SUBMISSION

Australian Government

Australian Centre for International Agricultural Research

ACIAR and public funding of R&D

Submission to Productivity Commission study on public support for science and innovation

Prepared with the Centre for International Economics

August 2006

Contents

Boxes, charts and tables

Introduction

The Australian Centre for International Agricultural Research (ACIAR) was established in 1982 as part of Australia's international development assistance 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. In 2005-06 it allocated just over $41 million for research across a number of scientific and technical disciplines, including: livestock production systems, animal health, fisheries, crop improvement and management, crop protection, horticulture, forestry, land and water resources, soil management and crop nutrition, post harvest technology and smallholder farm systems. ACIAR also supports economic and social science research in its agricultural development policy and agricultural systems economics and management programs.

In allocating investment ACIAR brings together the agricultural R&D priorities of the partner countries with the interests and capabilities of Australian researchers or research groups. ACIAR also supports International Agricultural Research Centres (IARCs), primarily those operating under the umbrella of the Consultative Group on International Agricultural Research (CGIAR), to undertake R&D of common interest to Australia and developing countries in our region.

ACIAR has a unique position as a funder of R&D: it is part of Australia's innovation system as well as part of the development assistance program. ACIAR is also unusual as it has had an extensive program of impact evaluations in place since 1986, with a strong focus on developing the methods of evaluation. For these reasons ACIAR is well placed to contribute to the Productivity Commission's Public Support for Science and Innovation Study and is pleased to provide this submission.

This submission introduces ACIAR's position in Australia's overseas aid and innovation systems, and briefly discusses the:

- effectiveness of R&D as a form of development;

- pathways in developing countries by which ACIAR's R&D delivers public benefits, and relevance for the Australian innovation system;
- spillovers to Australia of this international R&D — which are both demonstrable and substantive; and
- evaluation approaches and methods that ACIAR has developed over the last 20 years.

ACIAR's institutional location

ACIAR sits at an interface between two systems that, while administratively distinct, have strong linkages. ACIAR is primarily a part of Australia's aid program, funding research that when successful generates significant and lasting productivity benefits for agriculture in developing country partners. As with supporting construction of physical infrastructure or delivery of education, support for research is a form of aid that has the potential to continue to deliver benefits well after the funding has ceased.

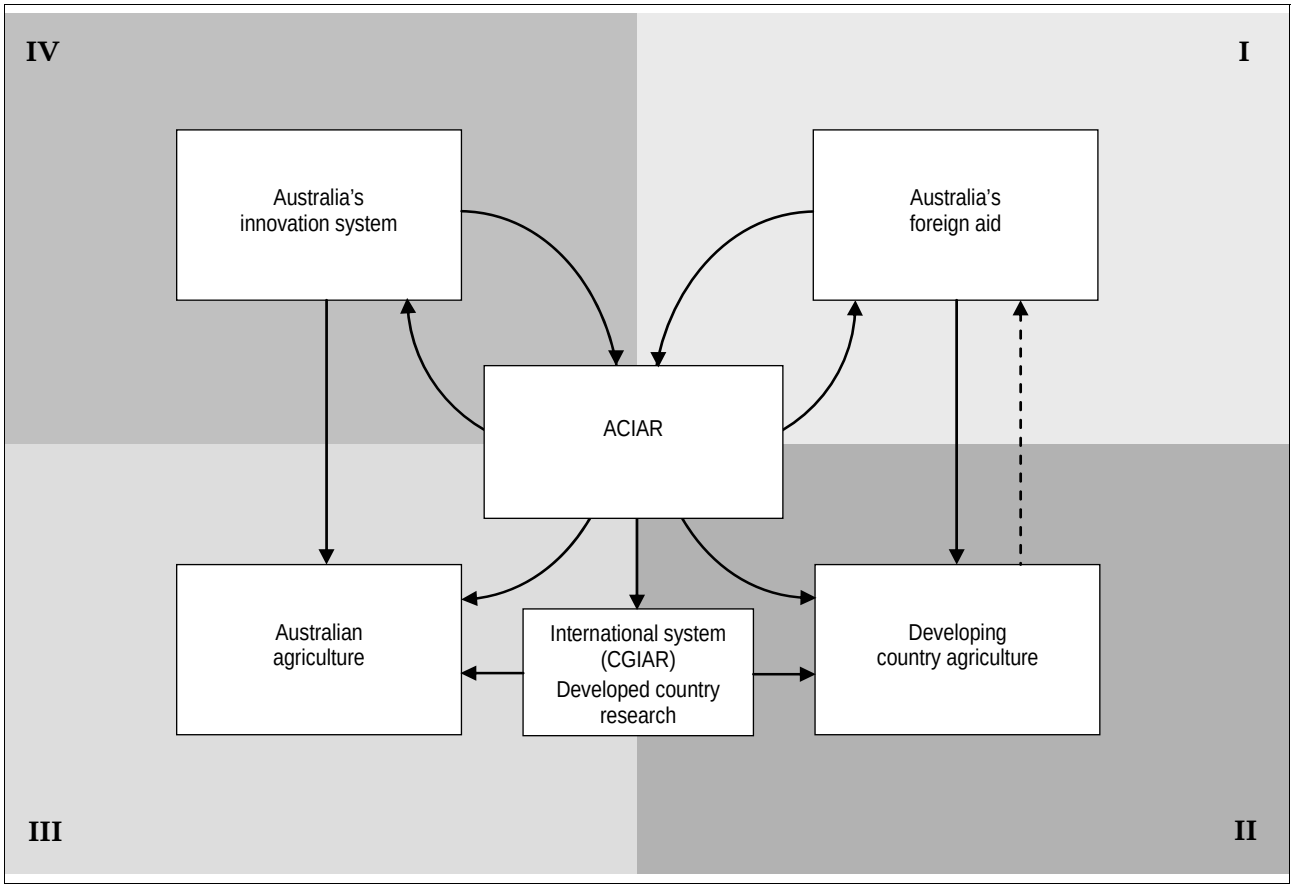
ACIAR's success in generating benefits for developing country partners builds on its ability to attract Australia's scientific resources into looking at a particular class of problem. This use of Australian research resources provides the link to Australia's innovation and research system.

