

Poverty Alleviation through Agricultural Research—the ACIAR Experience

Kenneth Menz, Godfrey Lubulwa and Padma Lal
Australian Centre for International Agricultural Research

ISBN 1 86320 281 1

Contents

Abstract	4
1. Introduction	5
2. Poverty alleviation and agricultural research—some reasons why the linkage is difficult	6
3. How does ACIAR target its research?	8
4. What has ACIAR achieved in terms of poverty alleviation and other impacts?	11
5. Concluding comment	13
6. References	15

Abstract

The evolution of a 'poverty alleviation' focus within the Australian Centre for International Agricultural Research (ACIAR) is briefly described. ACIAR has undertaken intensive efforts with ex ante and ex post economic evaluation for many years, but explicit measurement of achievement in the area of poverty alleviation has been minimal.

This is because: (a) the concept of poverty alleviation is elusive; (b) calculation of poverty alleviation first requires the calculation of economic benefits (unless poverty alleviation is to be 'self assessed'); (c) calculation of economic benefits from research can be difficult per se; and (d) the distribution of economic benefits is difficult or impossible to discern in a partial equilibrium framework.

The pragmatic approach taken within ACIAR in light of these issues is described. This approach remains fairly strongly focused upon the assessment of economic benefits, but with a poverty alleviation flavour.

1. Introduction

The Australian Centre for International Agricultural Research (ACIAR) is a Commonwealth Government institution. It is part of Australia's development assistance program, with a mandate to:

- (a) formulate programs and policies with respect to agricultural research for either or both of the following purposes—
 - i. identifying agricultural problems of developing countries,
 - ii. finding solutions to agricultural problems of developing countries;
- (b) commission agricultural research by persons or institutions;
- (c) communicate (research results);
- (d) establish and fund training schemes related to its research programs;
- (e) conduct and fund development activities related to its research programs; and
- (f) fund international agricultural research centres.

A recent external review of ACIAR (Nairn et al. 1998) recommended (p. 42) that:

ACIAR (should) more effectively communicate the way in which the benefits flow from ACIAR projects to ultimately achieve **poverty alleviation...**

Yet we find the targeting and evaluation of poverty alleviation aspects of our research to be a difficult, complex and imperfect task. In this paper, the mechanisms that ACIAR uses in attempting to do so are explained, as are some of the problems, and lessons.

2. Poverty alleviation and agricultural research—some reasons why the linkage is difficult

A recent paper by Maxwell (1999) surveys the definitional, conceptual and measurement issues relating to poverty. Maxwell claims that consensus has been achieved in some areas, but many complex areas of disagreement and confusion remain. There has been a tendency to broaden the definition of poverty alleviation—from ‘simple’ measures of income or consumption, to perspectives on basic needs. Recently, even broader-based definitions have been suggested, evolving into the development of a ‘sustainable livelihoods’ approach to poverty alleviation (Farrington et al. 1999). For some of the reasons indicated below, the linkage of agricultural research to poverty alleviation is difficult, even when the latter is defined narrowly. Agricultural research cannot be expected to have any direct impact on some of the parameters associated with the broader-based definitions of poverty alleviation, such as access to health and education services.

Considering specific aspects of agricultural research as a tool for alleviating poverty adds to the complexity.

- Poor ‘farmers’ may derive only a proportion of their income from agriculture (see e.g. Parilla 1995). In those cases, the impact of agricultural research will necessarily be limited.
- If farmers grow a multitude of crops, as many poor farmers do (Parilla 1995), then any crop-specific, research-generated productivity improvement will not result in far-reaching poverty alleviation for those farmers.
- Productivity improvements from agricultural research may have some negative impacts on farm prices and thus on farm incomes. But this is part of the long-term dynamic of economic development (Mellor, 1966). So the **timing** of any measure of poverty alleviation from agricultural research, as well as the choice of target group, will influence the result.
- The impact of research may be small per unit, and therefore insignificant for alleviating the poverty of any one person. However, overall economic benefits may still be substantial in comparison to the cost of the research. Such a lack of measurable ‘poverty alleviation’ in a given region does not imply an inappropriate allocation of research resources. It may simply reflect a broad geographical mandate and focus of the research institution.
- ‘Good research’ which may not ‘measurably’ impact on poverty alleviation would be ‘maintenance research’ (Alston et al. 1995). There may be no measurable reduction in poverty per se, but a prevention of poverty exacerbation. ACIAR funded a biological control project in the late 1980s on a pest of bananas in Papua New Guinea. Most bananas in Papua New Guinea are grown by smallholders, and are an important staple for them. The estimate of the economic benefits deriving from the project is over US\$150m (Waterhouse et al. 1999). This was a sound scientific project with high economic returns (in the sense of loss avoidance), but not showing any ‘measurable’ impact on poverty alleviation. (‘Loss’ from the pest never actually eventuated since the loss was pre-empted by the research). It was poverty alleviation, but difficult to see or measure, since the ‘without research’ scenario was not very visible.
- The thread of the research impact may be lost, or obscured, where other scientists are the primary users of the information produced by the research (i.e. where a piece of research is an ‘intermediate product’). Cause and effect relationships are obscured. ACIAR undertook a major piece of ‘detective work’ to try to unravel the respective contributions of a multi-year, multi-institution pigeon pea research endeavour. The research was funded by ACIAR in the early years, and subsequently fed into ICRISAT’s research program (Ryan, 1998). Although the distributional impacts of the project’s impacts were not closely examined, it appears that there was a strong poverty alleviation element. Can

