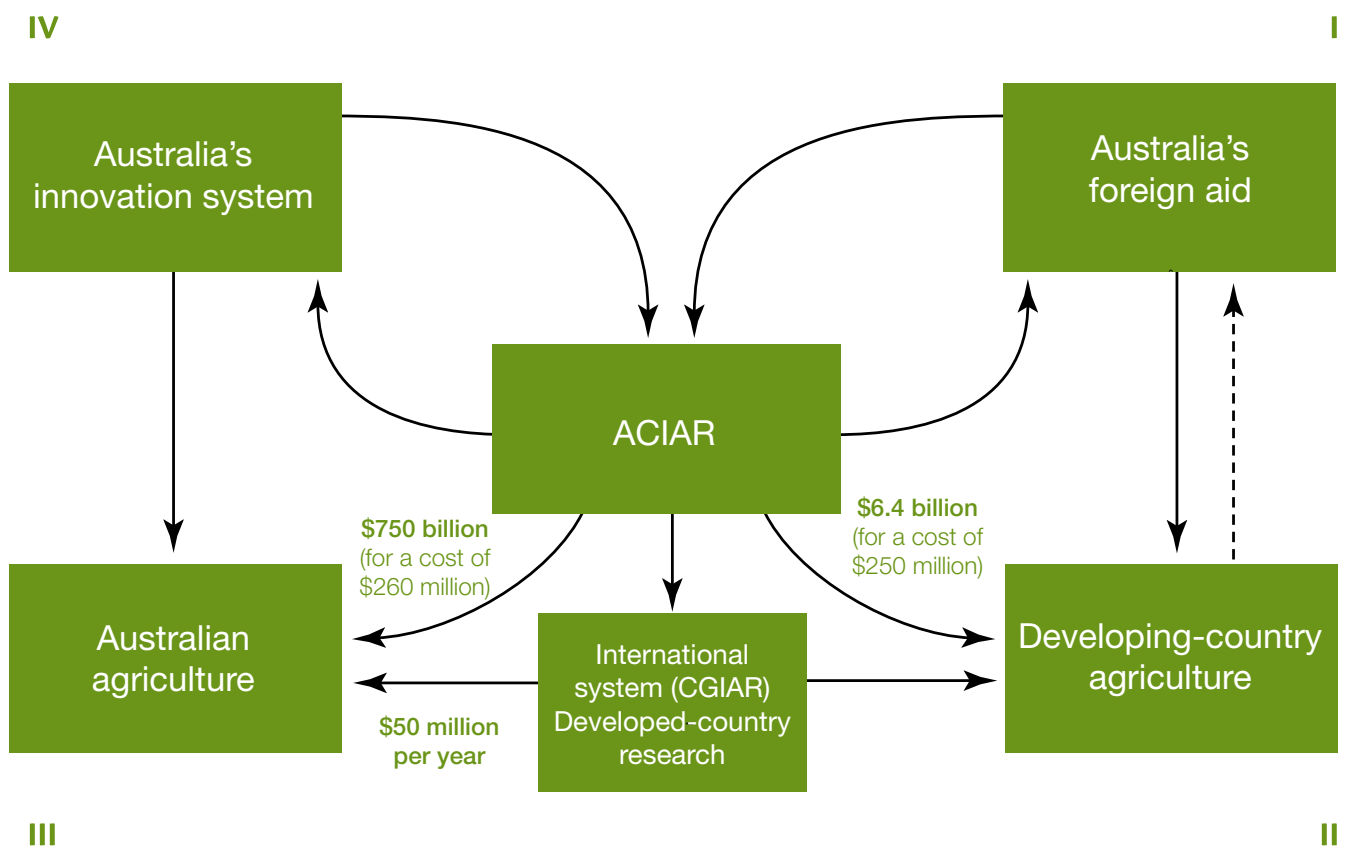


Figure 1. ACIAR's position in the international agricultural assistance and innovation system