These linkages are illustrated in chart 1. Schematically, ACIAR enables a number of important interactions. The best known interaction is illustrated in quadrant II of the chart, the delivery of research outcomes to developing country agriculture.

This is an effective way of transforming aid funds into benefits, and explains why ACIAR was established as part of Australia's international development cooperation program (quadrant I of the chart). ACIAR funds R&D projects in cooperation with agencies in developing partner countries. It draws on resources in the international agricultural research system, such as the IARCs under the CGIAR umbrella, and other research undertaken in developed countries.

ACIAR funded research also delivers direct benefits to Australian agriculture (quadrant III). These benefits arise through ACIAR's ability to access the global knowledge base and to combine aid funding with Australian research expertise, to examine issues that are of benefit to agriculture in partner countries and around the world.

1 **ACIAR, aid and Australia's innovation system**



Source: CIE 2006a

ACIAR's activities also interact with Australia's innovation system (quadrant IV) come about largely through the involvement of Australian researchers and research institutions (universities, state departments of agriculture and government research bureaus, Cooperative Research Centres and the Commonwealth Scientific and Research Organisation). These include:

- leveraging funding into areas of importance for Australian agriculture;
- providing access to a broader pool of researchers for problems of interest — that is, providing access to international expertise and environments;
- increasing the overall research base for agricultural issues of interest to Australia; and
- contributing to the overall stock of knowledge in an international context and thus helping identify both promising areas for research as well as 'dry holes'.

Another dimension of this interaction is the contribution that ACIAR makes to the pursuit of the Government's National Research Priorities (NRPs).[1] Around 57 per cent of ACIAR's research project funding in 2004-05 targeted priority goals identified in the NRPs, and contributions from collaborating institutions nearly doubled this funding (table 7 in appendix A). In particular ACIAR's emphasis on agricultural research to achieve sustainable development and natural resource management funds research that directly contributes to Australia's pursuit of better outcomes in areas such as water management, soil degradation, biodiversity and climate change responses. Similarly, ACIAR's projects dealing with food safety, animal and crop health and biosecurity concur with and contribute to Australia's need to maintain and enhance its agricultural and food health and safety status.

[1] These priorities, announced in December 2002 cover four main themes: 1. An environmentally sustainable Australia; 2. Promoting and maintaining good health; 3. Frontier technologies for building and transforming Australian industries; and 4. Safeguarding Australia.

The effectiveness of agricultural R&D as development assistance

The recent White Paper on the Australian Government's overseas aid program, 'Australian Aid: Promoting Growth and Stability' identifies the critical role that support to rural development and agricultural productivity can play in increasing incomes, stimulating development of the non-farm economy and generating employment opportunities in rural areas. The Paper articulates the Government's commitment to supporting agricultural R&D given the potential for advances in agricultural technology to increase farm productivity. The logic behind this commitment is compelling.

Agricultural productivity growth is essential for economic development

Agriculture remains a large sector of the economy in most of Australia's development partners, and is the source of livelihoods for the majority of the people. And typically rural people comprise the bulk of the population living below or near the poverty line. Improving the productivity of agriculture is therefore essential to reducing poverty and to economic growth through promoting domestic savings and releasing labour for alternative uses.

The returns on agricultural R&D are high in developing countries

Agriculture in many developing countries is land and labour intensive. Productivity is hampered by lack of access to capital and often to inputs such as suitable varieties, water and fertiliser. Agricultural activities are regularly exposed to pests and diseases, and the risk management response of high degrees of diversification limits scale economies. There is considerable scope for R&D to address these constraints and to improve productivity through reducing the costs, variability, quality and variety of production.

Evaluations of ACIAR's projects indicate the high returns that can be realised from this kind of research. A recent review of the returns to ACIAR's bilateral R&D investments showed that the benefits from projects accounting for 7.8 per cent of total investment had a cost benefit ratio of about 40:1 (Raitzer and Lindner, 2005). The benefits from this selection of projects alone represent more than three times ACIAR's total bilateral investment to date of $1.1 billion (real 2004 dollars[2)].

Examples include[3]:

- research into conservation tillage for dryland cropping in China, which is estimate to generate benefits of just over a billion dollars for a total project cost of $5 million, giving a benefit cost ratio of 205:1 (Vere 2005);
- research into the breeding and feeding of pigs in Vietnam and Australia that generated estimated benefits of $878 million for an outlay of $4.9 million, with a benefit cost ratio of 118:1 (Tisdell and Wilson 2001); and
- research into controlling Phalaris Minor in the Indian rice-wheat belt that generated estimated benefits of $422 million for a total project cost of $1.5 million, with a benefit cost ratio of 275:1 (Vincent and Quirke 2002).

But countries lack the scientific capacity to exploit these opportunities

The returns to R&D in agriculture in developing countries are particularly high as there are scientific capacity constraints, and the stock of knowledge is often low. The need for adaptation of technologies to local conditions limits the ease of direct transfer of knowledge, technologies, or germplasm.