that impact be attributed to ACIAR? Only in part! In practice, the impact was treated as a joint (and inseparable) product of the two institutions.

- The timing of any poverty alleviation impact from research was mentioned above, in the broad sense of the dynamic of economic development. However, there is also the narrower, project-specific 'adoption lag' aspect to consider when timing the measurement of impact. For example, an ACIAR project on 'soybean improvement in Thailand' that began in 1991, has resulted in a new variety, Chakkrabhandhu no. 1, certified in July 1998. However, this variety has not yet been sown or

harvested commercially. Eight years has elapsed since the project commenced. It may require several more years before any reasonable extrapolation about planting areas and yield impacts can be assessed as a step towards assessing poverty alleviation.

- It may be virtually impossible to trace the impacts of poverty alleviation in any kind of partial analytical framework. For example, Coxhead and Warr (1995) showed that changes in poverty due to technical progress in a developing country (Philippines) accrue mainly through wage changes. Such changes are captured only within a general equilibrium framework.

3. How does ACIAR target its research?

A. *Judgments are made about poverty alleviation aspects of potential research projects. These judgments are via a specification of countries with a high proportion of poor people, commodities grown or eaten by poor people, or socioeconomic groups thought to be in poverty.*

There was a recent interesting example in relation to the control of Newcastle disease in village chickens. ACIAR-sponsored research was successful in developing a heat-resistant vaccine that could be readily used in the field by coating it on chicken feed. The vaccine was commercialised by an Australian company that was subsequently taken over by an American firm. Uptake of that technology has been somewhat limited to date. The capacity of poor villagers to pay for the vaccine was found to be limited and there were some logistical problems. Having perceived these problems, ACIAR sponsored further research leading to the production of a new, uncommercialised vaccine suitable for poor farmers (Centre for International Economics 1998). Quantities of the seed of this vaccine can be made locally and chickens can be vaccinated either via drinking water or by eye drops. The point of telling the short story about this project was to emphasise that consideration of poverty alleviation aspects drove the evolution of the research along a particular poverty alleviation pathway.

B. *Given this subjective poverty alleviation framework mentioned in A, ACIAR implements certain procedures to maximise economic benefits within that framework. These are briefly described.*

Prioritising commodities from the perspective of potential economic benefits. In estimating the economic benefits from research, ACIAR utilises a commodity-based, multi-regional, research process model (Davis et al. 1987). The technical inputs to the model include estimates of the relative research capability of different countries, the potential spill over of research outputs to other countries, and the expected rate and extent of adoption of technology

in each country. The socioeconomic impacts are predicted using a multi-region model that takes into account the impact of the research on both the producers and consumers. Large (global) data-sets on commodity production and consumption (both commercial and subsistence), prices and elasticities are accessed by the model. This permits an estimation of world price effects that might spill over from research.

ACIAR uses the information generated from the model in several ways. One use is to assist in the Centre's aggregate priority-setting. Figures 1 and 2 show a summary of the type of results obtained from the model (for the regions 'Australia' and Southeast Asia). It shows a summary of results from the model. Commodities are ranked, by region, according to the welfare gains that would result from a 5% reduction in the unit cost of production. At every ACIAR project decision meeting, tabulated information is presented which indicates the priority rating of each commodity for each project being considered. ACIAR looks particularly closely at individual research project proposals that target low-priority commodities, and is most likely to conduct ex ante benefit-cost analyses on such proposals.

Ex ante project assessment. ACIAR uses research evaluations to estimate in advance the potential welfare impact of particular research projects. For this purpose, project-specific information is used, and potential impacts are estimated in consultation with the researchers, research managers and other technical experts. In Table 1 (column 3), the distribution of ex ante benefit-cost analyses by ACIAR program and geographical region is shown. We have not undertaken any explicit cross-checking of the analysis to see how reliable the results are, but there is a strong a priori judgment of overestimation. Nevertheless, we retain the requirement for a benefit-cost analysis, since we feel that, as a minimum, it forces project proponents to articulate clearly the mechanism by which economic benefits (a precursor to poverty alleviation) will accrue.