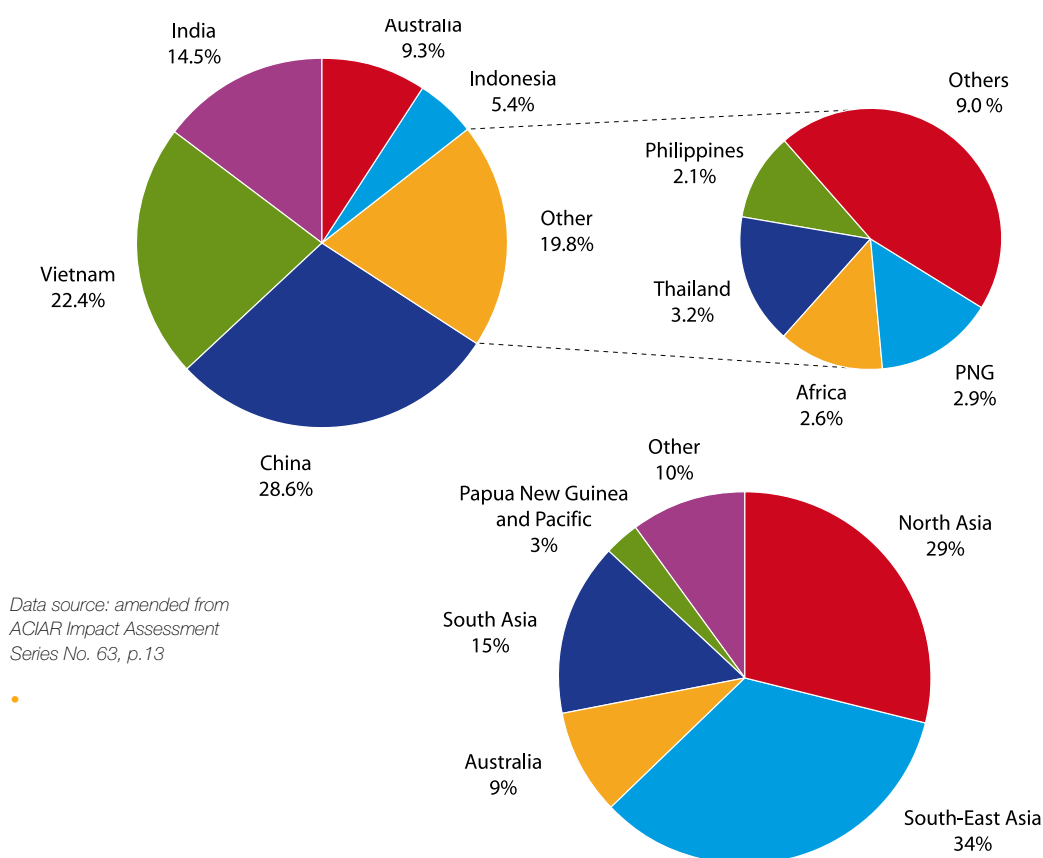
The area of most relevance in Figure 1 is quadrant II. Through its research, ACIAR aims to deliver measurable benefits to developing-country agriculture. The analysis presented in IAS 63 (*Analysis of ACIAR's returns on investment: appropriateness, efficiency and effectiveness*) indicates that the total benefits to ACIAR research estimated from 37 detailed quantitative economic impact assessments (covering 90 projects) amounts to A\$12.6 billion, for a total investment of around A\$234 million (present value terms in 2008 dollars). Of these benefits, an amount of around A\$6.8 billion is directly attributable to ACIAR funding.

Benefits arising from ACIAR research also accrue to Australian agriculture (quadrant III of Figure 1). In IAS 63 these benefits were examined in detail. Total benefits to Australia resulting from ACIAR research were around A\$1.2 billion (present value terms in 2008 dollars). Figure 2 shows the distribution of benefits across countries and regions.

ACIAR research delivers benefits to Australian agriculture from:

- new production technology
- protection from pests and diseases
- increased trade
- increases in the stock of knowledge of Australian researchers.

The benefits to Australia calculated to date are mostly of the first three types. While widely recognised as being extremely important, it is difficult to estimate the value of the increase in stock of knowledge and research capacity. ACIAR continues to fund research in areas where further benefits to Australia are likely to be realised.



Examples of past and present ACIAR projects expected to deliver benefits to Australia

Lifting crop production through better soil management and water use

In both north-western China and Australia, conservation farming practices are being promoted as an important component of more-sustainable farming systems. A research team is seeking to improve the productivity of conservation agriculture (CIM/2005/111) through adoption of more-water-efficient varieties of wheat in both countries. The scientists are targeting specific physiological traits (e.g. root elongation and root number, early vigour, transpiration efficiency) that make more-effective use of available water. Genetically improved varieties that show advantageous traits will lead to greater productivity in dryland wheat.

In associated research (CIM/2006/071), the Indo-Australian project on root and establishment traits for greater water-use efficiency in wheat seeks to develop wheat-breeding populations that combine desirable properties for increasing yields in water-limited conditions in Australia and India, through identification of molecular markers that indicate traits for deeper roots and better crop establishment.

ACIAR-supported research (CIM/2006/177) has revealed the increasing importance of element toxicities (e.g. excess aluminium, boron, iron, manganese, sodium) as a major factor affecting waterlogging tolerance in field environments. Researchers also know that waterlogging tolerance is a product of tolerance to an anaerobic environment. They are progressing towards a genetic solution, developing wheat with greater tolerance to both waterlogging and element toxicities. This work will lead to development of more-productive varieties of wheat suited to these challenging environments on Australian farms.