And the operating environment may be lacking to exploit the benefits

ACIAR has also recognised that the enabling environment for agriculture is critical for harvesting the full return on potential productivity growth. The policy and institutional environment influences the flow of agricultural inputs and outputs, and shapes the incentives for investment in new ways of doing things and investment in physical and human capital. Consequently, ACIAR also supports policy-oriented research that complements the technical R&D with the objective of better realising the

---

[2] Note that all values reported in this submission are in 2004 dollars unless otherwise stated.

[3] The references are to the original assessments of the projects: the benefit and cost values, in 2004 dollars, are from a revaluation presented in CIE 2006a.

potential benefits by removing barriers to adoption and improving market access.

Australia is well placed to share agricultural R&D expertise with development partners

Australia is particularly well placed to provide agricultural R&D across a range of commodities having a long history of agricultural R&D in public institutions such as the state departments of agriculture, CSIRO, and the universities.

ACIAR facilitates the undertaking of agricultural R&D in developing country partners by working with the countries to identify their needs. These are matched with Australian providers who identify the opportunities to extend their work to meet developing country needs in agricultural science. ACIAR also funds R&D to assess and enhance the policy environment affecting the adoption of the results of the R&D.

ACIAR's processes add value to this potential

ACIAR adds value by forming partnerships with international agricultural R&D organisations, Australian organisations and the research agencies in the developing partner countries. This enhances the effectiveness of the R&D undertaken. Co-funding opportunities and access to expertise and the Australian stock of knowledge lie at the core of these productive partnerships.

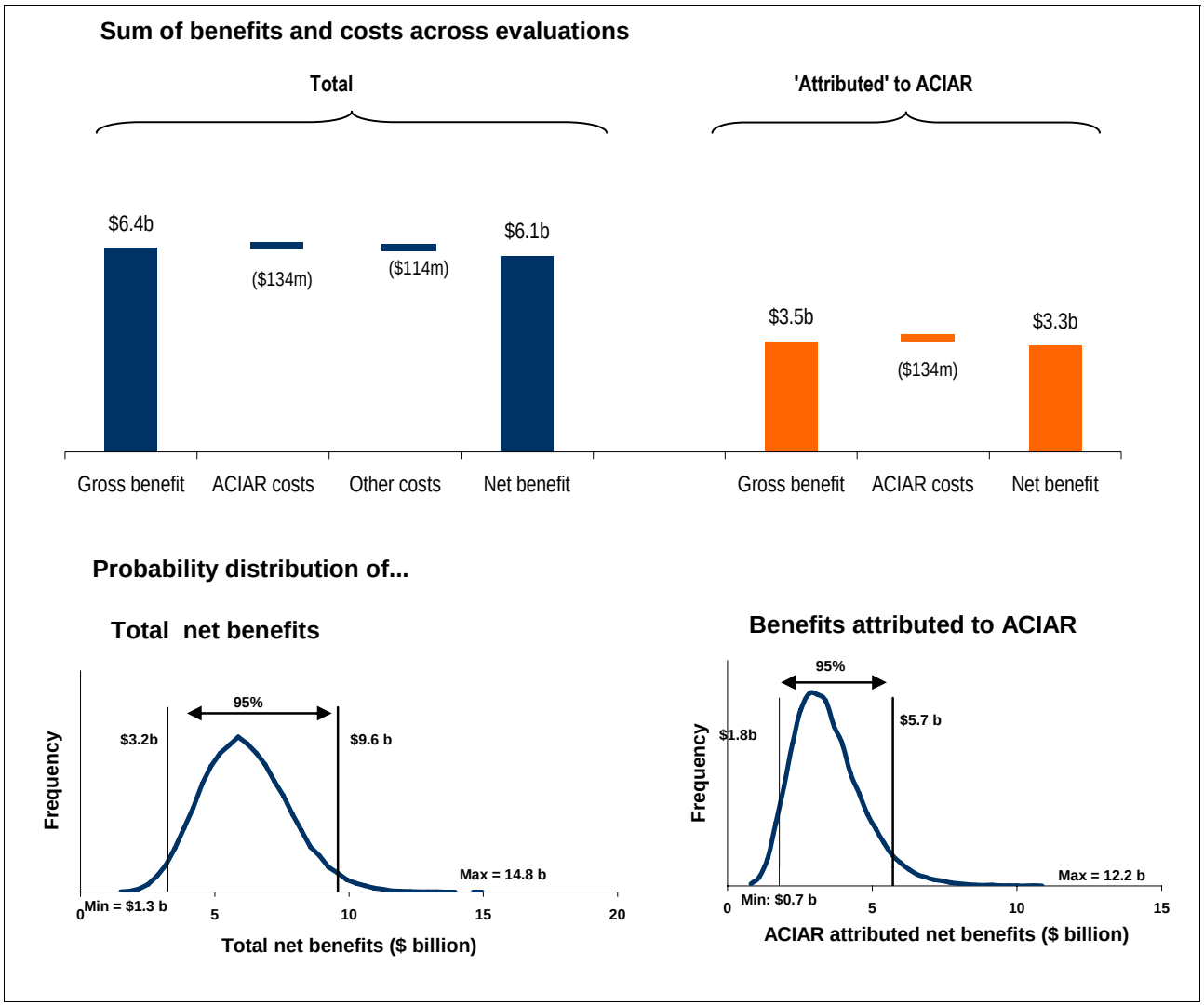
ACIAR R&D delivers significant benefits to developing partner countries

ACIAR's impact assessment program provides robust evidence of the size of the benefits being delivered by its activities. It is estimated that the 65 ACIAR-funded projects that have been subject to impact assessments have delivered benefits that total $6.4 billion to developing country partners and Australian agriculture for the expenditure of $134 million on those projects (and a total cost of $248 million). Around 88 per cent of the benefits accrued to developing country partners: the remaining 12 per cent accrued to Australian agriculture.