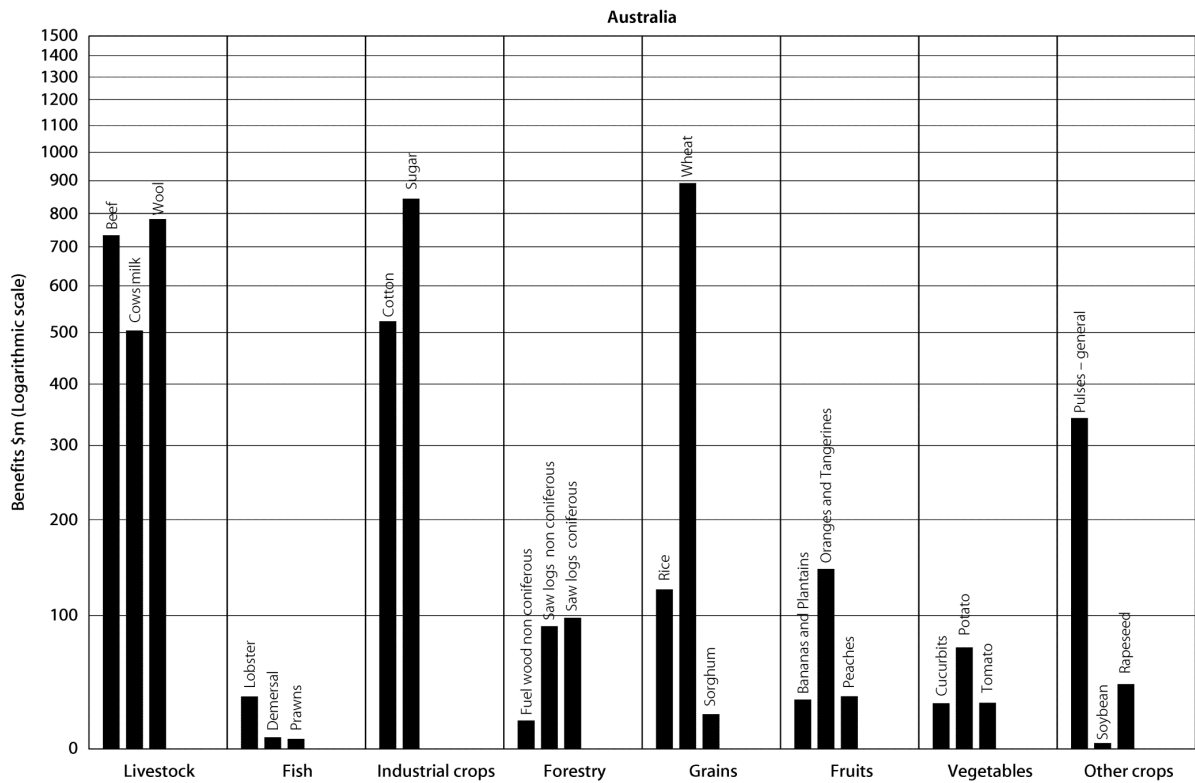


Figure 1. Australia—Priority ranking of selected commodities according to potential benefits resulting from agricultural research