Another project is designed to enhance farm profitability in north-western India and South Australia (CIM/2006/094) by improving grain quality of wheat. The primary objective is to develop innovative nitrogen-management scheduling with sustainable production practices that optimise specific grain quality attributes for both countries. The scientists are developing an environmental management system approach to crop monitoring, together with demonstrations of how to better manage nitrogen nutrition and increase nitrogen use efficiency across a range of different crop rotations.

A project (ASEM/2006/130) designed to improve the functioning of the production–marketing system for maize and soybean in north-western Cambodia is also helping farmers in north-western New South Wales. The project is assisting them to develop strategies for adapting their summer crops to climate variability and change. This involves modelling future climate scenarios, using APSIM simulation runs to gain a more comprehensive picture of potential options for sorghum farming.

Best-management practices for higher quality, disease-free fruits and vegetables

Work is in progress to lift the overall productivity of Bhutan's citrus industry on a sustainable basis and to improve the quality and yield of its present mandarin cultivar (HORT/2005/142). Related work in Australia is studying mandarin rootstock/scion compatibility, and tree and crop management strategies, assessing fruit quality characteristics and marketing opportunities. The principal aim of another citrus-related project (HORT/2005/160) is to improve mandarin and orange productivity in Pakistan and Australia through improved nursery production practices, and production and demonstration of best-practice orchard management.

Australia and Indonesia are working together to mitigate the threat posed by two diseases of bananas—fusarium wilt and banana blood disease (HORT/2008/040). Within Australia, the project is developing management strategies to slow the spread of fusarium wilt Race 1, which has become a major issue for ladyfinger banana growers on the Atherton Tablelands. The scientists are studying best-bet farm management practices and IPM strategies as means to control the disease.

In a focus on vegetable growers, a project (HORT/2006/107) seeks to strengthen the Cambodian vegetable industry through adoption of improved production and postharvest practices. The project team is also working with vegetable growers from a non-English-speaking background operating in Australia, seeking to understand the gaps in their education and to produce a suite of teaching materials suitable for extension to that group.

Developing a range of aquaculture-based industries

There is potential to establish a spiny lobster aquaculture industry involving Indigenous communities in northern Australia and village communities in Indonesia and Vietnam (SMAR/2008/021). A scoping study to determine the potential for lobster aquaculture development has narrowed the focus from five Indigenous communities close to Cairns to the community at Yarrabah, where necessary support from research personnel is readily available and several potential sites for lobster grow-out have been identified. A subsequent phase for a lobster pilot grow-out is in the planning stage.

The aquaculture industry worldwide has for too long relied on low-value fish as its main feed source. Three previous ACIAR projects have focused on developing alternative forms of nutrition for important aquaculture species. This substantial investment has resulted in fish foods based on locally obtainable low-cost materials. Now, further research is in progress (FIS/2006/141) to better understand the extent of feed-ingredient resource risks and the barriers (both perceived and real) to adoption of manufactured feed by marine aquaculture sectors in both Vietnam and Australia. In one segment of the project several Australian fish farmers and feed manufacturers have been surveyed to gain their perspectives on issues affecting fishmeal replacement technology in Australia for the production of diets for marine species. Project researchers are using the outcomes of the survey to determine the issues most pertinent to each sector.

There is excellent potential to raise the production of bivalves such as clams, mussels and oysters through better aquaculture in both Vietnam and Australia (FIS/2005/114). The Australian research has focused on finding a non-chemical process for producing triploid oysters (which have three sets of chromosomes instead of the usual two sets). These oysters grow faster and have greater resistance to environmental stresses. Research outcomes have been encouraging, with potential to support the raising of conventionally produced triploid oysters within Australia—to date, assisting New South Wales oyster farmers.

More-productive and profitable farming systems

As part of its commitment to tsunami recovery in Nanggroe Aceh Darussalam, Indonesia, ACIAR-funded research has addressed soil and agronomic production constraints arising from the tsunami, and emphasised capacity-building activities at regional and farmer levels (SMCN/2007/040). The project findings also have the potential to help farmers manage climatic and market variability in Australia through better understanding of how to manage the more resistant forms of soil organic carbon, and the impact these have on utilising limited water and nutrient supplies.

There is a strong imperative to improve the reproductive performance of cows and the performance of fattening cattle in low-input systems of Indonesia and northern Australia. A project (LPS/2008/038) is developing a new feeding regime using a systems approach with mixes of high-quality feeds to fatten animals and traditional feeds to maintain weight gain and body condition. This is expected to increase reproductive output to close to one calf per year, rather than calving every 18–24 months. The work has focused on East Java province, with the findings capable of incorporation into indigenous pastoral systems in the Northern Territory.