A meta-analysis of these evaluations (CIE 2006a, forthcoming) has extended Raizer and Lindner's review of returns to ACIAR's bilateral investments. Chart 2 summarises the aggregate results of this analysis. It shows that if the benefits from the activities are 'attributed' to ACIAR on the basis of ACIAR's share in total project costs, then the total benefits attributable to ACIAR are $3.5 billion, with benefits net of ACIAR's costs of $3.3 billion.

Chart 2 also illustrates the uncertainty around the total benefit estimates. Using information on the benefit estimates within the sample of project evaluations, the review estimated that the 95 per cent confidence interval for the total net benefits is between $3.2 billion and $9.6 billion, and that the comparable confidence interval for net benefits attributed to ACIAR is between $1.8 billion and $5.7 billion. The analysis revealed that the

2 **Total benefits of projects contained within assessments**



Source: CIE 2006a

assessed projects showed a wide range of benefits, with benefit cost ratios ranging from 10:1 to 200:1. It also showed that while the distribution is skewed towards the lower end of the distribution, there is a high probability of a very healthy return and a low probability of an exceptional return[4]. This result is consistent with the findings of a much larger meta-analysis of returns to agricultural R&D in developed and developing countries (Alston et al 2000) which concluded that while the average rate of return on research and extension studies was 81 per cent, the median rate of return was 44 per cent (still a healthy central tendency).

These benefits accrue through a number of pathways. The most obvious is through direct productivity improvements from new production technologies or techniques, or through new breeds and varieties. ACIAR research has also led to benefits from management of, and protection against, disease and pest incursion, increased demand in third country markets from meeting food safety, quarantine and quality requirements, and environmental, bio-diversity and sustainability improvements associated with management of natural resources. Chart 3 summarises the main pathways for these benefits to accrue to developing countries.

The focus is on R&D for the public good not public good R&D

Public goods are defined as non-rival and non-excludable in consumption. Technology is making it easier to exclude consumer segments, so that most previously public goods are 'club' goods, non-excludable only to those in the club. Knowledge is a classic club good, available free to those who have the capacity to access (and utilise) the information.

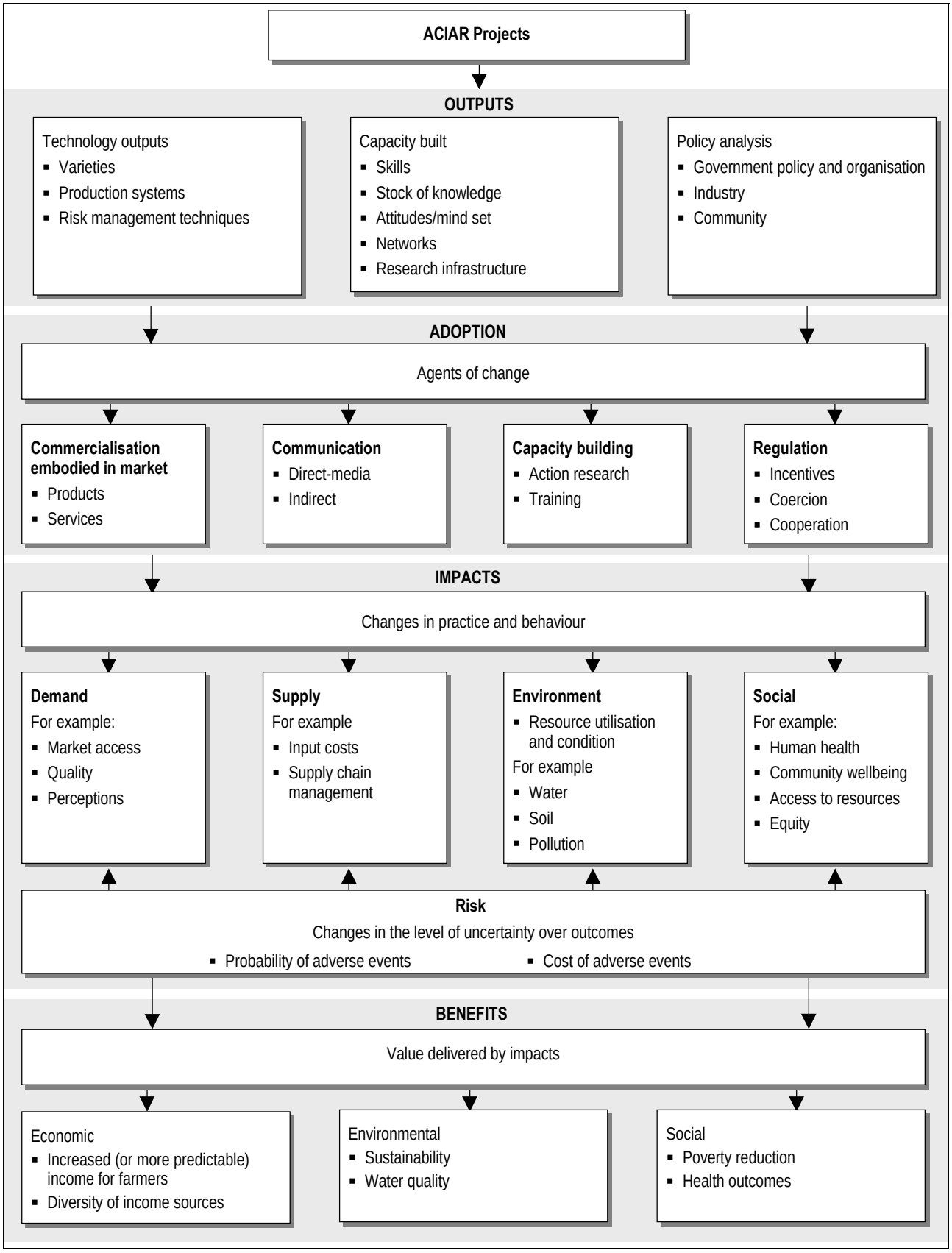
That said, R&D that delivers a pure public good tends to have very high returns. A project aimed at developing and delivering bio-control of the banana skipper pest in Papua New Guinea, generated estimated benefits of $555 million for an outlay of $2.1 million (benefit cost ratio of 258) (Waterhouse, Dillon and Vincent 1998).