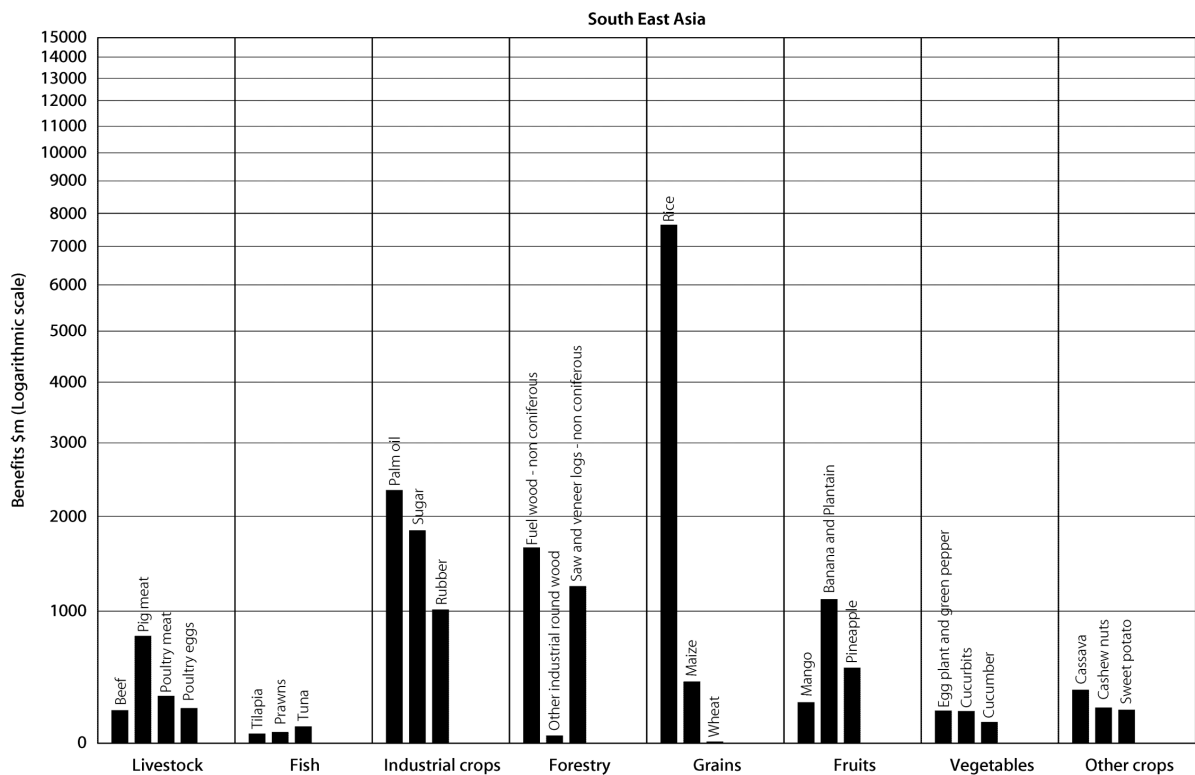


Figure 2. Southeast Asia—Priority ranking of selected commodities according to potential benefits resulting from agricultural research

ACIAR Impact Assessment Program

In summary, the consideration of poverty alleviation in guiding ACIAR research is via a two-stage process—first putting a poverty alleviation focus/framework/constraint around the population of possible projects, and then attempting to

maximise economic benefits within that focus/framework/constraint, in the manner described above.

Table 1. Summary of benefit–cost analyses, by program and by ACIAR mandate region

Program	Number of completed projects	Number of projects analysed ex ante	Number of projects evaluated ex post*
Animal Sciences			
China	8	1	
Southeast Asia	30	3	2
South Asia	12	2	3
South Pacific & PNG	4	1	
Africa	4		3
Crop Sciences			
China	8	1	4
Southeast Asia	31	5	5
South Asia	7	1	1
South Pacific & PNG	14		7
Africa	5		1
Agricultural and Natural Resource Economics/Farming Systems			
China	2		
Southeast Asia	24	4	
South Asia	2		
South Pacific & PNG	14	1	
Africa	1		
Fisheries			
China	0		
Southeast Asia	6	2	
South Asia	0		
South Pacific & PNG	13	2	4
Africa	1		
Forestry			
China	7		2
Southeast Asia	15		*
South Asia	2	1	
South Pacific & PNG	1		
Africa	6		5
Land and Water Resources			
China	11	4	1
Southeast Asia	33	2	
South Asia	6	1	1
South Pacific & PNG	2		
Africa	5		2
Postharvest Technology			
China	1		
Southeast Asia	19	9	10
South Asia	0		
South Pacific & PNG	1		
Africa	0		
TOTAL	295	40	51

* Projects are allocated to the region where most of the research effort occurred.

4. What has ACIAR achieved in terms of poverty alleviation and other impacts?

What is ACIAR trying to impact upon? A recent paper by Mauldon (1998) classified possible research impact into the following categories:

- scientific knowledge (technical success);
- human research capacity; and
- community impact (including economic benefits, since these would seem to be a prerequisite to poverty alleviation).

The first two impacts are readily assessed at around, or soon after, the time of project completion. ACIAR undertakes an independent review of all of its projects, and these first two items are explicitly included in the terms of reference for those reviews (see Appendix). Mauldon read and summarised all of these independent reviews (more than 100). Table 2 is reproduced from his report (Mauldon 1998).

The results in Table 2 provide a count of projects on the basis of one assessment criterion at a time. However, it is useful to categorise projects by composite scores, taking into account all the three categories of assessed performance. On the basis of

these scores, 2 projects (nearly 2%) could unequivocally be judged as having been outstandingly successful (a score of 5 for all parameters), 12 (11%) as having been very successful or better (a score of 4 or more for all parameters) and 48 (43%) as having been satisfactory or better (a score of 3 or more for all parameters). The remaining 63 (53%) projects had a score of two or less on at least one of the assessment parameters, but only three projects failed to make a score of 3 for at least one of the parameters.