Public benefits can be delivered through commercial arrangements

Partnership with commercial players in the distribution of publicly funded R&D outcomes is a common pathway for adoption of new varieties and in

[4] Because of the criteria used to select projects for the impact assessments, the sample covered by this analysis may not be representative of all ACIAR-funded projects.

3 **Pathways to benefits to developing countries from ACIAR projects**



some cases techniques. Partnership at the R&D stage has also raised the level of R&D funding and provided a pathway for adoption. A good example is the development of the hybrid pigeonpea by ICRISAT in partnership with a seed company. ACIAR funded the early research on the short duration pigeonpea that was fundamental to the development of the hybrid technology. The low income level of farmers and price sensitive demand, combined with low marginal costs, means that the seed company's optimal strategy is to price for maximum adoption, maximising the benefits from the research. The value of this R&D for India is estimated at $130 million.

But commercialisation as a pathway to benefits can be limited

In some developing countries where ACIAR works, the policy and institutional environment may not be conducive to the operation of commercial supply of new technologies. Alternative pathways have to be utilised or developed such as public sector extension systems or linkages with other development assistance programs. This said, commercial operations seem to thrive even in the most intimidating of environments, and ACIAR is seeking to further develop ways of supporting the dissemination of new ideas that do not crowd out private initiative.

The public benefits of private good R&D are higher in developing countries

The IARCs are committed to delivering R&D for public benefit, and to this end are working to define what R&D will satisfy this requirement. International public goods are defined as non-rival and non-excludable across a number of countries. This narrow focus, would however, exclude many R&D investments that can deliver considerable public benefits.

ACIAR's work on forestry in transition economies is an interesting example. ACIAR, along with a number of other organisations, supported the development of high-yielding eucalyptus plantations in China over a twenty year period. While the research delivered productivity improvements in an essentially commercial activity, there were considerable benefits in terms of improving the living standards of rural people in southern China. The activity resulted in significant environmental benefits from sources such as: reduced pressure on natural forests, provision of biological corridors, reduced water-borne soil erosion, improved water quality and protection of agricultural crops from winds, sandstorms and soil erosion.

In many developing countries, lack of capital, skills, and communication mechanisms to access information mean that people are often excluded from using information that is potentially useful to them. In these circumstances participative R&D allied with communication and extension strategies can deliver public benefits. The difference compared to Australia's innovation system is that in Australia access to capital, skills and communication are not, at least to any great extent, limited by education levels, public policy or state and private monopolies.

What public agricultural R&D in developing countries has in common with public R&D in Australia is the non-rival and often complementary nature of consumption. Exclusion may not be in the best interests of the users of the R&D, especially where it relates to product quality, consistency and control of pests and diseases.

There are substantial spillover benefits to Australia

Impact evaluations of ACIAR-funded projects suggest that these have delivered significant benefits to Australian agriculture. There are 20 projects for which benefits to Australia have been quantified. In present value terms, these benefits come to $735 million, more than covering the total cost of the projects of $60 million.

These quantified benefits arise in four main categories:

- Direct production benefits (44 per cent of the total) arising through research findings that directly improve the productivity of Australian agriculture.
- Indirect protection from disease or pest incursion (35 per cent of the total) that arises from applications of research findings that lower the chance of a disease or pest ever entering into Australia.
- Direct protection from disease or pest incursion (12 per cent of the total) arising from research findings that allow more effective quarantine or more effective control of disease or pests incursions.
- Increased trade benefits (9 per cent of the total) arising through research that increases the value of Australian exports.

It is not possible to attribute all of the benefits to ACIAR alone. Given the highly networked nature of Australian agricultural research, the benefits to these projects are likely to have emerged because of a combination of ACIAR funding and past funding from other agencies. At the same time, there are further sources of benefits to Australian agriculture that are difficult to quantify. These include improvements in biodiversity in partner countries that may be valued by Australians, training of researchers and general increases in the stock of knowledge that may be applicable in the Australian context, and may increase the probability of success or lower the cost of other research.

As well as these direct benefits, ACIAR's activities are extremely popular in partner developing countries, enhancing Australia's recognition in the region.

ACIAR's comprehensive program of impact evaluations guides investment

ACIAR has been undertaking impact evaluations of its projects since 1986. To date it has commissioned detailed impact evaluations of 65 completed projects.

Evaluating research impact

Most evaluations have focused on measuring the economic surplus resulting from the adoption of the R&D outputs. Methods of estimating economic surplus changes have varied depending on the nature of the outcomes. All evaluations:

- establish an explicit counterfactual — what would have happened in the absence of the R&D, which may have been a decline in productivity;
- look at the net effect of adoption including the opportunity cost of the resources used in implementation;
- take into account the impact on market prices of changes in volumes and quantities and the flow-on effects; and
- track the changes over a specific time period (usually 30 years) and apply a discount rate to the net benefit flows.