Community impact (which includes economic impact and impact on poverty alleviation) is more problematical. There will rarely be a community impact at the time of project completion, and, as indicated in the soybean example given earlier, a community impact may take many years after the conclusion of a particular project to eventuate. Although Mauldon (1998) made a first cut at classifying projects on this 'community impact' criterion, this was attempted at the time of project completion. The classification therefore was based more on an *expectation* of community impact within a reasonable time than on an observed

Table 2. The number and percentages out of 111 projects by degree of success and extent of impact

Category of success or impact	Technical success		Research Capacity		Community impact	
	(number)	%	(number)	%	(number)	%
Outstandingly successful (score of 5)	16	(14)	14	(13)	5	(5)
Very successful (score of 4)	41	(37)	36	(33)	20	(17)
Satisfactory (score of 3)	33	(30)	48	(42)	29	(26)
Less than satisfactory (score of 1 or 2)	21	(19)	13	(12)	57	(52)
TOTAL	111	100	111	100	111	100

ACIAR Impact Assessment Program

community impact. (In other words, this was really more of a classification of the nature of the research—applied, strategic, etc.) ACIAR has now commenced a ‘rolling’ desktop examination of all projects completed five years previously (Mauldon 1999). Where there is a positive and quantifiable ‘impact story’ to document, a more comprehensive ‘economic’ assessment is undertaken.

ACIAR conducted comprehensive economic assessments of 12 completed projects in 1991 (Menz 1991). Another 12 projects were assessed in 1998 ((Menz and Lawrence 1999). Some were repeat assessments. Three of the latter 12 projects were outstandingly successful in terms of economic return—Australian trees for China, banana skipper control in PNG, and Newcastle disease control in village chickens. Each of the three projects has a net present value (NPV) exceeding \$100 million. The benefits are accruing mainly to the developing country partner, but the banana skipper project has also provided significant benefits to Australia in terms of enhancing quarantine. A fourth project (Epizootic ulcerative syndrome in fish) is expected to give a similar level of economic returns, but adoption of the results is less advanced than in the other three cases, and therefore the predictions are more speculative. Nevertheless, estimates in all cases are based upon conservative assumptions.

Several projects had medium-level NPVs in the range \$10m to \$100m. These were projects resulting in improved postharvest handling of tropical fruit (Southeast Asia and Australia), reduced tariffs for Australian wool exported to China, improved fruit fly control (including a contribution to the pawpaw fruit fly eradication campaign in Queensland), and controlled traffic patterns in reduced tillage (China and Australia). Each of these projects is providing a significant economic benefit to Australia, as well as to other countries. Another project in this group was partially responsible for the widespread adoption of short season pigeon peas in India. It had no impact in Australia, since the mooted pigeon pea industry failed to materialise.

The final set of project benefits (NPVs under \$10m) resulted from bypass protein feed for Indian dairy cows, forest conservation in Vanuatu, and from the first accurate soil test for sulfur applicable to Australian pastures and canola-producing areas. In the latter two cases, the benefits are quite small, but still comfortably exceed project costs. Both also provide additional (non-quantified) environmental

benefits. The Vanuatu project had a strong environmental orientation from the beginning and it was gratifying to see the environmental benefits being achieved simultaneously with modest, but significant, economic benefits.

Part of the exercise summarised in Menz and Lawrence (1999) was to revisit some of the projects that had undergone economic assessment in 1991. Four projects were selected on this basis, with interesting results. In one case (Newcastle disease), the expected benefits had increase substantially by 1998, while in two cases—bypass protein for dairy cows in India and fruit fly control—the expected benefits had fallen substantially, but remained very positive. The fourth project, on Australian trees in China, gave a result in 1998 similar to that in 1991. In the case of Newcastle disease control, the spread of the technology to Africa is responsible for the increase in expected benefits. The promise of extensive use of new fruit fly control techniques in Southeast Asia, apparently imminent in 1991, did not eventuate. Why this was so, and whether a further effort by ACIAR or another agency, might be warranted, remain as open questions. In the case of the bypass protein technology for Indian dairy cows, the conversion of feed mills to the manufacture of bypass protein predicted in 1991 has continued, but at a somewhat slower rate. A number of components of the benefits predicted in 1991 related to an expected general development of the Indian dairy industry (improved animal quality etc.). This development did not occur, making the bypass protein technology less attractive.

Total benefits (net of research costs) of slightly over \$190m million were ascribed to the set of projects assessed. About 14% of these benefits are accruing to Australia and 86% to developing country partners.

So did these projects alleviate poverty? Leaving aside the Australian benefits listed, there seems to be reasonable expectation that all of the other projects were targeted to the poorer end of the respective populations.

Costs per assessment were about US\$10,000, including a field visit in most cases. No explicit attempt was made to measure *poverty alleviation*. Such an effort would have cost more and would have almost inevitably involved additional assumptions (e.g. about *ceteris parabus* outcomes; about extrapolation of adoption trends etc.)

5. Concluding comment

There was no explicit mention of poverty alleviation in the Act of the Australian Parliament under which ACIAR was originally established in 1982. There are some differences between the 1982 Act and the Act that currently governs ACIAR, but neither explicitly mentions poverty alleviation (see the Introduction to this paper). A review in 1997 of Australia's overseas aid program (of which ACIAR is a small part) made a strong recommendation (Committee of Review 1997) that:

The objective of the Australian aid program should be to assist developing countries to reduce poverty through sustainable economic and social development

ACIAR's first corporate plan (January 1994–December 1996) stated that ACIAR's Corporate mission was to 'improve the well being of people...'. Its current corporate plan explicitly includes the words 'to reduce poverty...', but there is also reference to 'food security' and 'sustainable resource management'.

The 1998 review (Nairn et al. 1998) of ACIAR recommended that the Centre, in relation to poverty alleviation:

- reorient its focus more towards development impact;
- demonstrate explicitly its achievements in poverty alleviation at the rural level; and
- monitor the CGIAR study on the impact of agricultural research on poverty alleviation.

In making these recommendations, the review team contemplated whether ACIAR's mission should be taken one step back from poverty alleviation to become something more like: 'to improve the capacity ...to identify and solve agricultural problems and constraints to development' (p. 19). However, this was not their final recommendation.

The evolution of ACIAR's research focus since its inception in 1982 could best be described as

'towards having a demonstrable economic impact'. Parallel with the evolution towards economic impact, there has been an evolution towards poverty alleviation. This trend began well before the recent review of ACIAR. Perhaps the outstanding issue is whether an international research organisation should satisfy itself with 'capacity building/knowledge generation', or should be involved with technology transfer and other more-applied issues, where comparative advantage may be less. The decision within ACIAR has been to move further towards the development end of the spectrum, sometimes in conjunction with agencies of that bent.

ACIAR uses a two-stage ex ante research targeting process: 1. choose research targets taking subjective account of poverty alleviation concerns; 2. then maximise economic benefits (and there are two strategies used for achieving the latter—prioritising commodities and regions and undertaking an explicit benefit–cost analysis of the expected project impact).

ACIAR is gravitating towards a three-stage ex post impact assessment process—one via a desk study at a preliminary stage (around the time of project conclusion), a desk study (5 years after project completion), and a 'full scale' assessment of those projects which appear to have had a substantive impact. Premature undertaking of ex post impact assessments can detract from credibility but often there is some imperative to make an early assessment to avoid 'losing the thread' when it is the experience with ACIAR projects that they do take a long time to have a community impact.

A recent external review of ACIAR expressed the opinion that ACIAR's ex post impact assessments still had a strong ex ante element (i.e. they were undertaken after the project was completed but before the full impact had been realised). This led to what the review team considered to be an

excessive number of assumptions. But the Thai soybean example, which is by no means atypical, does highlight the problem. One perhaps needs to wait for 10–12 years to reach a position to make a strong statement about poverty alleviation. But how many other things would have been changing during that time? (Would a *ceteris parabus* assumption be preferable to ‘real world’, but confounded data?) And is the cause and effect link between the project and the outcome being lost or obscured along the way?

For the various reasons discussed here, ACIAR has not specifically targeted *ex post* impact assessments on poverty alleviation. However, since we target poverty and income generation (albeit somewhat subjectively) in our choice of research projects, it is a reasonable assumption that the economic benefits emanating from our projects are strongly biased towards poverty alleviation.

General equilibrium models lend themselves to tracing poverty alleviation impacts of research. Indeed, it may be virtually impossible to trace these in any kind of partial framework. ACIAR has heavily promoted general equilibrium models as tools for broader agricultural policy research, with a strong poverty alleviation focus. Comprehensive, and agriculturally-oriented models have been produced for the Philippines (Coxhead and Warr 1995), Thailand (Warr 1998), Indonesia (Trewin 1999) Sri Lanka (Bandara and Coxhead 1999) and China (forthcoming project). General equilibrium models have not been explicitly used in ACIAR to target biophysical research. Usually the models would lack adequate technological definition for this purpose at the project level. However, they could be used for guiding or assessing biophysical research with a poverty alleviation focus, where the ‘research scope’ is fairly broadly defined, such as at a program level (Lin 1999).