ACIAR has a strong process to validate the results. These involve the conduct of meta-analyses, peer reviews, and use of an internal skill base.

ACIAR continues to develop its methods for impact evaluation and cooperate with international agricultural research organisations in doing so. Recent development includes guidelines for impact evaluation of capacity building activities undertaken with the Crawford Fund. ACIAR is currently writing comprehensive guidelines to improve the consistency and quality of their impact evaluations, in conjunction with the Standing Panel on Impact Assessment of the CGIAR. These will be shared with developing partner countries research agencies to assist them in undertaking their own impact evaluations.

Evaluating capacity building activities

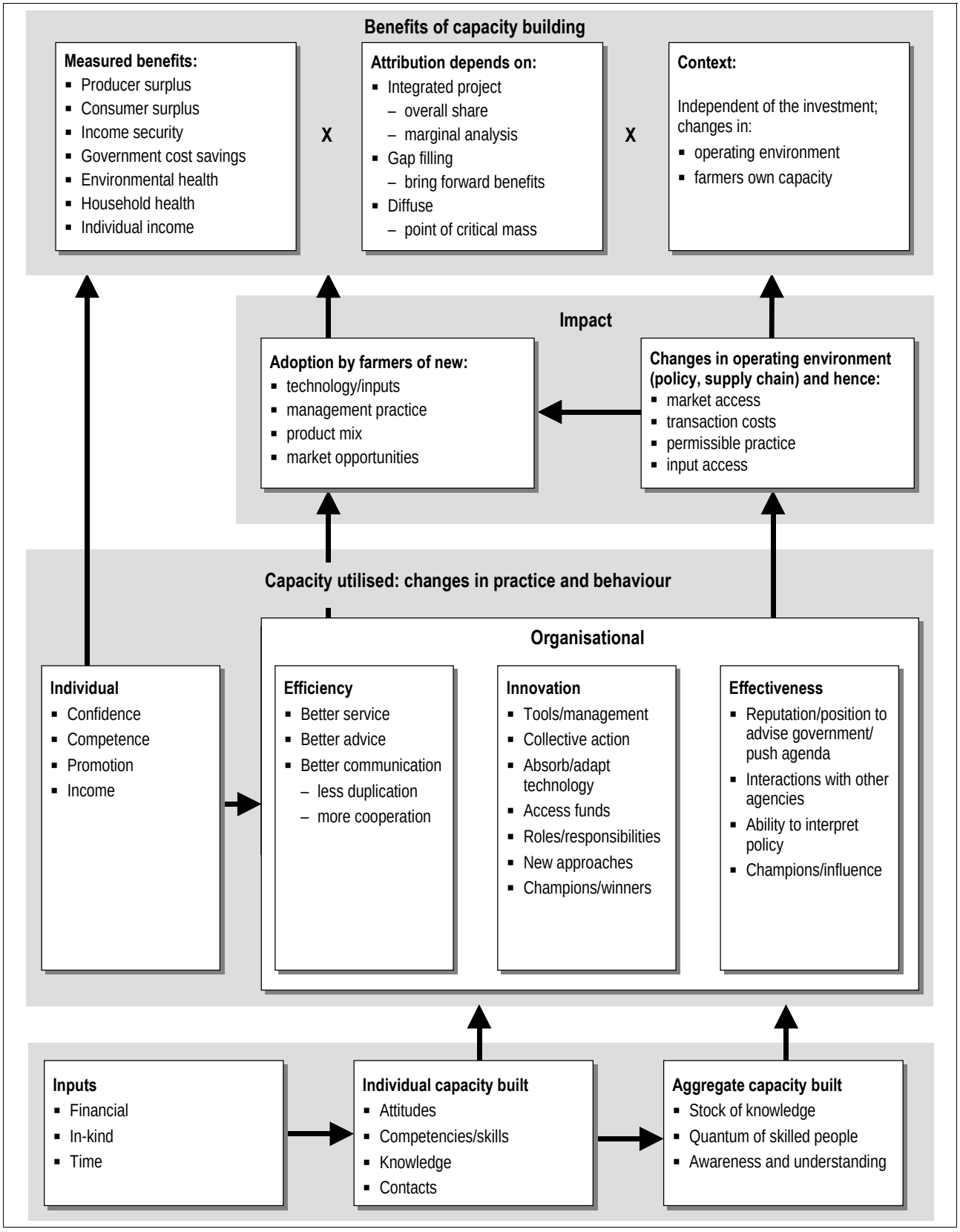
ACIAR projects often involve substantial training, usually through learning by doing, for collaborating scientists in developing partner countries. ACIAR also funds the John Allwright Fellowship Scheme, and works closely with The Crawford Fund Training Program, which funds formal training programs in-country and in Australia for agricultural researchers and policy makers. ACIAR and the Crawford Fund have recently collaborated to develop a framework for evaluation of the capacity building components of projects. The framework is summarised in chart 4.

The framework identifies:

- capacity built:
  - at the individual level this is the knowledge, skills, competencies, attitudes and contacts acquired as a result of the training;
  - at the organisational level it is the addition to the stock of knowledge of the organisation (not embodied in the individual), the quantum of skilled people and the overall awareness and understanding;
- capacity utilised:
  - at the individual level this is the application of the capacity built to raise their own productivity and/or achieve promotion;
  - at the organisational level utilisation of capacity is reflected in improved efficiency (productivity), innovation, or effectiveness;
- impact on farmers (the usual target):
  - directly through adoption of new varieties and technologies, or
  - indirectly through improvement in the operating environment that enhances market access, access to resources, diversification or reduced uncertainty, so enhancing income security, or lowering transaction costs.