6. References

- Alston, J.M, Norton, G.W. and Pardey, P.G. 1995. Science under scarcity: principles and practice for agricultural research evaluation and priority setting. Ithaca and London, Cornell University Press.
- Bandara, J.S. and Coxhead, I. 1999. Can trade liberalization have environmental benefits in a developing country agriculture? A Sri Lankan case study. *Journal of Policy Modeling* (in press).
- Centre for International Economics 1998. Control of Newcastle disease in village chickens. *Impact Assessment Series No. 1*. Canberra, ACIAR.
- Committee of Review 1997. One clear objective: poverty reduction through sustainable development. Canberra, Australian Agency for International Development (AusAID).
- Coxhead, I. and Warr, P. 1995. Does technological progress in agriculture alleviate poverty? *Australian Journal of Agricultural Economics*, 39, 25–70.
- Davis, J.S., Oram, P. and Ryan, J.G. 1987. Assessment of agricultural research priorities: an international perspective. Canberra, ACIAR.
- Farrington, J., Carney, D., Ashley, C. and Turton, C. 1999. Sustainable livelihoods in practice: early applications of concepts in rural areas. *Natural Resource Perspectives*, 42. London, Overseas Development Institute.
- Lin, J.Y. 1999. Technological change and agricultural household income distribution: theory and evidence from China. *Australian Journal of Agricultural and Resource Economics*, 43(2), 179–194.
- Mauldon, R.G. 1998. An assessment of the success and impact of ACIAR projects. *Economic Evaluation Unit Working Paper No. 29*. Canberra, ACIAR.
- 1999. A qualitative assessment of the research capacity and community impacts of three randomly-selected ACIAR-sponsored projects. *ACIAR Economic Evaluation Unit Working Paper No. 33*. Canberra, ACIAR.
- Maxwell, S. 1999. The meaning and measurement of poverty. *ODI Poverty Briefing No. 3*. London, Overseas Development Institute.
- Mellor, J.W. 1966. *The economics of agricultural development*. Ithaca, NY, Cornell University Press.
- Menz, K.M. 1991. Economic assessments 1–12: Overview. *Economic Assessment Series*. Canberra, ACIAR.
- Menz, K.M. and Lawrence, J. 1999. Is ACIAR delivering? *Partners in Research for Development*, 12, 11–18. Canberra, ACIAR.
- Nairn, M.E., Castillo, G.T. and Dun, R.B. 1998. Staying ahead: report of a review of the Australian Centre for Agricultural Research. Canberra, ACIAR.
- Parilla, L.S. 1995. Farm households and the farm resource base. In: Menz, K.M., O'Brien, G.C. and Parilla, L.S., ed., *A profile of upland farming systems on sloping land in the Philippines*. Working Paper No. 46. Canberra, ACIAR.
- Ryan, J.G. 1998. Pigeon pea improvement. *Impact Assessment Series No. 6*. Canberra, ACIAR.
- Trewin, R. 1999. Analysis of Chinese and Indonesian food policy options. In: Yang, Y. and W.M. Tian, W.M., ed., *China's agriculture at the crossroads*. London, McMillan.
- Warr, P. 1998. Boom, busts and the poor. *The Asia Pacific Magazine*. No. 11. Canberra, Australian National University.
- Waterhouse, D.F. 1999. Economic benefits to Papua New Guinea and Australia from the biological control of banana skipper (*Erionota thrax*). *ACIAR Impact Assessment Series No. 12*. Canberra, ACIAR.

ACIAR Impact Assessment Program

Papers in the Working Paper series (in reverse chronological order)