ACIAR has started to commission evaluations using this methodology. One has looked at the training component of the ACIAR investment in pigeonpea breeding research at ICRISAT. The project had aimed to develop Australian germplasm for use in India, but it turned out to be unsuitable. However the techniques learned and understanding gained clearly brought forward the development and adoption of a suitable short duration variety by several years. Thus the main value of the project came from the process of undertaking the R&D not the output of the R&D. The capacity building activities associated with the project were estimated to produce benefits

4 **Pathways for benefits from capacity building**



with a net present value of close to $68 million (Centre for International Economics, 2006b). The work also identified the way forward for the subsequent development of hybrid varieties, an increment in knowledge that generated a new research agenda.

Evaluation of policy research

Evaluation of policy research also presents significant challenges. A review and meta-analysis of ACIAR's policy research (Pearce 2005) identified some of the key challenges.

- Attribution: research is almost never the sole factor triggering policy change.
- Circularity: the benefits of policy research are typically evaluated using the same tools that are themselves products of the policy research.
- Implementation difficulties: one of the most plausible approaches to evaluating the effects of policy research, Bayesian decision analysis requires obtaining 'before' and 'after' probabilities from decision makers.
- Valuation: the value of policy changes that are public goods cannot easily be imputed using observed market prices and costs (as can the impacts of technical research).
- Poison wells: not all ideas generated by economic research are worth implementing — evaluation of policy research inevitably involves judgments about the usefulness of the ideas that emerge.

Some policy research projects have been covered by ACIAR's impact assessment work. Table 5 summarises the estimated benefit cost ratios for these projects.

The review reinforced the logic of a decision made by ACIAR's Board of Management in May 2004 to approve a strategy to make greater use of pilot or scoping studies to assess policy issues before making major technical

5 **Benefit cost ratios for selected ACIAR policy projects**

Project	*Estimated ratio of benefits to costs*
Analysis of socioeconomic and agribusiness developments in the Chinese beef and cattle industry	60
Raw wool production and marketing in China	40
Emergence and integration of regional grain markets in China	6 to 30
Establishment of a protected area in Vanuatu	4.5

Source: Pearce, 2005, McWaters and Templeton, 2004, Watson 1998, McMullen, 2004 and CIE 1998

research investments. The Board considered that it may also be important to have research on these important policy issues and their economic implications undertaken alongside or integrated with the technical research. This can be important to ensure that the technical research takes the possible impacts into account or works to foster improvements in policies.

The Board's position reflected its recognition that policy settings have the potential to be a major influence on the effectiveness and impacts of particular technical research projects. Policy settings may negatively affect the incentives that shape the willingness of producers to undertake the investments associated with adopting the results of technical research. Policy distortions can lead to situations in which the introduction of new techniques has counter-intuitive and sometimes counter-productive effects. ACIAR considers that undertaking policy and related economic assessments at the same time as the technical research can therefore be important to ensure maximum uptake and adoption of the technical results.

Evaluation of poverty impacts

ACIAR has also worked on the development of a framework for measuring the impacts of its research projects on poverty. Box 6 summarises the issues that have been identified in attacking this problem (Pearce, 2002).

6 Measuring the impacts of research projects on poverty

Measuring the impacts of a project on poverty requires a good understanding of:

- the technical impacts of the project;
- the pathways by which the project will affect the incomes, risk profiles and expenditure of different groups within the affected community;
- the merits and pitfalls of different definitions of poverty;
- the merits and pitfalls of different quantitative measures of poverty
- within any given definition (when will the headcount ratio be misleading? when should inequality be measured? how should a poverty line be established? and so on);
- how to establish a baseline estimate of poverty, including the use of household surveys and other data-collecting techniques;
- how to measure and simulate the income and expenditure patterns of different groups within the affected community; and
- how to asses economic interactions between different groups in the community.

Poverty evaluation is very much more complex than standard benefit–cost evaluation, as it requires that something be said about the impact of the projects on different groups. Further, some of the largest poverty effects of a project may be indirect, so more attention must be paid to the interactions between those groups affected.

ACIAR has commissioned reviews of the poverty impact of some of its projects. One example is the project targeting bio-control of the banana skipper pest, which was estimated to lift some 43 000 people in Papua New Guinea above the poverty line, through averted income losses and cost increases (Warner and Bauer 2003).

Conclusion

ACIAR's operation at an interface between Australia's innovation system and its development assistance program provides for some insights that are useful for the Productivity Commission's review of public support for science and innovation.

ACIAR funds collaborative research that draws on resources from parts of the innovation system and targets the pursuit of more productive and sustainable agricultural systems for the benefit of developing countries and Australia.

Funding R&D in agriculture, forestry and fisheries is an effective form of development assistance as increased productivity in these sectors is a critical ingredient to growth. Because so many poor people in the developing countries targeted by Australia's aid program are dependent on rural activities for their livelihoods, aid which improves their incomes or helps them better manage risk can make an important contribution to reducing poverty. ACIAR's R&D funding thus targets R&D for the public good, a target made somewhat larger in many countries because the institutions that create incentives for private R&D are often very weak.

ACIAR has a long standing program of quantitative evaluation of the impact of its activities. The evidence from this program confirms that the returns from agricultural R&D in developing countries are high, but that the distribution of the benefits is skewed, suggesting that there is a high probability of a healthy return, but a low probability of an exceptional return. The assessments also show that there have been significant benefits to Australian agriculture from this research, showing that research does not have to be done in Australia to provide direct benefits to Australia.