34. Mauldon, R.G. 1999. "Research Capacity and General Community Impact of Five ACIAR-Sponsored Projects."
33. Mauldon, R.G. 1999. "A Qualitative Assessment of the Research Capacity and Community Impacts of Three Randomly Selected ACIAR-Sponsored Projects."
32. Lubulwa, G. and S. McMeniman 1998. "ACIAR Economic Impact Model for Use in Project Development (Ex-ante) and Completed Project (or Ex-post) Evaluations: a User Manual."
31. Mauldon, R. 1998. "An Assessment of ACIAR-funded IARC Special and Restricted Grants Projects."
30. White, D.H. 1998. "A Global Agro-climatic Analysis of the Distribution and Production of Livestock Commodities."
29. Mauldon, R. 1998. "An Assessment of the Success and Impact of ACIAR Projects."
28. McMeniman, S. and G. Lubulwa 1997. "Project Development Assessment: an Economic Evaluation of the Potential Benefits of Integrating Apomixis into Hybrid Rice."
27. McWilliam, J., R. Sdoodee and L. Marlow 1996. "Evaluation of the Crawford Fund Master Classes in Biotechnology: and a Tracer Study of Participants, Their Sponsoring Institutions and Course Providers."
26. Lubulwa, G. and S. McMeniman 1996. "An Economic Evaluation of Realised and Potential Impacts of ACIAR's Biological Control Projects (1983–1996)." [Also published in *Biocontrol News and Information*, (a journal published by CAB International Bioscience, based in the UK), Volume 19, No. 3, pages 91N–98N, September 1998.]
25. Suzuki, P., S. Isvilanonda, C. Khaoparisuthi and W. Supakalin 1996. "A Preliminary Evaluation of 54 ACIAR-supported Projects in Thailand (1983–1995)."
24. Lubulwa, G., D. Gray, K. Patten and C. Nimbkar 1995. "Project Development Assessment: Prolific Worm-resistant Meat Sheep for Maharashtra, India and Australia."
23. Lubulwa, G. and S. Hargreaves 1996. "Estimates of Realised and Potential Impacts of Three ACIAR Projects on the Ecology, Epidemiology and Control of Ticks and Tick-Borne Diseases in Sub-Saharan Africa."
22. Lubulwa, G., D. Gwaze, J. Clarke, P. Milimo and J. Mulatya 1995. "Overcoming the Shortage of Fuelwood and Poles through Forestry Research: Estimate of Benefits from Three Completed ACIAR Forestry Projects in Africa and Thailand." [Also published in *Commonwealth Forestry Review* (edited at the Oxford Forestry Institute), Vol 77 (1), March 1998, pp 19–28.]
21. Lubulwa, G. 1995. "The Human Health Benefits of Research to Reduce the Hydrogen Cyanide Potential in Cassava Cultivars in Africa—a Completed Project Assessment of ACIAR Project PN9007." [Accepted for publication in *Impact Assessment and Project Appraisal* (a journal of the International Association for Impact Assessment)]
20. Lubulwa, G., S. Underhill and J. Davis 1995. "Project Development Assessment: Pineapple Quality Improvement (PN 9407)."
19. Lubulwa, G., B. Wafula, E. Craswell, I. Willet and J. Davis 1995. "Dryland Farming in the Semi-arid Tropics of Kenya: ACIAR Project Experience."
18. Davis, J. and G. Lubulwa 1995. "An Overview of ACIAR's Economic Evaluation Activities with a Forestry Program Focus."
17. Davis, J. and G. Lubulwa 1995. "Integration of Research Evaluation Analysis into Research Institution Decision-Making: an Overview of Progress at ACIAR."
16. Lubulwa, G., J. Desmarchelier and J. Davis 1995. "Incorporating Atmospheric Environmental Degradation in Research Evaluation of Options for the Replacement of Methyl Bromide: a Project Development Assessment of ACIAR Project PN9406." [Also published in *Impact Assessment and Project Appraisal* (a journal of the International Association for Impact Assessment), Volume 17, Number 1, March 1999, pp 45–53.]
15. Davis, J.S. and G. Lubulwa 1995. "An Overview of ACIAR's Economic Evaluation Activities with an Animal Sciences Program Focus."
14. Lubulwa, G., M.S. Arifin and J. Davis 1994. "Project Development Assessment: the Application of Plant Tissue Culture Techniques to the Propagation and Breeding of Tea in Indonesia."
13. Lubulwa, G. and J.S. Davis, 1994. "Inclusion of Environmental and Human Health Impacts in Agricultural Research Evaluation: Review and Some Recent Evaluations."

12. Davis, J.S. and G. Lubulwa 1994. "Collaboration Between ACIAR and Other Research Institutions in Research Evaluation: Experience in the Asian, Pacific and African Regions."
11. Davis, J.S. and G. Lubulwa 1994. "An Overview of ACIAR's Economic Assessments of the Postharvest Program Projects."
10. Lubulwa, A.S.G. and J.S. Davis 1994. "Estimating the Social Costs of the Impacts of Fungi and Aflatoxins." [Also published in E. Highley et al. (1994, editors), *Stored Product Protection, Proceedings of the 6th International Working Conference in Stored-product Protection*, National Convention Centre, Canberra, 17–23 April 1994. CAB International, Wallingford, Oxford.]
9. Lubulwa, A.S.G. and J.S. Davis 1994. "An Economic Evaluation of Postharvest Tropical Fruit Research: Some Preliminary Results." [Also published in B.R. Champ et al. (editors), *Proceedings of the International Conference on Postharvest Handling of Tropical Fruit*, Chiang Mai, Thailand, July 1993.
8. Davis, J.S. and A.S.G. Lubulwa 1994. "Evaluation of Postharvest Research: Results for an Application to Tropical Fruit Research Projects and Some Further Methodological Issues."
7. Davis, J.S. 1994. "Some Economic Aspects for Considering Future Directions for Tropical Forage Research."
6. Fearn, M., B. Smith, and J. Davis 1994. "Project Development Assessment: Pacific Island Pearl Oyster Resource Development: Project 9131."
5. Fearn, M. 1994. "Project Development Assessment: Mineral Elements Limiting Sheep Production in China: Project 8911."
4. Davis, J.S. 1994. "A Model for Evaluation of Waste Reducing Postharvest Research."
3. Davis, J.S. 1994. "Disaggregation Rather than Mathematical Manipulation for Incorporating Research Impacts on Supply."
2. Fearn, M., P. Mather, J. Macaranas and M. Capra 1994. "Project Development Assessment: Genetic Identification and Stock Improvement of Tilapia in Malaysia and Fiji: Project 9206."
1. Fearn, M., J.S. Davis, and A. Ringrose-Voase 1994. "Project Development Assessment: Management of Clay Soils for Lowland Rice-Based Cropping Systems: Project 8938."