ACIAR continues to refine and extend its assessment program, and is working on methodologies to evaluate the impact of policy research and capacity building. The evaluation program impacts on ACIAR's portfolio allocation. For example, evidence on the extent to which policy and institutional factors influence the conduct and uptake of technical research has led to an increased focus on pilot or scoping studies to assess policy issues before making major investments. It has also led to assessments of

the policy and institutional environment at the same time as technical research.

Some of the lessons from ACIAR's experience may be pertinent to the questions concerning public support for science and innovation in Australia being dealt with by the Productivity Commission. To ensure that public money is well spent requires assessing the likely impacts of prospective research, and the actual impacts of completed projects. It also requires being assured that the policy and institutional environment supports appropriate levels of adoption of research results. And to make the best ongoing contributions, research needs to be conducted in an environment in which the stock of knowledge held by individuals and organisations is available to a broader research community.

References

Alston J.M., Chan-Kung C., Marra M.C., Pardey P.G. and Wyatt T.J. 2000, A Meta-Analysis of Rates of Return to Agricultural R&D, International Food Policy Research Institute, Washington D.C.

Bauer M., Pearce D. and Vincent D. 2003*, Saving a staple crop: impact of biological control of the banana skipper on poverty reduction in Papua New Guinea*, Impact Assessment Series Report No. 22, ACIAR, Canberra

Centre for International Economics 2006a (forthcoming), *Benefits to Australia of ACIAR funded research*, Canberra

—— 2006b (forthcoming), *Capacity building evaluation*, ACIAR and the Crawford Fund, Canberra

—— 1998, Establishment *of a protected area in Vanuatu*, Impact Assessment Series Report No. 03, ACIAR, Canberra

McWaters V. and Templeton D. 2004, *Adoption of ACIAR project outputs: Studies of projects completed in 1999-2000*, ACIAR, Canberra

Mullen J.D. 2004*, Impact Assessment of ACIAR-Funded Projects on Grain-Market Reform in China*, Impact Assessment Series Report No. 26, ACIAR, Canberra

Pearce D. 2005, *Review of ACIAR's research on agricultural policy*, Impact Assessment Series Report No. 31, ACIAR, Canberra—— 2002, Measuring the poverty impact f ACIAR projects: a broad framework, Impact Assessment Series Report No. 19, CIAR, Canberra

Raitzer D.A. and Lindner R. 2005, *Review of the returns to ACIAR's bilateral R@D investments*, Impact Assessment Series Report No. 35, ACIAR, Canberra

Ryan J.G. 1998, *Pigeonpea improvement*, Impact Assessment Report No. 6, ACIAR, Canberra

Tisdell C. and Wilson C. 2001, Breeding *and feeding pigs in Australia and Vietnam*, Impact Assessment Report No. 17, ACIAR, Canberra

Van Bueren M. 2002, *Eucalypt tree improvement in China*, Impact Assessment Series Report No. 30, ACIAR, Canberra

Vere D. 2005, *Research into Conservation Tillage for Dryland Cropping in Australia and China*, Impact Assessment Series Report No. 33, ACIAR, Canberra

Vincent D. and Quirke D. 2002, *Controlling Phalaris minor in the Indian rice-wheat belt*, Impact Assessment Report No. 18, ACIAR, Canberra

Warner R. and Bauer M. 2002, *Mama Lus Fruit Scheme: an assessment of poverty reduction*, Impact Assessment Series Report No. 20, ACIAR, Canberra

Waterhouse D, Dillon B. and Vincent D.1998, *Economic benefits to Papua New Guinea and Australia from the biological control of banana skipper (Erionota thrax)*, Impact Assessment Series Report No. 12, ACIAR, Canberra

Watson A. 1998, *Raw wool production and marketing in China*, ACIAR project 8811, Impact Assessment Report No. 4, ACIAR, Canberra

Appendix

A ACIAR and the government's national research priorities

7 ACIAR's investment in National Research Priorities and co-funding by collaborating organisations (themes 1 and 4)

	ACIAR investment		*Co-funding*	
Theme and goal	***2004-05 (actual)***	***2005-06 (budget)***	***2004-05 (actual)***	***2005-06 (budget)***
	$m	$m	$m	$m
1. An environmentally sustainable Australia				
1.1 Water — a critical resource	3.67	3.53	3.59	3.78
1.2 Transforming existing industries	0.98	1.54	0.0	0.94
1.3 overcoming soil loss, salinity and acidity	3.02	3.07	2.93	2.05
1.4 Reducing and capturing emissions	0.55	0.57	0.93	1.05
1.5 Sustainable use of Australia's biodiversity	2.30	2.14	1.69	2.41
1.7 Responding to climate change and biodiversity	0.20	0.36	0.14	0.24
Total theme 1	10.72	11.21	9.28	10.47
4. Safeguarding Australia				
4.1 Critical Infrastructure	0.02	0.0	0.0	0.0
4.2 Understanding our region of the world	1.71	1.99	0.57	0.97
4.3 Protecting Australia from invasive diseases and pests	6.82	7.46	5.13	7.40
Total theme 4	8.55	9.45	5.70	8.37
Totals themes 1 and 4	19.26	20.66	14.98	18.84
Totals as percentage of totalACIAR research project funding	57%	59%	na	na

na not applicable

Note The Australian Government's National Research Priorities 2002 cover four main themes: 1. An environmentally sustainable Australia; 2. Promoting and maintaining good health; 3. Frontier technologies for building and transforming Australian industries; and 4. Safeguarding Australia.